Manufacturing Learning Australia

PML 99

Laboratory Operations

Training Package

Extension endorsed by the National Training Quality Council and agreed by Ministers January 2001.
This Training Package is to be reviewed by 30/11/2002
Acknowledgements
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Main Consultants: The Centre for Training, Assessment and Development, Canberra Institute of Technology
- principal consultant: Ivan Johnstone
Design Team: Manufacturing and Engineering ESD, NSW TAFE
Community Services, Health, Tourism and Hospitality ESD, NSW TAFE
Wodonga Institute of TAFE
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AQF 4

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Diploma of Laboratory Technology
Diploma of Laboratory Technology (Process Manufacturing Testing)
Diploma of Laboratory Technology (Pathology Testing)
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AQF 6

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- Mapping of specialist laboratory units in the Food Industry Training Package (Wine) against these competency standards

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- **PML COM 300 A**: Communicate with other people
- **PML DATA 300 A**: Process and record data
- **PML MAIN 300 A**: Maintain the laboratory fit for purpose
- **PML OHS 300 A**: Work safely in accordance with defined policies and procedures
- **PML OHS 301 A**: Work safely with instruments that emit ionising radiation
- **PML ORG 300 A**: Follow established work plan
- **PML QUAL 300 A**: Contribute to the achievement of quality objectives
- **PML QUAL 301 A**: Apply critical control point requirements
- **PML SAMP 300 A**: Handle and transport samples
- **PML SAMP 301 A**: Receive and prepare a range of samples for pathology testing
- **PML SCIG 300 A**: Operate basic handblowing equipment
- **PML SCIG 301 A**: Repair glass apparatus
- **PML TEAM 300 A**: Work efficiently as part of a team
- **PML TEST 300 A**: Perform basic tests
- **PML TEST 301 A**: Perform biological laboratory procedures
- **PML TEST 302 A**: Calibrate test equipment and assist with its maintenance
- **PML TEST 303 A**: Prepare working solutions
- **PML TEST 304 A**: Prepare culture media
- **PML TEST 305 A**: Perform aseptic techniques
- **PML TEST 306 A**: Assist with fieldwork
<table>
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<th>Code</th>
<th>Description</th>
<th>Code</th>
</tr>
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<tbody>
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<td>PML TEST 307 A</td>
<td>Prepare trial batches for evaluation</td>
<td>CS-151</td>
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<tr>
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<td>Contribute to the ongoing development of HACCP plans</td>
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<tr>
<td>PML MAIN 500 A</td>
<td>Maintain and control stocks</td>
<td>CS-233</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>Assist in the maintenance of reference material</td>
<td>CS-239</td>
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<tr>
<td>PML ORG 500 A</td>
<td>Schedule laboratory work for a small team</td>
<td>CS-245</td>
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<tr>
<td>PML SCIG 501 A</td>
<td>Design and manufacture glass apparatus and glass systems</td>
<td>CS-251</td>
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<tr>
<td>PML SCIG 502 A</td>
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<td>PML TEST 500 A</td>
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<td>PML TEST 501 A</td>
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<tr>
<td>PML TEST 502 A</td>
<td>Perform haematological tests</td>
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<tr>
<td>PML TEST 503 A</td>
<td>Perform histological tests</td>
<td>CS-293</td>
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<tr>
<td>PML TEST 504 A</td>
<td>Perform chemical pathology tests</td>
<td>CS-303</td>
</tr>
<tr>
<td>PML TEST 505 A</td>
<td>Conduct sensory analysis</td>
<td>CS-311</td>
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<tr>
<td>PML TEST 506 A</td>
<td>Apply spectrometric techniques</td>
<td>CS-317</td>
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<tr>
<td>PML TEST 507 A</td>
<td>Apply chromatographic and electrophoretic techniques</td>
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<tr>
<td>PML TEST 508 A</td>
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<td>PML TEST 509 A</td>
<td>Perform immunohaematological tests</td>
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<td>PML TEST 510 A</td>
<td>Perform fieldwork</td>
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<tr>
<td>PML TEST 511 A</td>
<td>Supervise earthworks inspection, sampling and testing operations</td>
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</tr>
<tr>
<td>PML COM 600 A</td>
<td>Develop and maintain laboratory documentation</td>
<td>CS-361</td>
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<tr>
<td>PML OHS 600 A</td>
<td>Implement and monitor risk management processes associated with OHS and environmental policies and procedures</td>
<td>CS-367</td>
</tr>
<tr>
<td>PML ORG 600 A</td>
<td>Supervise laboratory operations in work/functional area</td>
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<tr>
<td>PML ORG 601 A</td>
<td>Maintain registration and statutory or legal compliance in work/functional area</td>
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<tr>
<td>PML ORG 602 A</td>
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</tr>
<tr>
<td>PML QUAL 600 A</td>
<td>Maintain quality system and continuous improvement processes within work/functional area</td>
<td>CS-399</td>
</tr>
<tr>
<td>PML QUAL 601 A</td>
<td>Conduct an internal audit of the quality system</td>
<td>CS-407</td>
</tr>
<tr>
<td>PML TEAM 600 A</td>
<td>Manage and develop teams</td>
<td>CS-415</td>
</tr>
<tr>
<td>PML TEST 600 A</td>
<td>Select appropriate test methods and procedures</td>
<td>CS-423</td>
</tr>
<tr>
<td>PML TEST 601 A</td>
<td>Classify building sites</td>
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<td>PML TEST 700 A</td>
<td>Contribute to the development of products and applications</td>
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<tr>
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<tr>
<td>PML TEST 702 A</td>
<td>Contribute to the validation of test methods</td>
<td>CS-451</td>
</tr>
<tr>
<td>PML TEST 703 A</td>
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<td>Plan assessment</td>
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<td>BSZ 402 A</td>
<td>Conduct assessment</td>
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<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
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</table>
Background

to the

Laboratory Operations Training Package
(PML 99)
Revised January 2001
What is a Training Package?

Training Packages are a part of a new initiative by government and industry to make training more flexible, relevant and affordable for industry and for relatively neglected occupational groups such as laboratory personnel.

The main features of Training Packages are that they:

- **are developed by industry, for industry**
  
  The Australian National Training Authority provides funding to national industry training advisory bodies (ITABs) to develop Training Packages. During development, extensive consultation occurs to ensure that the package is relevant and useable. Before endorsement, the developers must validate the package and show that there is broad industry support for it.

- **encourage training at work**
  
  Training may occur on the job, off the job, during regular work, by work experience, work placement or work simulation. Usually, training involves a combination of all these methods depending on what suits the employer, the learner and the type of learning and work being done.

- **provide many pathways for people to become competent**
  
  Australians become work competent in many ways. Training Packages recognise this by putting the emphasis on what you can do not on how or where you learned to do it. For example, some experienced workers may be able to demonstrate competency against the standards and gain a qualification without completing any formal training course.

Training Packages, consist of **endorsed** and **non-endorsed components**.

The **endorsed components** contain:

- **competency standards** that specify the knowledge and skills needed for work within the scope of the Training Package. The standards provide an industry benchmark for training and assessment. They enable enterprises to accurately define particular job roles and provide useful guidance for designing job classifications, workplace appraisal, and skill development. They also provide the basis for designing vocational education and training courses for delivery by registered training providers off the job.

- **qualifications** that a person can receive when they are assessed as competent against the standards. These qualifications are recognised nationally. Each qualification consists of a number of core and elective competencies that industry representatives consider workers require to perform a particular job role.
assessment guidelines that set out the quality requirements for assessors and assessments. These guidelines ensure that all assessments will be thorough, consistent and valid. The guidelines provide an important part of the quality assurance for the issuing of qualifications.
The **non-endorsed components** contain:

*learning strategies* that provide information to assist training providers to design specific training programs to assist trainees attain the required competencies. In the Laboratory Operations Training Package, there are fifteen *Learning Solutions* which illustrate innovative approaches to work-based and provider-based learning. There is also an annotated *Resource Catalogue* of existing resources that have been mapped against the competency standards.

*assessment materials* that can be used to gather evidence of competency. They are designed to provide assessors with sufficient information to make reliable judgements about whether a person has met the required competency standard. In the Laboratory Operations Training Package, there are six *Assessment Solutions* which provide ideas and templates for the development of assessment tools and systems.

*professional development materials* that provide information, hints and resources for trainers and assessors about how to successfully implement the Training Package. In the Laboratory Operations Training Package, there is a *User’s Guide* to the materials, *A New Apprenticeship* booklet together with promotional brochures.

These two components of a Training Package are illustrated in the following diagram:
How could you use this Training Package in your workplace?

You could use the national competency standards to:

- develop competency based job and role descriptions for your personnel
- create competency profiles for your personnel by mixing and matching units of competency from various levels
- develop enterprise standards by customising the national standards to better suit your workplace.
You could use the assessment materials and competency standards to:

- assess the current competency of personnel and identify their training needs
- recognise the current competency of your personnel and arrange for the award of nationally recognised qualifications by a Registered Training Organisation (RTO).

You could use the “how to” materials for managers and supervisors to:

- improve on job training, coaching and mentoring.

You could use the full Training Package to:

- plan and deliver on and off the job training leading to nationally recognised qualifications in partnership with an RTO (or in your own right if your enterprise is an RTO).

**How was this Training Package developed?**

**Introduction**

Manufacturing Learning Australia (MLA) was funded by the Australian National Training Authority (ANTA) in June 1998 to undertake the development of a cross industry Training Package for Laboratory Operations.

The term “cross industry” is used to emphasise that laboratory personnel work in a very wide range of industry sectors and that the competency standards in the Training Package cater for this variety of workplaces. When future Training Packages are developed for industry sectors that include personnel with laboratory roles, it is expected that the package developers will incorporate relevant units of competency from this Training Package.

A consulting team led by the Centre for Training, Assessment and Development, Canberra Institute of Technology (CIT), undertook the development of the endorsed components of the Training Package and completed the project in July 1999.

The broad design and scope of the Training Package was defined by a Scoping Project concluded in May 1998. This project consulted with some 1500 stakeholders (ITABs, enterprises, professional organisations, individuals) throughout Australia by way of focus groups, newsletters and survey questionnaires.

The Scoping Project recommended the development of a Training Package to address the recognition and training needs of technical/laboratory personnel.
in five broad occupational categories:
laboratory supervisors, senior technical officers, technical specialists
technical officers
technical assistants
laboratory assistants
Sampler/testers.
In addition, the Scoping Project recommended that the cross industry competency standards in the Training Package should address any additional specific needs of three priority industry sectors:

process manufacturing and construction materials

biomedical and environmental services

food and beverage processing.

Following ANTA’s endorsement of the Scoping Study recommendations, the Laboratory Operations Training Package was developed to meet these requirements.

**Project management and methodology**

The project was managed by Barbara Wallace (MLA). The methodology was driven by the ANTA requirements for extensive consultation and validation and the need to produce a Training Package that is relevant to stakeholders. The consultants and project manager were guided throughout the project by a national steering committee.

**National steering committee**

A national steering committee was established to oversee the progress of the Training Package development and to provide policy and procedural guidance to the project team. The committee membership reflected the ANTA requirements for appropriate representation from industry, government and providers, including:

geographical spread - cross State/Territory representation

gender - both male and female representatives

employer representation

large, medium and small enterprises

subsector representation - process manufacturing and constructional materials, biomedical and environmental services, food and beverage processing

National/State/Territory ITAB representation

employee representation - two key unions
State/Territory Training Authority representation
training provider representation.

MLA approached all National ITABs for nominations of suitable industry and ITAB representatives.

All State/Territory Training Authorities (STAs) were kept fully informed of the progress of the project and received a complete consultation draft of the Training Package during May for comment prior to the usual validation phase.
The national steering committee membership is listed below:

<table>
<thead>
<tr>
<th>Name - Position</th>
<th>Organisation</th>
<th>Stakeholder representation</th>
<th>National / State</th>
</tr>
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<tbody>
<tr>
<td>Darren Robinson - Chair</td>
<td>Manager, Learning &amp; Development Caltex Refineries</td>
<td>Large chemical process manufacturing enterprise</td>
<td>National</td>
</tr>
<tr>
<td>Barbara Wallace - Project Manager</td>
<td>Manufacturing Learning Australia</td>
<td>Sponsoring national ITAB</td>
<td>National</td>
</tr>
<tr>
<td>Ivan Johnstone - Principal Consultant</td>
<td>Manager, CTAD (CIT)</td>
<td>Developers</td>
<td>National</td>
</tr>
<tr>
<td>John Blanche - Head Chemist</td>
<td>Nestle Confectionery Ltd</td>
<td>Large food enterprise with analytical laboratory</td>
<td>NSW</td>
</tr>
<tr>
<td>David Mendelssohn - Industrial Officer</td>
<td>CPSU</td>
<td>Community and public sector union</td>
<td>National</td>
</tr>
<tr>
<td>Ravi Bindiga - Chief Chemist</td>
<td>Probe Analytical, Orica Aust</td>
<td>Large chemical manufacturing enterprise with analytical laboratory</td>
<td>NSW</td>
</tr>
<tr>
<td>Regina Robertson - Technical Manager</td>
<td>NATA</td>
<td>National registration authority for small, medium and large sized laboratories</td>
<td>National</td>
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<tr>
<td>Brian MacKenzie - Senior Scientist</td>
<td>Path Centre</td>
<td>Large pathology laboratory</td>
<td>WA</td>
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<tr>
<td>Colin Xanthis - General Manager</td>
<td>Royal Perth Hospital</td>
<td>Community Services and Health Training Australia</td>
<td>WA</td>
</tr>
<tr>
<td>Paul O’Brien - Senior Exec. Officer</td>
<td>all relevant national ITABs</td>
<td></td>
<td>National</td>
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<tr>
<td>Name</td>
<td>Position/Role</td>
<td>Type</td>
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<tr>
<td>National Utilities ITAB</td>
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<tr>
<td>Andrew Boorman - Princ. Policy Officer</td>
<td>Dept Education Training, Employment</td>
<td>State/Territory training authority</td>
<td>SA</td>
</tr>
<tr>
<td>Colin Ormsby - State Organiser</td>
<td>AMWU (Technical/Supervisory division)</td>
<td>Manufacturing union</td>
<td>National</td>
</tr>
<tr>
<td>Raju Varanasi - Manager</td>
<td>Process Industry Programs, TAFE NSW</td>
<td>Large training provider</td>
<td>NSW</td>
</tr>
<tr>
<td>David Bristow - Managing Director</td>
<td>Simmonds &amp; Bristow</td>
<td>Medium sized environmental testing laboratory</td>
<td>QLD</td>
</tr>
<tr>
<td>Eddie Hardman - Senior Project Officer</td>
<td>ANTA</td>
<td>Australian National Training Authority</td>
<td>National</td>
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</table>
Project methodology

Key features of the project methodology are listed below.

The design team consisted of the principal consultant, one team leader for each of the three priority industry sectors and the MLA project manager. Small “expert” industry reference groups were used to develop and refine drafts prior to their distribution for comment. Enterprise site visits and telephone interviews were used to inform and validate drafts.

A broad communication strategy was employed, this included:

- newsletters (1500)
- mailout of drafts to industry reviewers, ITABs and STAs
- focus groups
- presentations
- the CS&H ITAB (Vic) website to host draft materials.

Consultation focus groups in all States and Territories involved 189 participants.

Validation of the first and second draft materials by industry, ITABs and STAs involved 400 and 140 reviewers respectively.

The first, second and final drafts were endorsed by the national steering committee.

Because of the wide ranging interest in this cross-industry project, MLA managed liaison with National ITABs, who in turn kept their State ITABs informed. These bodies, in conjunction with the national steering group, established the list of people who were invited to participate in the consultation and validation focus groups and mailouts.

The project plan, agreed by the national steering committee, is at Appendix 1 (page B-24).

Training Package development

Key features of the approach taken to develop the standards are listed below.

A review of recent functional analyses of the roles, duties and tasks performed by laboratory personnel was undertaken. Surveys and interviews were used to identify future training needs and areas of greatest technological change to avoid limiting the analysis to the status
Surveys and interviews focussed on articulating the roles and limits of responsibility of scientists, technicians, operators, supervisors and managers. Some units of competency were refined by asking laboratory personnel to identify aspects of effective practice through critical incident techniques. The designers built on the endorsed and widely accepted *Guideline Standards for Laboratory Assistants*. For example, the endorsed competencies for OHS, communication, teams and quality were used as a starting point for standards development. The OHS units for laboratory settings were developed in close cooperation with the Workcover Corporation (SA).
Portability of achievement for most units of competency is achieved through the use of “cross industry” variables and evidence guides and by keeping the specific industry variables to an acceptable minimum. Specific units of competency, particularly those dealing with specialised sampling and testing, were developed for the priority industry sectors when this “cross industry” approach was inappropriate.

In the Scoping Study, an early framework of competencies included the Frontline Management Standards. These standards were rejected as unsuitable for this project by subsequent focus group participants because most, if not all, laboratories are managed by scientists, engineers or medical staff. At most, technicians supervise a section or function. Therefore, specific units of competency dealing with laboratory supervision were developed to take account of the particular work environment, the hierarchy of personnel and supervision requirements and specific registration or legislative requirements such as who can perform tests or issue results.

In some States and Territories (eg, NSW, NT, ACT) technical officers perform tests linked to blood grouping, antibody screening and pre-transfusion cross matching of blood. In other States (eg, WA, Vic) they do not. It would appear that this is the result of differing history of work practices rather than specific legislative or regulatory requirements (eg, Victorian legislation, National Pathology Accreditation Advisory Council [NPAAC] Standard 1 where such tests rate no special mention). To take account of these differences, the unit PML TEST 509 A - Perform immunohaematological tests is elective.

The competency standards incorporate functional values, attitudes and essential knowledge as well as technical skills wherever relevant. The storylines “This competency in practice” attached to each unit of competency reinforce this model of competency. The storylines enhance the standards’ useability through the use of plain English workplace illustrations of competency provided by industry representatives.

Key features of the approach taken to develop the qualifications framework are listed below.

The framework consists of a logical skill progression based on real occupational roles and workplace application rather than a series of nested qualifications.

Portability of achievement is enhanced through creating a minimum of sector specific units of competency and qualifications. (Because specialisation is a requirement at AQF 5, four specialist Diploma qualifications are provided in addition to a broad cross industry Diploma.)

Flexibility is maximised by the creation of multiple entry points and minimising the number of prerequisite units of competency.

The assessment guidelines were developed by refining those used in previous Training Packages developed by Manufacturing Learning Australia and validating these with industry and training provider representatives.

**Project consultations**

Communication and consultation with a wide range of industry and provider representatives occurred throughout the design, development and review of
this Training Package.

Following the consultations associated with the prior Scoping Study, further focus groups were held in Sydney, Melbourne and Adelaide to clarify the scope and design of the standards.

The first draft materials, comprising a draft framework and examples of prototype units, were reviewed by the national steering group in December 1998 and circulated in January 1999 ahead of an extensive round of focus groups in all States and the NT in February and March. The draft materials were also available electronically from http://intraining.org.au/cshvic/laboratory.html. The framework and draft standards were then refined on the basis of this feedback.

Second draft materials comprising the qualifications framework, a complete set of draft standards and assessment guidelines were presented to the national steering committee before being circulated in May for validation. To avoid placing an undue burden on individuals, reviewers were sent at their request either a complete package or only those standards relevant to their sector. These materials were also available at the website address given above. The feedback received was incorporated in the final draft materials.

The final draft materials were endorsed by the national steering committee on 29 June 1999.

The principal consultant also presented the project findings and draft materials to representatives of training providers at meetings of the National TAFE Science Network in Canberra (1998 and 1999) and in Melbourne (December 1998). Network members were also directed to the CS&H ITAB website address.

A list of contributing organisations and people is provided in Appendix 2 (pages B-26–B-34). Those involved included:

managers (training, human resources, quality, technical)
employees (technical personnel at all levels, supervisors, scientists)
representatives of unions, government departments (eg, health and industrial relations) and professional bodies
training providers.

**Industry support**

All Industry Training Advisory Bodies (ITABs) who expressed interest in the project were provided with opportunities to participate in focus groups and review draft materials. Letters of support were received from the following national ITABs:
Australian Light Manufacturing ITAB
Community Services and Health Training Australia
Construction Training Australia
Forest and Forest Products
Infocomp ITAB
Manufacturing, Engineering and Related Services ITAB
Rural Training Council
National Utilities and Electrotechnology ITB.
In addition, verbal support was received from:

National Mining ITAB
National Sport and Recreation ITAB
Australian Seafood Industry Council
Meat Industry Training Advisory Council
Transport and Distribution Training Australia.

**Review and maintenance**

The Training Package will be reviewed within an appropriate period following its endorsement by the National Training Framework Committee (NTFC), once implementation can be observed and evaluated. This process will be managed by MLA.

Given their “cross industry” nature, the standards have been written in broad terms and focus on generic techniques, procedures, processes, functions and roles. References to specific equipment, materials, tests and measurements in performance criteria have been avoided. Therefore, future reviews of the Training Package are more likely to identify:

- new aspects of laboratory work
- modifications to extend coverage to additional industry sectors
- additional items in the range of variables and evidence guides resulting from changes to legislation, technology, workplace organisation and culture
- changes in packaging to enhance uptake and provision for new specialist qualifications.

**What occupations are covered by laboratory operations?**

**Titles and numbers**

There is a wide range of occupational titles used to describe technical personnel working in laboratories.

There are several Australian Standard Classification of Occupations (ASCO second edition) categories of worker relevant to this Training Package:

- Medical and Science Technical Officers (minor group 311)
⇒ 3111 Medical Technical Officers
⇒ 3112 Science Technical Officers and Technicians (Chemistry, Earth Science, Physics, Textiles, Life Science and Agricultural)

Building and Engineering Associate Professionals (minor group 312)

⇒ List of tasks include performing field and laboratory tests; recording results; testing, repairing and modifying equipment.
An estimation of the numbers of personnel in each occupational group is difficult. DEETYA Job Futures (June 97) states that there are:

38,200 Technical Officers in minor group 311, with above average employment growth expected for the period 1994-2005
91,800 Associate Professionals in minor group 312, with below average employment growth expected for the period 1994-2005. Only a small fraction of this group would undertake laboratory related work.

There are no ASCO occupations which wholly describe the work of the technical assistants, laboratory assistants/aides/attendants, sampler/testers, and those operators who undertake limited quality control duties. Therefore, it is not possible to accurately estimate the number of personnel in the group in which the greatest uptake of training will occur.

**Occupational trends**

The numbers, titles, entry qualifications, skill profiles and training required for laboratory personnel are being rapidly transformed due to:

- work reorganisation and flattening of technical structures
- increasing use of automated instrumentation
- increasing movement of the responsibility for quality and process control away from the laboratory and out into the manufacturing plant
- emergence of “new” sectors such as the construction materials testing industry.

**What industry sectors involve laboratory operations?**

Laboratory personnel are employed in an extremely wide range of enterprises and industry sectors. In general, they assist with the delivery/production and quality assurance of an enterprise’s products and services. Smaller numbers of laboratory personnel support the research and development effort of Australian industry, government and higher education. The cross industry competency standards in this Training Package are relevant for this occupational group.

**Priority industry sectors**

The Package also addresses the specific needs of the three priority industry sectors identified in the Scoping Study. Brief profiles of these three sectors are given below.

**Process manufacturing and construction materials industries**
There has been a marked shift in emphasis from quality control to quality assurance in process manufacturing industries. Responsibility for quality is passing to production teams who conduct routine testing either manually or via automated in line control systems. Quality testing/auditing of raw products, product stability, batches and packaging together with weight testing and final product validation is done by laboratory personnel. Many enterprises have a separate central R&D laboratory which develops new methods and products, and refines manufacturing processes. Where the company is a subsidiary of a global enterprise, much of this R&D function is located overseas.

Construction materials testing is a relatively new and fast growing employment source for laboratory personnel working in the road and building construction materials industry sectors. For example, in the 1980s there were four laboratories in NSW compared to over forty in 1997. The Engineering and Construction Laboratories Association estimates that there are approximately 1000 laboratory personnel in this sector throughout Australia, and of these only 25% have any recognised qualifications.

Much of this technical work is conducted in remote places. It is often noisy, dirty and involves heavy equipment. There is an overall industry strategy to upgrade testing facilities and the skills of personnel in response to the increasing adoption of the ISO Guide 25 quality system throughout the sector.

There is a strong emphasis on workplace training throughout this industry sector to ensure that personnel meet stringent global product specifications, National Association of Testing Authorities (NATA) and Good Manufacturing/Laboratory Practice (GMP/GLP) requirements and ISO 9000 and Guide 25 technical accreditation.

**Biomedical and environmental services**

In recent years, improvements in analytical instrumentation and data management systems have contributed to the major reorganisation of laboratory operations in the biomedical and environmental sectors. There has also been significant refocusing of resources in response to financial and market pressures. These forces have led private sector companies and government agencies to rationalise their services and to restructure their workforce in terms of numbers of personnel, their roles and their skills.

In most laboratories, the emphasis has moved from a technical imperative of “getting the result” to an enterprise imperative of “getting the result right AND quickly AND economically”. These changes have prompted the need to reorient the education and training of laboratory personnel to include the importance of quality systems, customer service, team work and data management, as well as developing technical competency.

There is a growing requirement for the use of scientific testing to demonstrate an enterprise’s compliance with regulations in areas such as environmental monitoring, food hygiene and water quality. As a result, an increasing number of laboratory personnel are being hired by companies who provide these specialist testing and analytical services to enterprises under contract.
There is a strong emphasis on workplace training throughout this industry sector to ensure that personnel meet stringent legislative, National Pathology Accreditation Advisory Council (NPAAC), NATA and Good Laboratory Practice (GLP) requirements, together with ISO 9000 and Guide 25 technical accreditation.

**Food and beverage processing industries**

The food and beverage industries have 250,000 workers and represent the largest manufacturing sector. Laboratory roles and functions have undergone rapid change since the 1980s due to the impact of global product specifications including HACCP and other quality requirements for local and export markets.

Testing and laboratory procedures are greatly influenced by the way work is organised in each enterprise. For example, milk tanker drivers conduct aseptic sampling before loading and then convey samples to the laboratory for further testing. Weighbridge operators may also conduct tests while assessment of the quality of raw products is often done by production personnel. In these ways, there is vertical integration of laboratory personnel and operators throughout any site.

As with the other manufacturing sectors, quality testing/auditing of raw products, product stability, batches, packaging, weight testing, final product validation and environmental testing are done by laboratory technicians. Many companies have a separate central R&D laboratory which develops new methods and products and refines manufacturing processes. Where the company is a subsidiary of a global enterprise, much of this R&D function is located overseas.

There is a strong emphasis on workplace training throughout all industry sectors to ensure that personnel meet stringent global product specifications, NATA, GMP/GLP, export and HACCP quality requirements, together with ISO 9000 and Guide 25 technical accreditation.

**Overlaps and additional industry sectors**

During the development of the standards it was noted that there are other activity areas that are relevant to, or overlap with, the three priority industry sectors covered by this Package. However, due to the contractual constraints on the project, we have not been able to address all occupational groups in this edition of the Training Package. In particular, the following areas have not been included:

- scientific glassblowing
- animal technology.

Work has commenced on developing and validating additional technical standards for these industry groups for inclusion in this Training Package. It should be noted that the only change to the Qualifications Framework will be an expansion of the stock of units in the elective banks. There will be no
additions or amendments to the qualifications themselves.

Once this work has been completed, these standards will be submitted to the NTFC for approval as an extension to the Laboratory Operations Training Package.

**What competencies are relevant for laboratory operations?**

A table containing all units of competency developed for this edition of the Training Package is provided on pages B16 to B17. These units provide a foundation for the development and recognition of laboratory skills in any industry sector and should be incorporated into other Training Packages wherever they are appropriate.

The units are listed under areas of activity and are grouped by unit codes.
Unit coding

All units of competency have a unique code for identification. For example, in the code

\[ PML\ COM\ 300\ A \]

PM indicates that the National Industry Training Advisory Body with responsibility for the Training Package is Process Manufacturing

L indicates that the Training Package covers the laboratory industry sector.

COM describes the principal area of activity covered by the unit, which in this case is communication

300 is a number that identifies the unit

A indicates that this is version A of the unit. When the standards are reviewed in the future, this letter will change as part of version control.

As outlined, the middle part of the code, that is, the COM in \( PML\ COM\ 300\ A \), identifies the principal activity covered in the unit. All areas of activity are listed below.

<table>
<thead>
<tr>
<th>Unit code</th>
<th>Principal activity for unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM</td>
<td><strong>Communication</strong>: oral, written, preparation of documents</td>
</tr>
<tr>
<td>DATA</td>
<td><strong>Data handling</strong>: data entry, transcription, calculations, analysis, computer software</td>
</tr>
<tr>
<td>MAIN</td>
<td><strong>Maintenance</strong>: cleaning of work surfaces and equipment, monitoring of stocks</td>
</tr>
<tr>
<td>OHS</td>
<td><strong>Occupational Health and Safety</strong>: including environmental monitoring</td>
</tr>
<tr>
<td>ORG</td>
<td><strong>Organisational skills</strong>: following work plans, supervising others</td>
</tr>
<tr>
<td>QUAL</td>
<td><strong>Quality</strong>: systems and continuous improvement, HACCP</td>
</tr>
<tr>
<td>SAMP</td>
<td><strong>Sampling</strong>: collection, handling, preparation, storage and transport</td>
</tr>
<tr>
<td>TEAM</td>
<td><strong>Team work</strong>: participation, organisation, development</td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>TEST</td>
<td><strong>Testing</strong>: performing and applying or developing tests, methods and procedures.</td>
</tr>
</tbody>
</table>
# Overview of units of competency

<table>
<thead>
<tr>
<th>DATA, SAMP, TEST</th>
<th>MAIN, OHS, QUAL, SCIG</th>
<th>COM, ORG, TEAM, TRAINING/ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML DATA 300 A</td>
<td>PML MAIN 300 A</td>
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<tr>
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<td>PML MAIN 300 A</td>
<td>BSZ 401 A</td>
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<tr>
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<td>PML MAIN 300 A</td>
<td>BSZ 401 A</td>
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<tr>
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<td>PML MAIN 300 A</td>
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<td>PML TEST 301 A</td>
<td>PML MAIN 300 A</td>
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<td>PML TEST 302 A</td>
<td>PML MAIN 300 A</td>
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<td>PML MAIN 300 A</td>
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<td>PML MAIN 300 A</td>
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<td>BSZ 401 A</td>
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<tr>
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<td>PML QUAL 400 A</td>
<td>BSZ 402 A</td>
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<tr>
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<td>BSZ 402 A</td>
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<td>PML QUAL 400 A</td>
<td>BSZ 402 A</td>
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<td>PML TEST 403 A</td>
<td>PML QUAL 400 A</td>
<td>BSZ 402 A</td>
</tr>
<tr>
<td>PML DATA 500 A</td>
<td>PML MAIN 500 A</td>
<td>BSZ 403 A</td>
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<td>PML MAIN 500 A</td>
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<td>PML MAIN 500 A</td>
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<td>PML MAIN 500 A</td>
<td>BSZ 403 A</td>
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<tr>
<td>PML TEST 503 A</td>
<td>PML MAIN 500 A</td>
<td>BSZ 403 A</td>
</tr>
</tbody>
</table>

- **DATA, SAMP, TEST**
  - Process and record data
  - Handle and transport samples
  - Receive and prepare a range of samples for pathology testing
  - Perform basic tests
  - Perform biological laboratory procedures
  - Calibrate test equipment and assist with its maintenance
  - Prepare working solutions
  - Prepare culture media
  - Perform aseptic techniques
  - Assist with fieldwork
  - Prepare trial batches for evaluation
  - Obtain representative samples in accordance with sampling plan
  - Perform instrumental tests/procedures
  - Perform non instrumental tests/procedures
  - Prepare, standardise and use solutions
  - Assist with geotechnical site investigations
  - Analyse data and report results
  - Use laboratory application software
  - Calibrate and maintain instruments
  - Perform microbiological tests
  - Perform haematological tests
  - Perform histological tests

- **MAIN, OHS, QUAL, SCIG**
  - Maintain the laboratory fit for purpose
  - Work safely in accordance with defined policies and procedures
  - Work safely with instruments that emit ionising radiation
  - Contribute to the achievement of quality objectives
  - Apply critical control point requirements
  - Operate basic handblowing equipment
  - Repair glass apparatus using simple glassblowing equipment

- **COM, ORG, TEAM, TRAINING/ASSESSMENT**
  - Communicate with other people
  - Follow established workplan
  - Work efficiently as part of a team
  - Plan Assessment
  - Conduct assessment
  - Review assessment
  - Train small groups
### Overview of units of competency continued ...

<table>
<thead>
<tr>
<th>DATA, SAMP, TEST</th>
<th>MAIN, OHS, QUAL, SCIG</th>
<th>COM, ORG, TEAM, TRAINING/ASSESSMENT</th>
</tr>
</thead>
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<td>PML SCIG 503 A</td>
<td>PML TEST 600 A</td>
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<td>PML TEST 505 A</td>
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<td>PML TEST 601 A</td>
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<tr>
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<td></td>
<td>PML OHS 600 A</td>
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<tr>
<td>PML TEST 507 A</td>
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<td>PML QUAL 600 A</td>
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<tr>
<td>PML TEST 508 A</td>
<td></td>
<td>PML QUAL 601 A</td>
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<tr>
<td>PML TEST 509 A</td>
<td></td>
<td>PML OHS 600 A</td>
</tr>
<tr>
<td>PML TEST 510 A</td>
<td></td>
<td>PML QUAL 600 A</td>
</tr>
<tr>
<td>PML TEST 511 A</td>
<td></td>
<td>PML QUAL 601 A</td>
</tr>
<tr>
<td>PML TEST 600 A</td>
<td></td>
<td>PML OHS 600 A</td>
</tr>
<tr>
<td>PML 601 A</td>
<td></td>
<td>PML QUAL 600 A</td>
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<td>PML QUAL 601 A</td>
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<td>PML QUAL 600 A</td>
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<td>PML QUAL 601 A</td>
</tr>
<tr>
<td>PML TEST 704 A</td>
<td></td>
<td>PML OHS 600 A</td>
</tr>
</tbody>
</table>

- **Perform chemical pathology tests**
- **Conduct sensory analysis**
- **Apply spectrometric techniques**
- **Apply chromatographic and electrophoretic techniques**
- **Perform ecological techniques**
- **Perform immunohaematological tests**
- **Perform field work**
- **Supervise earthworks inspection, sampling and testing operations**

- **Construct, modify and maintain high vacuum systems**

- **Select appropriate test methods and procedures**
- **Classify building sites**

- **Implement and monitor risk management strategies associated with OHS and environmental policies and procedures**
- **Maintain quality system and continuous improvement processes within work/functional area**
- **Conduct an internal audit of quality system**

- **Develop and maintain laboratory documentation**
- **Supervise laboratory operations in work/functional area**
- **Maintain registration and statutory or legal compliance in work/functional area**
- **Manage complex projects**
- **Manage and develop teams**

- **Contribute to the development of products and applications**
- **Troubleshoot equipment and production processes**
- **Contribute to the validation of test methods**
- **Develop or adapt analyses and procedures**
- **Integrate data acquisition and interfacing systems**
What are competency standards?

Competency

Someone who is competent can apply the necessary knowledge and skills to effectively perform the tasks associated with their job role or function. This involves:

- applying their knowledge and skills in a range of familiar situations
- using broad problem solving skills to handle unforseen situations
- managing a variety of tasks simultaneously
- dealing with the responsibilities and expectations of the workplace.

Format of competency standards

Competency standards are the benchmarks for competency based training and assessment, including the recognition of a worker’s current competency. The standards define the full range of workplace knowledge and skill requirements for the job roles and functions within the industry sectors covered by the Training Package. However, the standards are not to be interpreted as a curriculum document or training program, as there are many possible learning and assessment pathways by which individuals can meet the competency requirements.

Each competency standard, called a unit of competency, is made up of:

- **elements of competency** which are the main subdivisions of the unit
- **performance criteria** which can be assessed
- a **range of variables** statement which gives the broad context for the performance criteria and elements. Because the cross industry standards apply to such a wide range of industry settings, the range of variables statement has two parts:
  - cross industry variables
  - specific industry variables for each of the three priority industry sectors, if required.
- an **evidence guide** for trainers and assessors which provides information such as the critical aspects of competency and essential knowledge that underpin the unit of competency. As for the range of variables above, the evidence guide also has two parts:
  - cross industry evidence with cross industry application
  - specific industry evidence for each of the three priority industry sectors, if required.

The storylines, “**this competency in practice**”, use real case studies supplied by industry to illustrate the performance in a variety of workplaces.

- a **table of key competencies** which includes the seven areas of competency that underpin effective workplace performance. The key competencies are reported for all national industry standards and involve three levels of performance. In simple terms:
  - Level 1 is the level of competency required to undertake activities
  - Level 2 is the level of competency required to manage activities
  - Level 3 is the level of competency required to evaluate and reshape activities.

The format of a typical unit of competency is set out over the page. Further guidance in how to interpret competency standards is given on page CS-3.
Unit Title:
Perform instrumental tests/procedures

PML TEST 400 A

Unit descriptor

Element of competency
describe the building blocks which make up the unit

PERFORMANCE CRITERIA

1 Prepare sample

1.1 Identify materials to be tested, appropriate standard method and safety requirements

1.2 Use personal protective equipment and safety procedures as specified for test method and materials to be tested

1.3 Record sample description, compare with specification and note and report discrepancies

1.4 Prepare sample in accordance with testing requirements

RANGE OF VARIABLES

Cross industry variables
Specific industry variables

EVIDENCE GUIDE

Critical aspects of competency
Cross industry
Specific industry

Essential knowledge
Cross industry
Specific industry

Assessment context
Interdependent assessment of unit

Assessment methods and resources
This competency in practice

Key competencies

<table>
<thead>
<tr>
<th>Communicating ideas &amp; information</th>
<th>Collecting, analysing &amp; organising information</th>
<th>Planning &amp; organising activities</th>
<th>Working with others &amp; in teams</th>
<th>Using mathematical ideas and techniques</th>
<th>Solving problems</th>
<th>Using technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 2</td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 2</td>
<td>Level 2</td>
</tr>
</tbody>
</table>
Using competency standards

You could use these national competency standards to:

develop role and job descriptions for your personnel by choosing particular combinations of units of competency
develop enterprise standards by customising the national standards to suit the specific requirements of your workplace
recognise the current competency of your personnel by assessing them against the standards and arranging for them to receive appropriate qualifications from this Training Package
design in house training.

Advice governing the:

packaging of units of competency for the purposes of awarding qualifications
customisation of competency standards

is given on pages QF-7 and QF-8 respectively.
What is the Australian Qualifications Framework?

The Australian Qualifications Framework (AQF) provides a national framework for all education and training qualifications in Australia.

The six vocational education and training qualifications are set out on the left hand side of the table below. The four types of qualifications relevant to the Laboratory Operations Training Package are shown in bold.

<table>
<thead>
<tr>
<th>Vocational education and training (VET) sector</th>
<th>Higher education sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQF 6 Advanced Diploma</td>
<td>Doctoral Degree</td>
</tr>
<tr>
<td>AQF 5 Diploma</td>
<td>Masters Degree</td>
</tr>
<tr>
<td>AQF 4 Certificate IV</td>
<td>Graduate Diploma</td>
</tr>
<tr>
<td>AQF 3 Certificate III</td>
<td>Graduate Certificate</td>
</tr>
<tr>
<td>AQF 2 Certificate II</td>
<td>Bachelor Degree</td>
</tr>
<tr>
<td>AQF 1 Certificate I</td>
<td>Advanced Diploma</td>
</tr>
<tr>
<td></td>
<td>Diploma</td>
</tr>
</tbody>
</table>

There is some overlap between the qualifications offered in each sector. For example, an increasing number of university graduates and experienced technicians undertake Graduate Certificate study in the VET sector to enhance their technical skills and hence their career options.

A Training Package specifies which combinations of competency standards make up the qualifications for the industry. The rules are made as flexible as possible to provide individuals and enterprises with the scope to obtain qualifications of most use to them. In general, a Training Package will specify rules for the inclusion of compulsory core competencies, elective competencies and imported competencies from other industry Training Packages.

The AQF lists distinguishing features that define the level of knowledge and skills that graduates of a particular qualification should be able to demonstrate. This ensures that qualifications are awarded consistently.

These features are listed for each qualification in the AQF Implementation Handbook (Second Edition, 1998) and reproduced on the following page.
### Distinguishing features of qualifications in the Australian Qualification Framework

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do the Competencies enable an individual with this qualification to:</td>
<td>Do the Competencies enable an individual with this qualification to:</td>
<td>Do the Competencies enable an individual with this qualification to:</td>
<td>Do the Competencies or Learning Outcomes enable an individual with this qualification to:</td>
<td>Demonstrate understanding of a broad knowledge base incorporating some theoretical concepts</td>
<td>Demonstrate understanding of a broad knowledge base incorporating theoretical concepts, with substantial depth in some areas</td>
</tr>
<tr>
<td>demonstrate knowledge by recall in a narrow range of areas</td>
<td>demonstrate basic operational knowledge in a moderate range of areas</td>
<td>demonstrate some relevant theoretical knowledge</td>
<td>demonstration of a broad knowledge base incorporating some theoretical concepts</td>
<td>demonstrate understanding of a broad knowledge base incorporating theoretical concepts, with substantial depth in some areas</td>
<td>demonstrate understanding of a broad knowledge base incorporating theoretical concepts, with substantial depth in some areas</td>
</tr>
<tr>
<td>demonstrate basic practical skills such as the use of relevant tools</td>
<td>apply a defined range of skills</td>
<td>apply a range of well developed skills</td>
<td>apply solutions to a defined range of unpredictable problems</td>
<td>analyse and plan approaches to technical problems or management requirements</td>
<td>analyse, diagnose, design and execute judgements across a broad range of technical or management functions</td>
</tr>
<tr>
<td>perform a sequence of routine tasks given clear direction</td>
<td>perform a range of tasks where choice between a limited range of options is required</td>
<td>perform processes that require a range of well developed skills where some discretion and judgement is required</td>
<td>identify and apply skill and knowledge areas to a wide variety of contexts with depth in some areas</td>
<td>transfer and apply theoretical concepts and/or technical or creative skills to a range of situations</td>
<td>demonstrate a command of wide ranging, highly specialised technical, creative or conceptual skills</td>
</tr>
<tr>
<td>receive and pass on messages/information</td>
<td>assess and record information from varied sources</td>
<td>interpret available information, using discretion and judgement</td>
<td>identify, analyse and evaluate information from a variety of sources</td>
<td>evaluate information using it to forecast for planning or research purposes</td>
<td>generate ideas through the analysis of information and concepts at an abstract level</td>
</tr>
<tr>
<td>take limited responsibility for own outputs in work and learning</td>
<td>take responsibility for own outputs in work and learning</td>
<td>take responsibility for own outputs in relation to specified quality standards</td>
<td>take responsibility for own outputs in relation to broad quantity and quality parameters</td>
<td>take responsibility for the achievement of group outcomes</td>
<td>demonstrate accountability for personal outputs within broad parameters</td>
</tr>
<tr>
<td>take limited responsibility for the output of others</td>
<td>take limited responsibility for the output of others</td>
<td>take limited responsibility for the quantity and quality of the output of others</td>
<td>take limited responsibility for the quantity and quality of the output of others</td>
<td>take limited responsibility for the achievement of group outcomes</td>
<td>demonstrate accountability for group outcomes within broad parameters</td>
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</table>
What qualifications are contained in this Training Package?

**Titles and codes of qualifications**

The following qualifications form the basis of this Training Package:

- **Certificate III in Laboratory Skills** PML 301 99
- **Certificate IV in Laboratory Techniques** PML 401 99
- **Diploma of Laboratory Technology** PML 501 99
  - Diploma of Laboratory Technology
  - Diploma of Laboratory Technology (Process Manufacturing Testing)
  - Diploma of Laboratory Technology (Pathology Testing)
  - Diploma of Laboratory Technology (Biological and Environmental Testing)
  - Diploma of Laboratory Technology (Food Testing)
- **Diploma of Laboratory Technology (Scientific Glassblowing)** PML 502 00
- **Advanced Diploma of Laboratory Operations** PML 601 99

The qualification titles indicate the AQF outcome of each qualification, that is, Certificate III (AQF 3), Certificate IV (AQF 4), Diplomas (AQF 5) and Advanced Diploma (AQF 6).

Each qualification title contains an appropriate industry/occupational description such as: Laboratory Skills, Laboratory Techniques, Laboratory Technology, Laboratory Operations. For the Diplomas of Technology which address particular specialisations, there is an additional title given in brackets such as (Pathology Testing).

Each qualification has a national code, such as PML 301 99. In this case, the:

- **PM** indicates that the National Industry Training Advisory Body with responsibility for the Training Package is Process Manufacturing
- **L** indicates that the qualifications cover the laboratory industry sector.
- **301** is a unique number in which the “3” indicates AQF 3 and the “01” is the number assigned to the Certificate III in Laboratory Skills
- **99** indicates that the Training Package was endorsed in 1999.

**Statement of Attainment**

Statements of Attainment, listing competencies achieved, will be issued to candidates where they have completed one or more units of competency but have not met the requirements of a qualification.
### Appendix 1: Project plan

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<tr>
<td>MLA</td>
<td>Contract principal consultant</td>
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<tr>
<td></td>
<td>Establish national steering group</td>
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<td></td>
<td>Convene meeting of National ITABs to confirm approach (12 Aug 98)</td>
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<tr>
<td>Steering group</td>
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<td>Meet to refine &amp; confirm project plan and package design (8 Sep 98)</td>
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<tr>
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<td>Develop draft project plan and package design based on scoping study (27/28 Aug 98)</td>
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<td>Design team</td>
<td>Set up industry consultation groups to assist with package development for:</td>
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<td></td>
<td>4 process manufacturing &amp; construction materials</td>
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<td>4 biomedical/environmental</td>
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<td>4 food and beverage</td>
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<td></td>
<td></td>
<td>Develop first draft generic units and business support units (6 Oct 98)</td>
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<td>Refine package design (all units), draft generic and business support units of competency</td>
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<td>4 circulate drafts to industry reps Australia-wide (17/24 Nov 98)</td>
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<td>Design team meet (23 Oct 98)</td>
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<td>Meet to review draft generic standards and packaging model (15 Dec 98)</td>
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## Project plan continued ...

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<td>Circulate draft materials to National ITABs and Australia-wide reviewers for comment in early January (3 weeks to comment).</td>
<td>Circulate draft consolidated package to national ITABs</td>
<td>→ Submit final draft Training Package to ANTA for evaluation</td>
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<td>Circulate draft consolidated package to national steering committee</td>
<td>○ Submit final product</td>
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<tr>
<td>MLA</td>
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<td>Assemble final draft endorsed package</td>
<td>↑ Meet to validate final Training Package</td>
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<tr>
<td>Principal consultant</td>
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<td>Review assessment guidelines from relevant industry Training Packages and develop first draft</td>
<td>Assemble final draft endorsed package</td>
<td>← Assemble final draft of the Training Package</td>
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<td>Review AQF models from relevant industry Training Packages and develop first draft</td>
<td>Circulate draft consolidated package to industry reviewers &amp; key stakeholders</td>
<td>↓ Make any modifications required by ANTA evaluation &amp; assemble final product</td>
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<td>Refine draft materials using industry feedback</td>
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<td>Develop technical units of competency, review AQF and review assessment guidelines</td>
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<td>4 circulate drafts to industry reviewers Australia-wide</td>
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<td>4 focus groups to develop range of variables, evidence guides and packaging</td>
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<td>Produce final drafts of technical units</td>
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Appendix 2: Contributing organisations and people

This project had the active support from many people in a wide range of industries. These people attended industry focus groups, were happy to be interviewed, waded through voluminous drafts of materials and made detailed, constructive and insightful comments.

Written submissions following first consultation draft

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<th>Organisation</th>
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### Hobart focus group

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<td>Juergen</td>
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<td>Fabel</td>
<td>Tas CSPH ITAB</td>
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### Adelaide focus groups

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Adelaide focus groups continued ...

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Sydney focus groups

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### Responses to the second consultation / validation draft

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Special thanks are also due to the management and development team:

- Barbara Wallace, MLA
- Ivan Johnstone, CIT
- Kerry Manikis, CIT
- Raju Varanasi, NSW TAFE
- Gary Wood, NSW TAFE
- Bob Blycha, NSW TAFE
- Karen Stacey, Wodonga TAFE
Extension to the Laboratory Operations Training Package - 2001

Following the NTFC’s endorsement of the Laboratory Operations Training Package in 1999, additional units of competency were developed to address the training needs of people working in the following occupational areas:

- scientific glassblowing
- sampling, testing and related activities in a construction or similar environment.

The scientific glassblowing competency units include the SCIG tag in their respective unit codes:

- PML SCIG 300 A Operate basic handblowing equipment
- PML SCIG 301 A Repair glass apparatus using simple glass blowing equipment
- PML SCIG 501 A Design and manufacture glass apparatus and glass systems
- PML SCIG 502 A Perform glass coating, grinding and finishing operations
- PML SCIG 503 A Construct, modify and maintain high vacuum systems.

The two '300' series units have been added to the list of elective units for the Certificate III in Laboratory Skills (PML 301 99). The three additional '500'series units have resulted in an additional qualification at that level:

- Diploma of Laboratory Technology (Scientific Glassblowing) PML 502 00

The addition of the construction materials testing competencies had no effect on the qualifications structure of the package as they have been added to the banks of electives within existing qualifications under the Laboratory Operations Training Package. The five construction materials testing units have no such identifying tag – they are tagged under TEST (four units) and OHS (one unit). The five units are:

- PML TEST 307 A Prepare trial batches for evaluation
- PML OHS 301 A Work safely with instruments that emit ionising radiation
- PML TEST 403 A Assist with geotechnical site investigations
- PML TEST 511 A Supervise earthworks inspection, sampling and testing operations
- PML TEST 601 A Classify building sites.

Thus:

- PML TEST 307 A and PML OHS 301 A have been added to the list of elective units for the Certificate III in Laboratory Skills (PML 301 99)
- PML TEST 403 A and PML TEST 511 A have been added to the lists of elective units for the Certificate IV in Laboratory Skills (PML 401 99)
- PML TEST 403 A and PML TEST 511 A have been added to the lists of elective units for Diploma of Laboratory Technology (PML 501 99), and the Process Manufacturing Testing specialisation of the diploma qualification
PML 601 A has been added to the list of elective units for the Advanced Diploma of Laboratory Operations (PML 601 99).

**Project management/methodology**

The extension activities were managed by Barbara Wallace (MLA). Methodology was driven by the ANTA requirements for extensive consultation and validation, and the need to produce a Training Package that is relevant to stakeholders.

**Scientific glassblowing competencies**

The design team consisted of one team leader and a project officer from the process manufacturing testing team of the original Laboratory Operations Training Package team. A committee made up of Australian glassblowers was established to oversee the development of the scientific glassblowing units to provide guidance to the project team:

<table>
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<tr>
<td>John Holmes</td>
<td>Chairman, Scientific Glassblowers Association of Australia</td>
</tr>
<tr>
<td>Roy Parrott</td>
<td>Secretary, Scientific Glassblowers Association of Australia</td>
</tr>
<tr>
<td>Emmanuel Bellatoni</td>
<td>Managing Director, Embell Scientific Pty Ltd</td>
</tr>
<tr>
<td>Chris Tomkins</td>
<td>Scientific Glassblower, Australian National University, Canberra</td>
</tr>
<tr>
<td>Peter Henry</td>
<td>Scientific Glassblower, University of New England, Armidale</td>
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<td>Greg Cole</td>
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<td>Bob Blycha</td>
<td>Senior Project Officer, MEESD, TAFE NSW</td>
</tr>
<tr>
<td>Raju Varanasi</td>
<td>Manager, Process Industry Programs, TAFE NSW</td>
</tr>
<tr>
<td>John Clarke</td>
<td>Managing Director, Enviro Glass Pty Ltd</td>
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Our thanks to all of these people for their enthusiastic contributions to this process.

Draft competencies were reviewed by scientific glassblowers from the private and public sector and were subsequently endorsed by the project steering committee. Final validation occurred at the 4th Australasian Scientific Glassblowers Symposium held in Wellington, New Zealand, 21-23 October 1999.

**Construction materials testing competencies**

MLA would like to thank Alan Bartlett of Alan Bartlett Consulting for first raising the need for separate construction materials testing competencies, and for his sterling efforts in developing and validating these units.

The following industry technical experts were also involved in the development and validation of the five construction materials testing competency units:

- Chris Pearce, Bowler Geotechnical (Brisbane North, Qld)
- Glenn Heers, Bowler Geotechnical (Browns Plains, Qld)
- Howard Hughes, H&M Testing (Nerang, Qld)
• Ian Ferris, CM Testing Service (Bundaberg, Qld)
• John Simmons, Sherwood Geotechnical & Research Services (Graceville, Qld)
• Michael Sutton, Technical Manager, CSR Readymix (Petrie, Qld)
• Paul Fraser, Civil Quality Assurance (Qld) Pty Ltd (Strathpine, Qld)
• Peter Simson, Civil Engineering Laboratories, Qld Department of Natural Resources (Rocklea, Qld)
• Rebecca Blight, Qld Building Services Authority (Brisbane, Qld)
• Scott Walton, Laboratory Supervisor, Qld Dept of Natural Resources (Ayr, Qld).
Qualifications Framework

for the

Laboratory Operations Training Package (PML 99)

Revised January 2001
Qualifications overview

The following qualifications framework has been developed in consultation with a wide cross section of industry representatives and reflects current and future employment demand. The qualifications are not a series of nested courses but rather a logical skill progression based on real occupational roles and workplace application.

To promote portability, “cross industry” qualifications have been developed for AQF 3, 4, 5 and 6 outcomes. Because specialisation is an industry requirement at AQF 5, four specialist Diploma qualifications have been developed in addition to the broad cross industry Diploma.

Not all qualifications may apply to all sectors. For example, it is likely that enterprises in the:
- food and manufacturing sectors will access all qualifications
- construction materials sector will access the Certificate III and IV qualifications
- the biological/environmental sector will access all qualifications. However, some enterprises in the pathology services sector may only require the Certificate III and Diploma of Laboratory Technology (Pathology Testing).

Statements of Attainment will be issued to candidates who have completed one or more units of competency but have not met the requirements of a qualification.

Individual units of competency also provide the basis of training in any laboratory skills no matter what the industry sector. The developers of other Training Packages are therefore encouraged to incorporate units listed here wherever it is appropriate.

Certificate II qualification

The clear message from industry is that there is no vocational outcome at Certificate II for laboratory personnel. However, where enterprises believe that laboratory skills should be addressed as part of a Certificate II qualification, there is ample scope to export units of competency from this Training Package to Certificate II qualifications within other Training Packages. In such cases, any packaging would need to be consistent with the packaging rules defined for the host Training Package. If in the future, there is a demonstrated demand for a Certificate II outcome within this Training Package, the issues will be reviewed at that time. (Further advice on exporting units is given on page QF-10.)

Certificate III in Laboratory Skills

The Certificate III in Laboratory Skills provides a broad and flexible package of competencies which meets the needs of laboratory assistants and similar personnel. Candidates must choose either PML TEST 300 A or PML TEST 301 A as electives. This choice addresses the different roles of, on the one hand, workers in the manufacturing/food and construction materials industry sectors who commonly perform basic tests, and on the other hand, workers in the pathology and biological/environmental industry sectors who tend to perform procedures rather than whole tests. The core and wide range of electives is designed to maximise the portability of this entry level qualification.
Certificate IV in Laboratory Techniques

The Certificate IV in Laboratory Techniques provides a broad and flexible package of competencies which meets the needs of technical assistants and similar personnel. This qualification recognises that some industry sectors employ technicians who have broad technical-scientific knowledge and skills, but without substantial depth in one specialisation as provided by the Diploma qualification. This package of competencies also addresses the concerns of industry representatives who stated that a gap between AQF 3 and 5 in the qualifications framework could represent a barrier to career progression in some sectors.

Diploma of Laboratory Technology

The general Diploma of Laboratory Technology and five specialist Diplomas (one with a separate qualification code owing to its slightly different packaging rules) provide broad and flexible packages of competencies which meet the needs of technical officers and similar personnel, and scientific glassblowers. Because of budgetary and other constraints, the specialist Diplomas are limited to specific occupations within the priority industry sectors identified for the Training Package development and the extension to include scientific glassblowing. The need for additional specialist Diplomas may arise in the future. Packaging rules for these qualifications would need to be submitted to the National Training Quality Council (NTQC) via MLA in order to be nationally recognised.

The design of the core and most units of competency enables the same unit to be used in a number of industry sectors and thereby promotes job mobility. Any small variations in emphasis, materials or legislation between sectors is noted in the range of variables and evidence guides. Where the variations were too large to accommodate in this way, specialised units of competency have been developed (eg, PML TEST 504 A – Perform chemical pathology tests).

Advanced Diploma of Laboratory Operations

The Advanced Diploma of Laboratory Operations provides a broad and flexible package of competencies which meets the needs of laboratory supervisors, senior technical officers and similar personnel. There is broad support for the identified competencies with some differences between enterprises and sectors as to whether their supervisors are required to have a university degree.

Advice to providers has been provided regarding entry to this qualification as there is no industry support for an off the job only pathway to an Advanced Diploma in Laboratory Operations. To enter the Advanced Diploma of Laboratory Operations, entrants must have completed any Diploma of Laboratory Technology or demonstrate equivalent competency. It is recommended that entrants have had an appropriate period of employment at an occupational level commensurate with any Diploma of Laboratory Technology prior to entry to the Advanced Diploma of Laboratory Operations.

The competencies PML TEST 700 A, PML TEST 701 A, PML TEST 702 A, PML TEST 703 A, and PML TEST 704 A have been included to provide a bridge to further qualifications beyond the scope of this Training Package. For example, providers in some States and Territories have proposed a Graduate Certificate to meet the training and recognition needs of technical specialists for some industry sectors. By incorporating these competencies within the Advanced Diploma as electives, jurisdictions can accredit higher
qualifications such as a Graduate Certificate or Graduate Diploma based on these competencies if they so wish.

Possible learning and career pathways

The Scoping Study conducted prior to the development of this Training Package identified the three most significant barriers to career progression as:

rigid adherence to a qualification as a mechanism for advancement
lack of recognised training
lack of training opportunities.

The Laboratory Operations Training Package has been designed to be as flexible as possible to help reduce these barriers. For example:

- multiple entry points are provided so that it is not necessary to achieve a lower qualification (such as the Certificate III) before undertaking a higher qualification (Certificate IV or Diploma)
- where units such as PML OHS 300 A – Work safely in accordance with defined policies and procedures are included in several qualifications, once competency has been demonstrated direct credit transfer will apply.

Career paths above AQF 5 and 6 are becoming increasingly constrained unless technicians undertake university study. With this in mind, particular attention has been given to stating the critical aspects of competency and essential knowledge required for each unit of competency in sufficient detail to maximise articulation and credit transfer arrangements between the vocational education and training (VET) and higher education sectors.

There is also a growing number of higher education graduates updating their laboratory technology skills through TAFE and private provider courses. To address this emerging need, five “700 series” units of competency have been included in this Training Package to provide nationally endorsed competency standards to underpin the development of Graduate Certificate courses where State/Territory Training Agencies (STAs) and providers choose to offer them.

New Apprenticeships

The possibility of completing all qualifications through a New Apprenticeship pathway has been accommodated. Given both the “cross industry” nature of the qualifications and that laboratory personnel are employed throughout Australia in a variety of industry sectors, it is anticipated that there could be broad uptake of the Training Package. However, Commonwealth and State/Territory policy will ultimately determine the implementation and funding of Traineeships and New Apprenticeships.
Pathways

The flowchart over the page sets out possible learning and career paths for laboratory personnel. It provides an indication of possible sequencing of qualifications, multiple entry points, links between qualifications in the VET and higher education sectors, and the occupational roles within laboratory operations. Market forces will determine the availability of particular learning pathways and employment outcomes.
Possible entry points (●→) and career paths (→) for personnel employed in laboratories

The Laboratory Operations (cross-industry) Training Package generally meets the recognition / training needs of the occupations shown in **bold**.

Please note that entry to the Advanced Diploma is via the Diploma, a degree or demonstration of equivalent competency. Experience working in the field, at Diploma level, is also recommended.
Packaging advice

A qualification may be awarded by a Registered Training Organisation (RTO) when a candidate has demonstrated the set of competencies specified in the packaging rules for the qualification. Where a candidate has completed a unit or group of competencies that do not fully meet the requirements of a qualification, their achievement would be recognised through the award of a Statement of Attainment.

All units of competency have been categorised as either compulsory core, stream core or elective units. To be awarded a qualification, candidates must satisfy the following rules:

Certificate III in Laboratory Skills

Candidates must achieve twelve (12) units of which:

- eight (8) are compulsory core units

the balance of the twelve (12) units are electives and must include either:

- \( PML \ TEST \ 300 \ A \) or \( PML \ TEST \ 301 \ A \) or both

- \( PML \ SCIG \ 300A \) or \( PML \ SCIG \ 301A \) or both

Certificate IV in Laboratory Techniques

Candidates must achieve sixteen (16) units of which:

- eleven (11) are compulsory core units

the balance of the sixteen (16) units are electives and must include \( PML \ TEST \ 300 \ A \) or \( PML \ TEST \ 301 \ A \) or both.

Diploma of Laboratory Technology

Where candidates do not require any specialisation, they must achieve twenty (20) units of which:

- thirteen (13) are compulsory core units

the balance of the twenty (20) units are electives where at least:

\( \Rightarrow \) one (1) elective is \( PML \ TEST \ 300 \ A \) or \( PML \ TEST \ 301 \ A \)

\( \Rightarrow \) four (4) electives must be chosen from the listed units.

Diploma of Laboratory Technology (Process Manufacturing Testing)

Candidates must achieve twenty (20) units of which:

- thirteen (13) are compulsory core units

- five (5) are stream core units

- two (2) are electives.
Diploma of Laboratory Technology (Pathology Testing)

Candidates must achieve twenty (20) units of which:

thirteen (13) are compulsory core units
six (6) are stream core units
one (1) is an elective.

Diploma of Laboratory Technology (Biological and Environmental Testing)

Candidates must achieve twenty (20) units of which:

thirteen (13) are compulsory core units
five (5) are stream core units
two (2) are electives.

Diploma of Laboratory Technology (Food Testing)

Candidates must achieve twenty (20) units of which:

thirteen (13) are compulsory core units
five (5) are stream core units
two (2) are electives.

Diploma of Laboratory Technology (Scientific Glassblowing) PML 502 00

Candidates must achieve twenty (20) units of which:

eleven (11) are compulsory core units
four (4) are stream core units and must include PML SCIG 300 A, PML SCIG 301 A and PML SCIG 501 A
four (4) are electives and must include PML SCIG 502 A or PML 503 A or both

Advanced Diploma of Laboratory Operations PML 601 99

Candidates must achieve twelve (12) units of which:

eight (8) are compulsory core units
four (4) are electives.

Customisation advice

Because of budgetary and other constraints during the development of this Training Package, the development of technical units has been restricted to three priority industry sectors. Nonetheless, this Training Package is relevant to the broad spectrum of Australian industries, and users are encouraged to customise qualifications and units of competency to suit their enterprise or sector purposes provided that the customisation rules outlined over the page are followed.
Customisation of this Training Package may be achieved by:

- choosing appropriate electives from units provided in this Training Package
- importing elective units from other Training Packages
- customising units of competency to better suit an enterprise or industry context.

**Choosing appropriate electives**

The electives listed within the Laboratory Operations Training Package provide for skill development in all areas identified by industry representatives during consultations.

All qualifications are able to be customised since candidates are able to choose particular combinations of elective units to suit their individual needs or work context.

The training and assessment of workers is seen as a key role for many laboratory personnel. Therefore, in addition to the technical and supervisory units, the following units from the *Training Package for Assessment and Workplace Training* are particularly relevant as electives:

- BSZ 401 A Plan assessment
- BSZ 402 A Conduct assessment
- BSZ 403 A Review assessment
- BSZ 404 A Train small groups.

In keeping with the hierarchy of supervision present in laboratories, industry representatives have recommended that while BSZ 404 A is appropriate for inclusion in Certificate IV and Diploma qualifications, the assessment units are more appropriate for the Advanced Diploma. To ensure that no qualification in this Training Package has an overly training and assessment focus, the completion of the three units BSZ 401 A, BSZ 402 A, and BSZ 403 A will only be counted as one (1) elective unit (Workplace assessor) in this Training Package.

**Importing elective units from other Training Packages**

To achieve maximum cross industry application, the packaging rules enable units of competency to be imported from any Training Package that is directly relevant to the candidate’s current or intended laboratory work environment. In providing this flexibility it is incumbent on RTOs to ensure that the integrity of qualifications in the Training Package is maintained. The following guidelines for importing units apply:

- Imported units must relate to core functions or roles in the candidate’s current or intended laboratory work environment (eg, food production processes, process manufacturing operations, information technology, front line management, workplace training and assessment)
- The original title and code for the imported unit of competency must be retained
- Imported units must come from a set of endorsed competency standards
- Imported units must have the same scope and similar degree of complexity as the elective units they replace
Any prerequisite units specified for the imported units cannot be counted as electives in this Training Package.

**Customising units of competency**

It is vital that the cross industry standards are able to be used in a wide range of industry sectors and enterprises. To enable this, customisation of the standards is actively encouraged provided the following requirements are met:

- general directions, generic equipment/processes/procedures, and standard operating procedures may be replaced by enterprise specific ones
- customisation must be limited to altering the wording of the range of variables and evidence guide.

As a minimum, the customised unit of competency must:

- be part of a qualification with the same AQF outcome
- be of a similar breadth, complexity and size
- be relevant to the particular industry sector or enterprise
- retain the original unit title and unit code (e.g., PML SAMP 400 A)
- not reduce health, safety or environmental requirements.

When customising the competency standards, the Registered Training Organisation and/or enterprise must ensure the integrity of the competency standards.

To provide further guidance, an example of a customised unit is provided in Appendix 3 (page QF-26).

The unit PML ORG 300 A – Follow established workplan is a core unit within the Certificate III in Laboratory Skills. It has been customised to reflect the work context of a laboratory assistant working in a science laboratory in education. Because the unit has broad cross industry relevance it can be readily customised with the addition of education specific variables and evidence requirements and a more appropriate storyline (“this competency in practice”).

**Exporting competencies to other Training Packages**

Manufacturing Learning Australia encourages other industries and their ITABs to access units in this Training Package which might be appropriate for their needs. These competencies may be used provided that:

- the original unit title and unit code are retained
- they are only customised to the extent outlined above
- the user advises MLA in writing of the specific competencies exported to enable input during future revisions and ongoing communication.
AQF 2

There is no accepted laboratory role at this AQF outcome for most industry sectors. Therefore, there is no Certificate II qualification in the Laboratory Operations Training Package. However, the “cross industry” units listed for the Certificate III in Laboratory Skills provide a foundation for developing laboratory skills in any industry sector and these may be incorporated into qualifications within other Training Packages at AQF 2 where appropriate.

Occupational group

Samplers and testers, production personnel, drivers, sample couriers, plant operators and many other titles.

The work they perform

Samplers and testers conduct limited sampling and testing as part of their duties in process operations. They apply a restricted range of skills and operational knowledge to perform these tasks and do not generally work inside a laboratory. They:

- follow set procedures to sample raw materials and products
- may package, label, store and transport samples
- use simple equipment (hydrometers, thermometers, pH meters) to make measurements that take a short time and involve a narrow range of variables and easily recognised control limits
- may make visual inspection of products and packaging.

Examples of the work of samplers and testers are given below:

A milk tanker driver conducts aseptic sampling of milk before loading and then conveys the samples to the laboratory.

An operator in a quarry may take samples from stockpiles and conveyors and conduct simple tests on different grades of aggregates.

Achievement of units of competency from this Training Package provides a pathway for such personnel to develop the skills needed to take on quality control and limited laboratory roles as part of their normal duties. The following units are particularly relevant.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML SAMP 300 A</td>
<td>Handle and transport samples</td>
</tr>
<tr>
<td>PML SAMP 301 A</td>
<td>Receive and prepare a range of samples for pathology testing</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
</tbody>
</table>
AQF 3

There is a laboratory role at this AQF outcome for all industry sectors.

Certificate III in Laboratory Skills

Candidates require twelve (12) units of competency consisting of eight (8) compulsory core units and the balance from elective units that satisfy the packaging rules. Units may be assessed in the workplace or in a simulated workplace environment.

Occupational group

Laboratory assistants, glassblowers, laboratory attendants and many other titles.

The work they perform

Laboratory assistants perform straightforward sampling and testing. They follow set procedures and recipes, and apply well developed technical skills and basic scientific knowledge. They generally work inside a laboratory but may also perform technical tasks in the field or within production plants. They may also perform a range of laboratory maintenance and office tasks.

The majority of their work involves a predictable flow of parallel or similar tasks within one scientific discipline. They:

- perform straightforward technical tasks using relevant procedures, Australian Standards and readily available advice. These tasks generally require close attention to detail and to the accuracy and precision of measurements. They may require the use of manual or semi-automated techniques.
- operate test equipment and instruments and make limited adjustments to their controls
- process and record data and recognise trends and out of control conditions
- solve predictable problems using clear information or known solutions. Where alternatives exist, they are limited and apparent.
- work under close and regular supervision, although they may have autonomy for specific tasks and responsibility for their own outputs
- take decisions within defined limits of responsibility
- work as part of a team.

Examples of the work of laboratory assistants are given below:

A laboratory assistant at a dairy factory gathers samples from the milk tankers, vats and the processing line, and performs routine chemical and bacteriological tests on the samples.

A laboratory assistant in a pathology laboratory receives and prepares tissue samples.

Scientific glassblowers operate basic handblowing equipment to make and repair glass apparatus. At this level they follow established procedures, and apply well developed technical skills and basic scientific knowledge to glasswork. They generally work inside scientific laboratories but may also perform technical tasks in production plants, including scientific glass instrument manufacturing establishments. They may also perform a range of laboratory maintenance and office tasks.

The competencies they require
The units of competency required have been grouped under two headings over the page. The units listed under the heading **compulsory core** are considered to be essential for all laboratory assistants. The units listed under the heading **elective** may only apply to some personnel according to the size and scope of the operations of the particular enterprise and laboratory.

Note that the number of units in the elective bank has been increased from two (in the original version of this Training Package) to four with the inclusion of the two additional units relevant to scientific glassblowing.

**Certificate III in Laboratory Skills  PML 301 99**

*Compulsory core units of competency*

**Achieve the following EIGHT compulsory core units**

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML COM 300 A</td>
<td>Communicate with other people</td>
</tr>
<tr>
<td>PML DATA 300 A</td>
<td>Process and record data</td>
</tr>
<tr>
<td>PML MAIN 300 A</td>
<td>Maintain the laboratory fit for purpose</td>
</tr>
<tr>
<td>PML OHS 300 A</td>
<td>Work safely in accordance with defined policies and procedures</td>
</tr>
<tr>
<td>PML ORG 300 A</td>
<td>Follow established work plan</td>
</tr>
<tr>
<td>PML QUAL 300 A</td>
<td>Contribute to the achievement of quality objectives</td>
</tr>
<tr>
<td>PML TEAM 300 A</td>
<td>Work efficiently as part of a team</td>
</tr>
<tr>
<td>PML TEST 302 A</td>
<td>Calibrate test equipment and assist with its maintenance</td>
</tr>
</tbody>
</table>

**Elective units of competency**

**Achieve at least ONE (and up to FOUR) of the following units. The units ‘operate basic handblowing equipment’ (PML SCIG 300 A) and ‘repair glass apparatus using simple glass blowing equipment’ (PML SCIG 301 A) have been developed to meet the needs of scientific glassblowers, who are advised to achieve one or both of these two units.**

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
<tr>
<td>PML TEST 301 A</td>
<td>Perform biological laboratory procedures</td>
</tr>
<tr>
<td>PML SCIG 300 A</td>
<td>Operate basic handblowing equipment</td>
</tr>
<tr>
<td>PML SCIG 301 A</td>
<td>Repair glass apparatus using simple glass blowing equipment</td>
</tr>
</tbody>
</table>
Achieve electives from units listed for the Certificate III or Certificate IV in this Training Package, or from units imported from other Training Packages that satisfy the packaging rules defined earlier, to bring the total number of units up to TWELVE

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Unit Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML OHS 301 A</td>
<td>Work safely with instruments that emit ionising radiation</td>
</tr>
<tr>
<td>PML QUAL 301 A</td>
<td>Apply critical control point requirements</td>
</tr>
<tr>
<td>PML SAMP 300 A</td>
<td>Handle and transport samples</td>
</tr>
<tr>
<td>PML SAMP 301 A</td>
<td>Receive and prepare a range of samples for pathology testing</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
<tr>
<td>PML TEST 301 A</td>
<td>Perform biological laboratory procedures</td>
</tr>
<tr>
<td>PML TEST 303 A</td>
<td>Prepare working solutions</td>
</tr>
<tr>
<td>PML TEST 304 A</td>
<td>Prepare culture media</td>
</tr>
<tr>
<td>PML TEST 305 A</td>
<td>Perform aseptic techniques</td>
</tr>
<tr>
<td>PML TEST 306 A</td>
<td>Assist with fieldwork</td>
</tr>
<tr>
<td>PML TEST 307 A</td>
<td>Prepare trial batches for evaluation</td>
</tr>
</tbody>
</table>

Units **PML TEST 300 A, PML SAMP 400 A and PML TEST 303 A** are relevant for laboratory assistants working in manufacturing and construction materials testing laboratories.

Units **PML TEST 301 A, PML SAMP 301 A, PML TEST 303 A and PML TEST 305 A** are relevant for laboratory assistants working in pathology services laboratories.

Units **PML TEST 300 A, PML TEST 301 A, PML TEST 305 A and PML TEST 306 A** are relevant for laboratory assistants working in biological/environmental services laboratories.

Units **PML TEST 300 A, QUAL 301 A, PML TEST 303 A and PML TEST 305 A** are relevant for laboratory assistants working in food and beverage processing laboratories.

- Units **PML SCIG 300A and PML SCIG 301A** are relevant for scientific glassblowers.
- Units **PML OHS 301 A and PML TEST 307 A** are relevant for construction materials testing.
AQF 4

There is a laboratory role at this AQF outcome for some industry sectors. For example, some enterprises in the food and manufacturing sectors employ personnel who conduct a wider range of basic tests than do laboratory assistants and who generally have a more enhanced quality role. They may also conduct a limited number of specialised tests.

Certificate IV in Laboratory Techniques

Candidates require sixteen (16) units of competency consisting of eleven (11) compulsory core units and the balance from elective units that satisfy the packaging rules. Units may be assessed in the workplace or in a simulated workplace environment.

Occupational group

Technical assistants, technicians and many other titles.

The work they perform

Technical assistants undertake a wide range of sampling and testing that requires the application of a broad technical knowledge and some scientific knowledge.

Although technical assistants generally work in a laboratory, they often work closely with other personnel throughout the workplace and with suppliers. They may assist other personnel to solve technical problems and to adjust formulations and production mixes. They may also train them to collect samples and conduct basic tests reliably.

The work of technical assistants involves similar tasks within one scientific discipline with occasional peak periods and some interruptions. They:

- work according to established procedures in a structured environment
- collect and prepare samples
- conduct a wider range of basic tests and a limited range of specialised tests and measurements using manual, semi-automated and fully automated techniques
- define and solve problems of limited complexity where the information available is less obvious, but not contradictory, and can be determined by direct reasoning
- work under the direction and regular supervision of senior technical staff, laboratory or quality managers, or scientific/medical personnel. The work of technical assistants is normally subject to frequent progress and quality checks
- generally work in a team and may have responsibility for their own work outputs.

An example of the work of technical assistants is given below:

A technical assistant who works in a mineral preparation plant receives and logs incoming ore samples and operates handling equipment to move samples to treatment points. In the laboratory, the assistant conducts routine chemical and physical tests and redirects other subsamples for specialised analyses.

The competencies they require

The units of competency required have been grouped under two headings over the page. The units listed under the heading compulsory core are considered to be essential for all technical assistants. The units listed under the heading elective may only apply to some personnel according to the size and scope of the operations of the particular enterprise and laboratory.
Certificate IV in Laboratory Techniques

Compulsory core units of competency

Achieve the following ELEVEN compulsory core units

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Unit Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML COM 300 A</td>
<td>Communicate with other people</td>
</tr>
<tr>
<td>PML DATA 300 A</td>
<td>Process and record data</td>
</tr>
<tr>
<td>PML MAIN 300 A</td>
<td>Maintain the laboratory fit for purpose</td>
</tr>
<tr>
<td>PML OHS 300 A</td>
<td>Work safely in accordance with defined policies and procedures</td>
</tr>
<tr>
<td>PML ORG 300 A</td>
<td>Follow established work plan</td>
</tr>
<tr>
<td>PML QUAL 401 A</td>
<td>Apply quality system and continuous improvement processes</td>
</tr>
<tr>
<td>PML TEAM300 A</td>
<td>Work efficiently as part of a team</td>
</tr>
<tr>
<td>PML TEST 302 A</td>
<td>Calibrate test equipment and assist with its maintenance</td>
</tr>
<tr>
<td>PML TEST 400 A</td>
<td>Perform instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 401 A</td>
<td>Perform non-instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 402 A</td>
<td>Prepare, standardise and use solutions</td>
</tr>
</tbody>
</table>

Elective units of competency

Achieve a minimum of ONE of the following units

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Unit Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
<tr>
<td>PML TEST 301 A</td>
<td>Perform biological laboratory procedures</td>
</tr>
</tbody>
</table>

Achieve electives from units listed for the Certificate IV or Diplomas in this Training Package, or from units imported from other Training Packages that satisfy the packaging rules defined earlier to bring the total number of units up to SIXTEEN

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Unit Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML DATA 501 A</td>
<td>Use laboratory application software</td>
</tr>
<tr>
<td>PML QUAL 400 A</td>
<td>Contribute to the ongoing development of HACCP plans</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 305 A</td>
<td>Perform aseptic techniques</td>
</tr>
<tr>
<td>PML TEST 403 A</td>
<td>Assist with geotechnical site investigations</td>
</tr>
<tr>
<td>PML TEST 501 A</td>
<td>Perform microbiological tests</td>
</tr>
<tr>
<td>PML TEST 511 A</td>
<td>Supervise earthworks inspection, sampling and testing operations</td>
</tr>
<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
</tr>
</tbody>
</table>

Units PML TEST 300 A, PML DATA 501 A and PML SAMP 400 A are relevant for technical assistants working in manufacturing and construction materials testing laboratories

Units PML TEST 301 A, PML TEST 305 A and PML TEST 501 A are relevant for technical assistants working in biological/environmental services laboratories

Units PML TEST 305 A and PML QUAL 400 A are relevant for technical assistants working in food and beverage processing laboratories
PML TEST 403 A and PML TEST 511 A are relevant for construction materials testing.
AQF 5

There is a laboratory role at this AQF outcome for most industry sectors. There are two qualifications at this level within the Laboratory Operations training Package.

The first is:

**Diploma of Laboratory Technology**

Within this single qualification, learners may achieve either the generic qualification or a streamed qualification from the following list:

- **Diploma of Laboratory Technology (Process Manufacturing Testing)**
- **Diploma of Laboratory Technology (Pathology Testing)**
- **Diploma of Laboratory Technology (Biological and Environmental Testing)**
- **Diploma of Laboratory Technology (Food Testing)**

For each Diploma stream under PML 501 99 (including the generic qualification), candidates require twenty units of competency, consisting of thirteen compulsory core, with the balance of units made up from the stream core units specified for each qualification and electives that satisfy the packaging rules. Units may be assessed in the workplace or in a simulated workplace environment.

**Occupational group**

Technical officers, laboratory technicians and many other titles.

**The work they perform**

Technical officers conduct a wide range of sampling and testing that requires the application of broad scientific-technical knowledge and skills, with substantial depth in some areas. Although technical officers generally work in a laboratory, they often work closely with personnel in other teams within a section of the workplace. They may liaise with suppliers to troubleshoot product non-conformance at the direction of laboratory supervisors or managers. They gather information on non-conformance and events that may lead to the modification of workplace procedures. They may also demonstrate methods to others and train them to collect samples and conduct basic tests reliably.

The work of technical officers involves frequent peak periods and interruptions. They:

- work according to established procedures in a structured environment
- collect and prepare samples and communicate sample requirements to other personnel
- conduct a wide range of routine and specialised tests where atypical samples may be involved and the instrumentation used has a wide range of operating variables
- contribute to the modification of SOPs when necessary
- define and solve problems where alternatives are not obvious and where investigations and trials may be required and the implications of various solutions considered
work under the direction and supervision of senior technical staff, laboratory or quality managers, or scientific/medical professionals
generally work as part of a team and may have a role in the planning of schedules and monitoring of resources in their work area.
Examples of the work of technical officers are given below:
Technical officers who work in a pathology laboratory perform a range of tests on body tissues and fluids to measure quantities such as:
⇒ the amount of biological substances, such as cholesterol or creatine, that are present
⇒ biological function (eg, clotting)
⇒ the presence of drugs (eg, heparin or alcohol).
They also prepare cultures, stained tissue sections and thin films to count and classify cells, bacteria and parasites. They also perform routine calibration and maintenance of instruments.

A technical officer who works in a major food processing plant conducts a range of tests on the company products to measure:
⇒ the concentration of nutrients and food additives such as dyes and flavourings
⇒ the concentration of contaminants such as heavy metals and microbial toxins
⇒ pH, salt, moisture, fat content, etc.
The officer also conducts a range of tests on the packaging material used for the company’s products.

The competencies they need

The units of competency required have been grouped under three headings in the tables below. The units listed under the heading **compulsory core** are considered to be essential for all technical officers. The units listed under the heading **stream core** are compulsory for technical officers who perform that specialist work. The units listed under the heading **elective** may only apply to some personnel according to the size and scope of the operations of the particular enterprise and laboratory.

**Compulsory core units of competency for ALL Diplomas**

**Achieve the following THIRTEEN compulsory core units**

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML COM 300 A</td>
<td>Communicate with other people</td>
</tr>
<tr>
<td>PML COM 500 A</td>
<td>Provide information to customers</td>
</tr>
<tr>
<td>PML DATA 300 A</td>
<td>Process and record data</td>
</tr>
<tr>
<td>PML DATA 500 A</td>
<td>Analyse data and report results</td>
</tr>
<tr>
<td>PML DATA 501 A</td>
<td>Use laboratory application software</td>
</tr>
<tr>
<td>PML MAIN 300 A</td>
<td>Maintain the laboratory fit for purpose</td>
</tr>
<tr>
<td>PML OHS 300 A</td>
<td>Work safely in accordance with defined policies and procedures</td>
</tr>
<tr>
<td>PML ORG 300 A</td>
<td>Follow established work plan</td>
</tr>
<tr>
<td>PML QUAL 401 A</td>
<td>Apply quality system and continuous improvement processes</td>
</tr>
<tr>
<td>PML TEAM 300 A</td>
<td>Work efficiently as part of a team</td>
</tr>
</tbody>
</table>
PML TEST 400 A  Perform instrumental tests/procedures
PML TEST 402 A  Prepare, standardise and use solutions
PML TEST 500 A  Calibrate and maintain instruments

**Diploma of Laboratory Technology**

For the Diploma of Laboratory Technology, with no specialisation, candidates must achieve a total of twenty (20) units of competency. In addition to achieving the thirteen (13) compulsory core units listed for all Diplomas, they must achieve a further seven (7) units as follows:

**Elective units of competency**

**Achieve a minimum of ONE of the following units**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
<tr>
<td>PML TEST 301 A</td>
<td>Perform biological laboratory procedures</td>
</tr>
</tbody>
</table>

**Achieve SIX elective units including at least FOUR of the following units**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML QUAL 400 A</td>
<td>Contribute to ongoing development of HACCP plans</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 305 A</td>
<td>Perform aseptic techniques</td>
</tr>
<tr>
<td>PML TEST 401 A</td>
<td>Perform non-instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 403 A</td>
<td>Assist with geotechnical site investigations</td>
</tr>
<tr>
<td>PML TEST 501 A</td>
<td>Perform microbiological tests</td>
</tr>
<tr>
<td>PML TEST 503 A</td>
<td>Perform histological tests</td>
</tr>
<tr>
<td>PML TEST 505 A</td>
<td>Conduct sensory analysis</td>
</tr>
<tr>
<td>PML TEST 506 A</td>
<td>Apply spectrometric techniques</td>
</tr>
<tr>
<td>PML TEST 507 A</td>
<td>Apply chromatographic and electrophoretic techniques</td>
</tr>
<tr>
<td>PML TEST 508 A</td>
<td>Perform ecological techniques</td>
</tr>
<tr>
<td>PML TEST 511 A</td>
<td>Supervise earthworks inspection, sampling and testing operations</td>
</tr>
</tbody>
</table>
With any balance of electives drawn from units listed below or from the Advanced Diploma in this Training Package, or from units imported from other Training Packages that satisfy the packaging rules defined earlier

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML MAIN 500 A</td>
<td>Maintain and control stocks</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>Assist with the maintenance of reference material</td>
</tr>
<tr>
<td>PML ORG 500 A</td>
<td>Schedule laboratory work for a small team</td>
</tr>
<tr>
<td>PML TEST 502 A</td>
<td>Perform haematological tests</td>
</tr>
<tr>
<td>PML TEST 504 A</td>
<td>Perform chemical pathology tests</td>
</tr>
<tr>
<td>PML TEST 509 A</td>
<td>Perform immunohaematological tests</td>
</tr>
<tr>
<td>PML TEST 510 A</td>
<td>Perform fieldwork</td>
</tr>
<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
</tr>
</tbody>
</table>
**Diploma of Laboratory Technology (Process Manufacturing Testing)**

For the Diploma of Laboratory Technology (Process Manufacturing Testing), candidates must achieve a total of twenty (20) units of competency. In addition to achieving the thirteen (13) compulsory core units listed for all Diplomas, they must achieve a further seven (7) units as follows:

**Stream core units of competency**

Achieve all FIVE of the following stream core units

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
<tr>
<td>PML TEST 401 A</td>
<td>Perform non-instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 506 A</td>
<td>Apply spectrometric techniques</td>
</tr>
<tr>
<td>PML TEST 507 A</td>
<td>Apply chromatographic and electrophoretic techniques</td>
</tr>
</tbody>
</table>

**Elective units of competency**

Achieve TWO electives drawn from units listed below or from the Advanced Diploma in this Training Package, or from units imported from other Training Packages that satisfy the packaging rules defined earlier

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML MAIN 500 A</td>
<td>Maintain and control stocks</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>Assist with the maintenance of reference material</td>
</tr>
<tr>
<td>PML ORG 500 A</td>
<td>Schedule laboratory work for a small team</td>
</tr>
<tr>
<td>PML TEST 403 A</td>
<td>Assist with geotechnical site investigations</td>
</tr>
<tr>
<td>PML TEST 510 A</td>
<td>Perform field work</td>
</tr>
<tr>
<td>PML TEST 511 A</td>
<td>Supervise earthworks inspection, sampling and testing operations</td>
</tr>
<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
</tr>
</tbody>
</table>
Diploma of Laboratory Technology (Pathology Testing)

For the Diploma of Laboratory Technology (Pathology Testing), candidates must achieve a total of twenty (20) units of competency. In addition to achieving the thirteen (13) compulsory core units listed for all Diplomas, they must achieve a further seven (7) units as follows:

Stream core units of competency

Achieve all SIX of the following stream core units

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML TEST 301 A</td>
<td>Perform biological laboratory procedures</td>
</tr>
<tr>
<td>PML TEST 305 A</td>
<td>Perform aseptic techniques</td>
</tr>
<tr>
<td>PML TEST 501 A</td>
<td>Perform microbiological tests</td>
</tr>
<tr>
<td>PML TEST 502 A</td>
<td>Perform haematological tests</td>
</tr>
<tr>
<td>PML TEST 503 A</td>
<td>Perform histological tests</td>
</tr>
<tr>
<td>PML TEST 504 A</td>
<td>Perform chemical pathology tests</td>
</tr>
</tbody>
</table>

Elective units of competency

Achieve ONE elective drawn from units listed below or from the Advanced Diploma in this Training Package, or from units imported from other Training Packages that satisfy the packaging rules defined earlier

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML MAIN 500 A</td>
<td>Maintain and control stocks</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>Assist with the maintenance of reference material</td>
</tr>
<tr>
<td>PML ORG 500 A</td>
<td>Schedule laboratory work for a small team</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 506 A</td>
<td>Apply spectrometric techniques</td>
</tr>
<tr>
<td>PML TEST 507 A</td>
<td>Apply chromatographic and electrophoretic techniques</td>
</tr>
<tr>
<td>PML TEST 509 A</td>
<td>Perform immunohaematological tests</td>
</tr>
<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
</tr>
</tbody>
</table>
Diploma of Laboratory Technology (Biological and Environmental Testing)

For the Diploma of Laboratory Technology (Biological and Environmental Testing), candidates must achieve a total of twenty (20) units of competency. In addition to achieving the thirteen (13) compulsory core units listed for all Diplomas, they must achieve a further seven (7) units as follows:

Stream core units of competency

Achieve all FIVE of the following stream core units

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML TEST 301 A</td>
<td>Perform biological laboratory procedures</td>
</tr>
<tr>
<td>PML TEST 305 A</td>
<td>Perform aseptic techniques</td>
</tr>
<tr>
<td>PML TEST 501 A</td>
<td>Perform microbiological tests</td>
</tr>
<tr>
<td>PML TEST 506 A</td>
<td>Apply spectrometric techniques</td>
</tr>
<tr>
<td>PML TEST 507 A</td>
<td>Apply chromatographic and electrophoretic techniques</td>
</tr>
</tbody>
</table>

Elective units of competency

Achieve TWO electives drawn from units listed below or from the Advanced Diploma in this Training Package, or from units imported from other Training Packages that satisfy the packaging rules defined earlier

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML MAIN 500 A</td>
<td>Maintain and control stocks</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>Assist with the maintenance of reference material</td>
</tr>
<tr>
<td>PML ORG 500 A</td>
<td>Schedule laboratory work for a small team</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 503 A</td>
<td>Perform histological tests</td>
</tr>
<tr>
<td>PML TEST 508 A</td>
<td>Perform ecological techniques</td>
</tr>
<tr>
<td>PML TEST 510 A</td>
<td>Perform fieldwork</td>
</tr>
<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
</tr>
</tbody>
</table>
Diploma of Laboratory Technology (Food Testing)

For the Diploma of Laboratory Technology (Food Testing), candidates must achieve a total of twenty (20) units of competency. In addition to achieving the thirteen (13) compulsory core units listed for all Diplomas, they must achieve a further seven (7) units as follows:

Stream core units of competency

Achieve all FIVE of the following stream core units:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML QUAL 400 A</td>
<td>Contribute to ongoing development of HACCP plans</td>
</tr>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
<tr>
<td>PML TEST 305 A</td>
<td>Perform aseptic techniques</td>
</tr>
<tr>
<td>PML TEST 401 A</td>
<td>Perform non-instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 501 A</td>
<td>Perform microbiological tests</td>
</tr>
</tbody>
</table>

Elective units of competency

Achieve TWO electives drawn from units listed below or from the Advanced Diploma in this Training Package, or from units imported from other Training Packages that satisfy the packaging rules defined earlier

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML MAIN 500 A</td>
<td>Maintain and control stocks</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>Assist with the maintenance of reference material</td>
</tr>
<tr>
<td>PML ORG 500 A</td>
<td>Schedule laboratory work for a small team</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 505 A</td>
<td>Conduct sensory analysis</td>
</tr>
<tr>
<td>PML TEST 506 A</td>
<td>Apply spectrometric techniques</td>
</tr>
<tr>
<td>PML TEST 507 A</td>
<td>Apply chromatographic and electrophoretic techniques</td>
</tr>
<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
</tr>
</tbody>
</table>
The second qualification available within this Training Package at AQF 5 is:

**Diploma of Laboratory Technology (Scientific Glassblowing)  PML 502 00**

**Occupational group**

The scientific glassblowing stream of this qualification covers scientific glassblowers, who may also be described as scientific glass instrument makers or by similar titles.

**The work they perform**

Scientific glassblowers conduct a wide range of testing and glassblowing that requires the application of broad scientific-technical knowledge and skills to design and manufacture scientific glass apparatus and glass systems. Scientific glassblowers may perform glass coating, grinding and finishing operations, and construct, modify and maintain glass systems, including high vacuum systems. Although scientific glassblowers generally work in a scientific laboratory, they often work closely with personnel in other teams within a section of the workplace. They may liaise with suppliers to troubleshoot glass systems at the direction of laboratory supervisors, managers or researchers. They may also demonstrate methods to others and train them to perform glasswork and evaluate glass systems.

The work of scientific glassblowers involves frequent peak periods and interruptions. They

- work according to established procedures in a structured environment
- evaluate and maintain glass systems and communicate requirements to other personnel
- conduct a wide range of routine and specialised equipment design, manufacture, repair and maintenance activities where atypical glass systems may be involved and the equipment used has a wide range of operating variables
- contribute to the modification of SOPs when necessary
- define and solve problems where alternatives are not obvious and where investigations and trials may be required and the implications of various design solutions considered
- work under the direction and supervision of senior technical staff, laboratory or quality managers, or scientific/medical professionals
- generally work as part of a team and may have a role in the planning of schedules and monitoring of resources in their work area.

**The competencies they need**

The units of competency required by scientific glassblowers at this level have been grouped under three headings in the tables below. The units listed under the heading **compulsory core** are considered to be essential for all technical officers. The units listed under the heading **stream core** are compulsory for technical officers who perform that specialist work. The units listed under the heading **elective** may only apply to some personnel according to the size and scope of the operations of the particular enterprise and laboratory.

Note that the compulsory core bank of units for PML 502 00 differs from the compulsory core for PML 501 99, in that units PML TEST 400 A and PML TEST 402 A have been moved from the compulsory core bank to the elective bank, and the unit selection rules modified accordingly.
For the Diploma of Laboratory Technology (Scientific Glassblowing), candidates must achieve a total of twenty (20) units of competency. In addition to achieving the eleven (11) compulsory core units listed overleaf, they must achieve a further nine (9) units as follows:

Compulsory core units of competency for the Diploma of Laboratory Technology (Scientific Glassblowing) (PML 502 00)

Achieve the following ELEVEN compulsory core units for this Diploma (PML 502 00)

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML COM 300 A</td>
<td>Communicate with other people</td>
</tr>
<tr>
<td>PML COM 500 A</td>
<td>Provide information to customers</td>
</tr>
<tr>
<td>PML DATA 300 A</td>
<td>Process and record data</td>
</tr>
<tr>
<td>PML DATA 500 A</td>
<td>Analyse data and report results</td>
</tr>
<tr>
<td>PML DATA 501 A</td>
<td>Use laboratory application software</td>
</tr>
<tr>
<td>PML MAIN 300 A</td>
<td>Maintain the laboratory fit for purpose</td>
</tr>
<tr>
<td>PML OHS 300 A</td>
<td>Work safely in accordance with defined policies and procedures</td>
</tr>
<tr>
<td>PML ORG 300 A</td>
<td>Follow established work plan</td>
</tr>
<tr>
<td>PML QUAL 401 A</td>
<td>Apply quality system and continuous improvement processes</td>
</tr>
<tr>
<td>PML TEAM 300 A</td>
<td>Work efficiently as part of a team</td>
</tr>
<tr>
<td>PML TEST 500 A</td>
<td>Calibrate and maintain instruments</td>
</tr>
</tbody>
</table>

Stream core units of competency

Achieve at least FOUR of the following units, including PML SCIG 300A, PML SCIG 301 A and PML SCIG 501 A.

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML SCIG 300 A</td>
<td>Operate basic handblowing equipment</td>
</tr>
<tr>
<td>PML SCIG 301 A</td>
<td>Repair glass apparatus using simple glassblowing equipment</td>
</tr>
<tr>
<td>PML SCIG 501 A</td>
<td>Design and manufacture glass apparatus and glass systems</td>
</tr>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
<tr>
<td>PML TEST 301 A</td>
<td>Perform biological laboratory procedures</td>
</tr>
</tbody>
</table>
Elective units of competency

Achieve a further FOUR or FIVE elective units, including at least THREE of the following units, to bring the total number of units up to TWENTY. The units PML SCIG 502 A and PML SCIG 503 A have been developed specifically for this qualification, and one or both of these units should be included in the choice of electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML SCIG 502 A</td>
<td>Perform glass coating, grinding and finishing operations</td>
</tr>
<tr>
<td>PML SCIG 503 A</td>
<td>Construct, modify and maintain high vacuum systems</td>
</tr>
<tr>
<td>PML TEST 400 A</td>
<td>Perform instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 401 A</td>
<td>Perform non-instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 402 A</td>
<td>Prepare, standardise and use solutions</td>
</tr>
<tr>
<td>PML TEST 506 A</td>
<td>Apply spectrometric techniques</td>
</tr>
<tr>
<td>PML TEST 507 A</td>
<td>Apply chromatographic and electrophoretic techniques</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML ORG 500 A</td>
<td>Schedule laboratory work for a small team</td>
</tr>
<tr>
<td>PML MAIN 500 A</td>
<td>Maintain and control stocks</td>
</tr>
</tbody>
</table>

Any remaining electives may be drawn from units listed below or from the Advanced Diploma in this Training Package, or from units imported from other Training Packages that satisfy the packaging rules defined earlier.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML TEST 305 A</td>
<td>Perform aseptic techniques</td>
</tr>
<tr>
<td>PML TEST 501 A</td>
<td>Perform microbiological tests</td>
</tr>
<tr>
<td>PML TEST 502 A</td>
<td>Perform haematological tests</td>
</tr>
<tr>
<td>PML TEST 503 A</td>
<td>Perform histological tests</td>
</tr>
<tr>
<td>PML TEST 504 A</td>
<td>Perform chemical pathology tests</td>
</tr>
<tr>
<td>PML TEST 505 A</td>
<td>Conduct sensory analysis</td>
</tr>
<tr>
<td>PML TEST 508 A</td>
<td>Perform ecological techniques</td>
</tr>
<tr>
<td>PML TEST 509 A</td>
<td>Perform immunohaematological tests</td>
</tr>
<tr>
<td>PML TEST 510 A</td>
<td>Perform fieldwork</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>Assist with the maintenance of reference material</td>
</tr>
<tr>
<td>PML QUAL 400 A</td>
<td>Contribute to ongoing development of HACCP plans</td>
</tr>
<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
</tr>
</tbody>
</table>
AQF 6

There is a laboratory role at this AQF outcome for most industry sectors.

**Advanced Diploma of Laboratory Operations**  
PML 601 99

Candidates require twelve (12) units of competency consisting of eight (8) compulsory core units and four (4) electives that satisfy the packaging rules.

**Occupational group**

Senior technical officers, laboratory supervisors, senior laboratory technicians and other titles.

**The work they perform**

Senior technicians or laboratory supervisors are generally responsible for the planning, allocation of tasks, coordination, quality assurance, recording and reporting of laboratory outputs within their work area or project team. This requires significant judgement about work sequences, choice of appropriate technology and procedures to ensure that products and services meet customer expectations and are provided safely and efficiently in keeping with enterprise business plan. Under broad direction from scientists/medical staff/engineers the senior technician/supervisor accepts responsibility for the day to day operation of his/her work/functional area.

Senior technicians are required to have considerable technical insight, well developed analytical skills and the ability to apply in-depth specialist technical knowledge to determine methods of approach from a range of possible alternatives. They may be recognised as an authority in a particular technical activity or function because they keep up to date with the developments of their particular field. They may make original contributions to technical activities and are closely involved with continuous development of novel systems, methods or procedures.

Senior technicians are often responsible for the effective implementation of operational policies and the technical training of personnel in their work area. They also contribute significantly to the development of these policies through the application of specialised technical knowledge.

Their work involves frequent peak periods, multiple and competing demands and frequent interruptions. Immediate decisions are often required. They must be adaptable to deal with the demands brought about by any of a number of causes. For example:

- a range of demanding clients, suppliers, or contractors
- changes in technology
- regularly changing priorities.

In the course of their normal work, they:

- plan, allocate and monitor resources for their work area and are responsible for their work group’s outputs
- apply in-depth technical knowledge and skills to deliver the variety of products and services associated with the work area
- explain complex instructions and procedures to others
define and solve complex problems by investigating, developing and testing alternatives in response to vague or ill-defined information which is not readily accessible and requires selective analysis
make significant contributions to the development of technical and operational policy and procedures within a function or work area
liaise with outside organisations, customers, suppliers and contractors on technical matters
provide technical information to internal and external customers
often provide workplace training and assessment
implement, maintain and promote OHS, quality and other compliance requirements and conduct audits
work under the general direction of laboratory or quality managers, or scientific/medical personnel.

They may also undertake a range of complex technical tasks. For example:

conduct a wide range of complex and specialised tests
exercise considerable analytical and judgemental skills to determine appropriate methods and procedures from a range of alternatives
modify methods to cope with non-routine tests and analyses where unusual samples could be involved and/or where the instrumental controls require optimisation
develop or adapt methods and procedures.

An example of the work of a laboratory supervisor is given below:

A laboratory supervisor in a large water and sewerage utility company has been a senior technical officer for more than five years. The officer supervises technical personnel in the environmental testing section, monitors the quality of their work, oversees their training and ensures that regulatory and NATA requirements are met. The officer assists with the planning of the section’s work program and advises management and customers about test schedules, results and methodology.

**The competencies they need**

The units of competency required have been grouped under two headings over the page. The units listed under the heading **compulsory core** are considered to be essential for all laboratory supervisors. The units listed under the heading **elective** may only apply to some personnel according to the size and scope of the operations of the particular enterprise and laboratory.

**Advice to providers**

To enter the Advanced Diploma of Laboratory Operations, entrants must have completed any Diploma of Laboratory Technology or demonstrate equivalent competency. It is recommended that entrants have had an appropriate period of employment at an occupational level commensurate with any Diploma of Laboratory Technology prior to entry to the Advanced Diploma of Laboratory Operations.
## Advanced Diploma of Laboratory Operations

### Compulsory core units of competency

**Achieve the following EIGHT compulsory core units**

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Unit Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML COM 500 A</td>
<td>Provide information to customers</td>
</tr>
<tr>
<td>PML COM 600 A</td>
<td>Develop and maintain laboratory documentation</td>
</tr>
<tr>
<td>PML OHS 300 A</td>
<td>Work safely in accordance with defined policies and procedures</td>
</tr>
<tr>
<td>PML OHS 600 A</td>
<td>Implement and monitor risk management processes associated with OHS and environmental policies and procedures</td>
</tr>
<tr>
<td>PML ORG 600 A</td>
<td>Supervise laboratory operations in work/functional area</td>
</tr>
<tr>
<td>PML ORG 601 A</td>
<td>Maintain registration and statutory or legal compliance in work/functional area</td>
</tr>
<tr>
<td>PML QUAL 600 A</td>
<td>Maintain quality system and continuous improvement processes within work/functional area</td>
</tr>
<tr>
<td>PML TEAM 600 A</td>
<td>Manage and develop teams</td>
</tr>
</tbody>
</table>

### Elective units of competency

**Achieve FOUR elective units drawn from units listed below or from units imported from other Training Packages that satisfy the packaging rules defined earlier**

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Unit Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML ORG 602 A</td>
<td>Manage complex projects</td>
</tr>
<tr>
<td>PML QUAL 601 A</td>
<td>Conduct an internal audit of the quality system</td>
</tr>
<tr>
<td>PML TEST 600 A</td>
<td>Select appropriate test methods and procedures</td>
</tr>
<tr>
<td>PML TEST 700 A</td>
<td>Contribute to the development of products and applications</td>
</tr>
<tr>
<td>PML TEST 701 A</td>
<td>Troubleshoot equipment and production processes</td>
</tr>
<tr>
<td>PML TEST 702 A</td>
<td>Contribute to the validation of test methods</td>
</tr>
<tr>
<td>PML TEST 703 A</td>
<td>Develop or adapt analyses and procedures</td>
</tr>
<tr>
<td>PML TEST 704 A</td>
<td>Integrate data acquisition and interfacing systems</td>
</tr>
</tbody>
</table>
Appendix 3: Example of a customised unit of competency

Unit Title: - unchanged

Follow established work plan

PML ORG 300 A

Unit descriptor - unchanged

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>unchanged</td>
<td>unchanged</td>
</tr>
</tbody>
</table>

RANGE OF VARIABLES

Cross industry variables - unchanged

*The variables shown in bold italics may not be directly relevant to science laboratories in education*

This unit of competency includes the following types of information sources and documentation:

- job cards, *batch cards, production schedules*

This unit of competency includes communication with relevant personnel to:

- modify work plan to cope with *urgent tests*, abnormal results, problems with equipment and reagents, *problems with production and quality control*.

Specific industry variables - add for education

Education

- Types of information and documentation could include:
  - relevant State/Territory education policies and guidelines for the use of human tissue and bodily fluids in student exercises; for the use and storage of animals; for the collection and disposal of wastes
  - class schedules and timetables
  - requirements for teacher/demonstrator and student experiments
  - protocols for maintaining cultures for ongoing class use and experiments
Workplace activities could include but are not limited to:
- dispensing samples and arranging equipment and apparatus for student use
- photocopying student notes
- tracking usage of consumables
- ordering materials and equipment.

Updating information - unchanged

EVIDENCE GUIDE

Critical aspects of competency

Cross industry - unchanged

Essential knowledge

Cross industry - unchanged

Specific industry - add for education

Education

Competency includes the ability to apply and explain workplace procedures covering:
- State/Territory education requirements for the operation of science laboratories.

Assessment context - unchanged

Interdependent assessment of unit - unchanged

Assessment methods and resources - unchanged

This competency in practice - add for education

Education

Add storyline.

Key competencies - unchanged
Assessment Guidelines

for the

Laboratory Operations Training Package
(PML 99)

December 1999
Assessment system overview

Why develop assessment guidelines?

Assessment guidelines are part of the endorsed components of all Training Packages. It is intended that these particular assessment guidelines will be common to all Training Packages developed by Manufacturing Learning Australia (MLA).

The purpose of developing assessment guidelines is to set out the mechanisms and processes for ensuring reliable, flexible, fair and valid assessment of achievement against nationally endorsed industry competency standards.

These assessment guidelines bring together all of the common processes, approaches and systems involved in assessment across all process manufacturing Training Packages. Assessment details specific to an industry sector will be contained in the non-endorsed components of the relevant Training Package.

What is the role of an assessor?

The primary role of an assessor for national recognition purposes is to collect sufficient evidence, then objectively assess and judge the competency of a candidate against national competency standards.

Assessments against the competencies in the Training Package will be carried out in accordance with these endorsed guidelines. The guidelines include the necessary competencies for those conducting assessments, and provide for those situations where more than one person may contribute to the assessment and where the required technical and assessment competencies may not all be held by any one person.

What is the role of Registered Training Organisations in assessment?

All assessment for national recognition purposes is undertaken by, or auspiced¹ through, a Registered Training Organisation (RTO).²

RTOs will provide a range of training and assessment products and services to support the delivery and award of qualifications in this Training Package.

Provision has also been made for RTOs that only conduct assessment and award qualifications and statements of attainment. An assessment only RTO may be established to serve an industry sector, a whole industry or multiple industries.

The RTO keeps and maintains records of assessments against competency standards, and issues the statements of attainment and qualifications.

Non-registered training organisations (that is, organisations which deliver training, but are not registered) or enterprises may form partnerships with RTOs in order to jointly provide training and assessment.

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¹ Auspicing is a process whereby a Registered Training Organisation validates assessment carried out by industry or individual enterprises.
² A Registered Training Organisation (RTO) is a nationally recognised organisation which delivers training, or may be registered for assessment and the award of qualifications and statements of attainment (refer to Glossary).
What about qualifications in this new system?

Outcomes of assessment are reported directly in terms of:
statements of attainment against the relevant competency units
qualifications under the Australian Qualifications Framework.

Who will monitor the new process?

A key feature of the assessment system will be the external auditing process. The State/Territory Training Authorities (STAs) will monitor compliance to the assessment system as a requirement of registration.

RTOs are responsible for ensuring that assessors are competent and maintain their competency, as required by these assessment guidelines.

Assessment principles

What are the principles upon which assessment is based?

The assessment system described here meets the requirements of the 1996 ANTA Ministerial Council (MINCO) In Principle Agreement. (MINCO comprises the Commonwealth and State/Territory Ministers with responsibility for vocational education and training.)

Competency standards are the benchmarks for assessment. Assessment will be against the relevant competency standards.

Competency comprises the following aspects:
task skills (performance of individual tasks)
task management skills (managing a number of different tasks within the job)
contingency management skills (responding to problems, breakdowns and changes in routine)
job/role environment skills (dealing with the responsibilities and expectations of the workplace).

Assessment is an integral component of training. Assessment must be reliable, flexible, fair and valid:

To be reliable, the assessment methods and procedures must ensure that competency standards are applied consistently.

To be flexible, assessment should be able to take place on the job, off the job or a combination of both. It should allow for diversity regarding how, where and when competencies have been acquired.

To be fair, the assessment must not advantage or disadvantage particular candidates or groups of candidates. Although laboratory work is highly exacting, assessors should make reasonable adjustments to the assessment process to take account of such things as a candidate’s: disability, literacy, numeracy or language difficulties.

To be valid, the assessment has to assess what it claims to assess. Sufficient evidence must be collected that is relevant to the standard being assessed.
Although laboratory work is highly exacting, assessors should make reasonable adjustments to the assessment process to take account of such things as; disability and/or literacy, numeracy or language difficulties.

**Assessment options**

**What are the available options for assessment?**

Assessment may occur in a range of environments, appropriate to the context and nature of the competencies being assessed:

- on the job
- off the job
- a combination of both.

Units of competency may be assessed separately or in combination.

Assessment may occur as part of a structured training program or through an “assessment only” process, where candidates receive recognition of current competencies.

Each assessment option must provide the opportunity for the candidate to demonstrate competency. Whilst the preferred mode of assessment is through demonstration of skills in a workplace setting, this requirement can be met in a number of ways:

The issuing of a qualification is based on achievement of competency in a number of prescribed units of competency as detailed in the Qualifications Framework of this Training Package. A Statement of Attainment recognises the partial achievement of a qualification and will list the unit or units of competency in which competency is achieved.

There are a number of ways by which appropriate experience towards the development of competency may be gained, including:

- standard employment
- placement in an enterprise for work experience
- participation in a New Apprenticeships arrangement
- use of a simulated work environment.

All credentials identified within process manufacturing Training Packages are potential New
Apprenticeships.

Key features of New Apprenticeships are:

- negotiated training programs leading to a national qualification
- the training program involves paid work and structured training which may be on the job or a combination of on the job and off the job
- a training agreement registered with the appropriate STA.

Any of the pathways identified in these assessment guidelines and detailed in process manufacturing Training Packages may be the basis of a New Apprenticeship training program.

**Assessor competencies**

**What are the requirements of a competent assessor?**

Assessment against the competencies in this Training Package should be carried out by a person or persons who meet the following requirements:

- holds formal recognition of competency in at least the units for which they wish to conduct assessment
- holds the following competencies for assessors contained in the *Training Package for Assessment and Workplace Training*:
  - BSZ 401 A Plan assessment
  - BSZ 402 A Conduct assessment
  - BSZ 403 A Review assessment
- which are deemed equivalent to the units:
  - Conduct assessment in accordance with an established assessment procedure
  - Extension unit: Plan and review assessment.
- have current knowledge of industry roles and practice
- have knowledge of current enterprise practices for the job or the role against which the performance is being assessed.

**How may the requirements for competent assessors be used?**

The requirement to use competent assessors may be met through the use of any of the following options:

- an *assessor* who is competent against the assessor competency standards and the relevant vocational competencies
- an *assessor* who is competent against the assessment competency standards and who has *ready access to another person* who is competent in, and can advise the assessor on, the relevant industry competencies at least to the level being assessed
- a *person from the workplace* with the relevant vocational competencies at least to the level being assessed who utilises industry endorsed assessment procedures with the outcome being validated by an *external assessor* who is competent against the assessor standards.
How may assessors remain competent?

The requirement for current knowledge of industry roles and practice could be met through an appropriate combination of:

- current work
- relevant release to industry
- exposure to industry visits and training sessions
- attendance at professional development activities focused on emerging/current best practice in industry

and may be evidenced by:

- recent work history (paid or unpaid)
- provision of a statement of professional or workplace activities supported by a responsible industry referee.

How may assessment be carried out?

Assessments against the competencies in the Training Package will be carried out in accordance with these endorsed guidelines. The guidelines include the necessary competencies for those conducting assessments, and provide for those situations where more than one person may contribute to the assessment and where the required technical and assessment competencies may not all be held by any one person.

Designing assessment

What criteria must be met when designing assessment?

The relevant competency standards are the benchmark for assessment.

The design of assessment needs to ensure that all aspects of competency are covered:

- task skills (performance of individual tasks)
- task management skills (managing a number of different tasks within the job)
- contingency management skills (responding to problems, breakdowns and changes in routine)
- job/role environment skills (dealing with the responsibilities and expectations of the workplace)
- relevant underpinning knowledge.

Assessment must address the performance criteria specified in the three relevant units of the Training Package for Assessment and Workplace Training:

- BSZ 401 A Plan assessment
- BSZ 402 A Conduct assessment
- BSZ 403 A Review assessment

Workplace assessor
Evidence gathering methods must be gender and culturally inclusive and take into account the language, literacy and numeracy skills of both candidate and assessor. Assessors may consider:

- incorporating a range of assessment techniques
- integrating the assessment of units related to the performance of “whole of work” tasks, roles or functions
- using a holistic approach which combines, knowledge, understanding, problem solving, technical skills and applications to new situations into the assessment process
- assessing in the workplace (wherever possible), using familiar skills and materials
- eliminating any unnecessary reading or written assessment (if these skills are not required to do the job, they should not be part of the assessment)
- ensuring understanding of questions by rephrasing to clarify and using the language and terms of the job and the workplace
- encouraging the candidate to ask questions to clarify instructions
- providing clarification of purpose and process of assessment
- considering cultural and gender issues when setting up the assessment.

In all pathways, where candidates have difficulty achieving competency in a particular unit of competency, it may indicate the necessity to further develop the key competencies required to attain that unit of competency.

**Conducting assessments**

**What should be kept in mind when conducting assessments?**

Assessors must identify which of the relevant competency standards is being assessed, and be familiar with the content and context of the standard and how it is applied in the workplace.

Assessments must meet the standards as set down in the in the Training Package for Assessment and Workplace Training:

- BSZ 401 A Plan assessment
- BSZ 402 A Conduct assessment
- BSZ 403 A Review assessment

Evidence-gathering methods must be appropriate to the context of the assessment, the assessor and the candidate.

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3 The relationship between the key competencies and each unit of competency is given in the Competency Standards.
The collection of evidence must meet the principles of validity, authenticity, sufficiency, currency and consistency:

**Valid** evidence collection ensures that the assessment assesses what it claims to assess. The evidence collected must be relevant to the activity and focus on the knowledge and skills specified in the Evidence Guides and Performance Criteria.

**Authentic** assessment relates primarily to achieving "a close correspondence between the assessment situation and the situation in which the candidate will one day operate". A driving practical test is, in this sense, an authentic assessment process. In other contexts where complete authenticity will usually not be practical, every effort should be made to maximise authenticity. An assessor must also ensure that the evidence actually relates to the performance of the person being assessed, and not that of another person. Where this is an issue, validation of the evidence by a third party may be necessary.

A **sufficient** assessment requires that sufficient evidence is collected to demonstrate competency in the standard being assessed. Evidence should be gathered on a number of occasions, in a range of contexts and using different assessment methods.

**Currency** of evidence collection ensures that the evidence is not outdated and that the person is competent in terms of the most recent standards. This is of particular concern when assessing for the purposes of recognition of current competencies.

A **consistent** assessment ensures both that the evidence collected demonstrates consistent achievement of the specified standard by the person being assessed, and that the outcomes of the assessment process are substantially consistent irrespective of where, when and by whom the assessment is conducted.

Following the assessment process, assessment outcomes need to be recorded and securely stored, and feedback provided in terms of performance against the relevant process manufacturing competency standards.

Where assessment is occurring in the workplace:

Take into account that the person being assessed may have had little experience of structured training and assessment. Carefully explain the process of making judgements against the standards and make the candidate feel as relaxed as possible.

Consult on the assessment process with the parties involved.

The assessment should take place over a reasonable length of time so that the candidate has the opportunity to demonstrate work responsibility and contingency management. Third party reports of workplace performance, if available, are helpful for this.

Consider the other staff in the workplace likely to be affected by the process. All staff directly or indirectly involved in the process should be briefed on the factors which will impact on them, such as duration or changes in work routine.

Ensure that assessment is as compatible as possible with the normal pattern of work and causes minimal disruption. If the process involves candidates being away from their work area for a period of time, then arrangements should be made with their immediate supervisor to cover their duties for that period of time.

Assessment resources included in the non-endorsed component of the relevant Training Package will provide ways in which to address these matters.

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4 Alison Wolf, *Competency-based Assessment*, Buckingham (UK), Open University Press, 1995, p 135
Where assessment is occurring out of the workplace:

Where it is not possible for assessment to occur in the workplace, assessment should take place in a situation as close as possible to workplace reality.

Ensure that all aspects of competency are assessed.

The assessment should take place over a reasonable length of time so that the candidate has the opportunity to demonstrate work responsibility and contingency management. Third party reports of workplace performance, if available, are helpful for this.

Documents used in assessment should closely reflect workplace reality.

Assessment resources listed in the non-endorsed component of the relevant Training Package will provide ways in which to address these matters.

The following are some of the commonly used methods of gathering evidence. It is good practice to use more than one method of evidence collection in an assessment.\(^5\)

- demonstration
- questioning
- workplace performance
- simulation
- products/services
- oral presentation
- projects/assignments
- work-based research assignments
- written tests
- skills portfolio
- third party reports.

**Recording and reporting assessment outcomes**

**How are assessment outcomes to be recorded?**

Assessment outcomes must be reported and recorded in terms of the relevant competency standards.

Qualifications and statements of attainment issued by RTOs will comply with the requirements of the Australian Recognition Framework and the specific qualification requirements of the relevant Training Package.

Results will be recorded as achievement of a qualification or a statement of attainment against the relevant competency standards.

Responsibility for recording, storing and accessing assessment outcomes rests with the RTO that issues the qualification or statement of attainment under the Australian Qualifications Framework (AQF).

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\(^5\) For further information regarding methods of gathering evidence, refer to Conducting Assessment Training Programs, available from Australian Training Products.
Appeal and reassessment process

What process is available to dispute an assessment outcome?

An appeals and reassessment process is an integral part of all training and assessment pathways leading to a statement of attainment or qualification under the AQF.

The appeals and reassessment process is developed and managed by the RTO.

As a first step, appeals should be made to and reassessments done by the RTO.

Should this fail, responsibility rests with the STAs for the implementation of fair and impartial appeals processes.

The appeals and reassessment process is described to the candidate prior to assessment taking place, as part of the explanation of the overall assessment procedure.

Parties involved in the assessment have the right, under the appeals and reassessment process, to request reassessment at a later time if reasonable grounds are demonstrated for questioning the original outcome.

External audit of RTO

Is there any external monitoring of the assessment process?

External audit of RTOs is a requirement of the National Training Framework. External audits are seen as important quality assurance activities to improve and further develop the assessment processes and outcomes.

Audit processes will be initiated and managed by the STAs with the involvement of industry.

Standards for audit of the RTO must include compliance with these assessment guidelines.

Assessment references

These Assessment Guidelines apply specifically to the Laboratory Operations Training Package, available from Manufacturing Learning Australia or Australian Training Products.
Related Training Packages are available from the following sources.

### Process Manufacturing Competency Standards
- Training Package for the Chemical, Hydrocarbons and Oil Refining Industries
- Training Package for the Plastics, Rubber and Cablemaking Industries
- Training Package for the Manufactured Mineral Products Industry covering cement, ceramics, clay, concrete, glass and related products
- Cross Industry Training Package for Laboratory Operations

**Available from:**
- **Manufacturing Learning Australia**
  - Suite 302, 368 Sussex Street, SYDNEY NSW 2000
  - phone 02 9264 9822
  - fax 02 9264 9938
  - email mlaust@ozemail.com.au

Or: **Australian Training Products Ltd** (see below for contact details)

### Training and Assessment Competency Standards

**Available from:**
- **National Assessors and Workplace Trainers Body**
  - 8 Soudan Lane, PADDINGTON NSW 2021
  - phone 02 9360 7322
  - fax 02 9360 5688
  - email assessors@nawtb.com.au
  - internet www.nawtb.com.au

### Frontline Management Competency Standards

**Available from:**
- **Business Services Training Australia**
  - Ground Floor, Como Centre, 650 Chapel Street, SOUTH YARRA VIC 3141
  - phone 03 9824 0866
  - fax 03 9824 0877
  - email nclement@bigpond.com

### ANTA publications

- Training Packages: An integrated approach to flexible training delivery

**Available from:**
- **the Australian National Training Authority**
  - GPO Box 3120, BRISBANE QLD 4001
  - phone 07 3246 2300
  - fax 07 3246 2490
  - internet www.anta.gov.au

### ATP publications

- Conducting Assessment Training Program

**Available from:**
- **Australian Training Products Ltd**
  - PO Box 12211 A’Beckett St Post Office Melbourne, Victoria 8006, Australia
  - Telephone +61 3 9655 0600
  - Facsimile +61 3 9639 4684
  - E-mail: sales@atpl.net.au
  - Internet: www.atpl.net.au
## Glossary

**Appeals process**  
The process by which disputes involving the outcome of an assessment may be reassessed

**Assessment**  
The process of collecting evidence and making judgements on whether competency has been achieved

**Auspicing**  
A process whereby a Registered Training Organisation manages the quality assurance of assessment carried out by industry or individual enterprises

**Assessment system**  
A process designed to ensure that assessment decisions made in relation to many individuals, by many assessors, in many situations are consistent, fair and valid

**Candidate**  
Person to be assessed

**Competency**  
Competency comprises the knowledge and skills and the consistent application of that knowledge and skills to the standard of performance required in employment.

**Customisation**  
The process of adding enterprise-specific information to the endorsed national standards so that the standards reflect the work of a particular workplace, whilst maintaining the integrity of the standard

**Evidence**  
The set of information which, when matched against the relevant criteria, provides proof of the candidate’s competency. Evidence can take many forms and be gathered from a number of sources.

**Integrated assessment**  
An approach to assessment that covers multiple elements and/or units from relevant competency standards. An integrated approach attempts to combine knowledge, understanding, problem solving, technical skills, attitudes and ethics into assessment tasks in order to link assessment with the performance of realistic “whole of work” tasks, roles and functions.

**MLA**  
Manufacturing Learning Australia (MLA) is the National Process Manufacturing Industry Training Advisory Body Ltd.

**MINCO**  
ANTA Ministerial Council of Federal and State Ministers. This body is responsible for vocational education and training.

**NTFC**  
National Training Framework Committee, this body is responsible for endorsing Training Packages.

**Reassessment**  
An assessment activity initiated as a result of an appeal against
the outcome of a previous assessment

**Glossary continued ...**

<table>
<thead>
<tr>
<th><strong>Records of assessment</strong></th>
<th>The information that is retained by the organisation that is responsible for issuing the nationally recognised statement of attainment or qualification of the assessment outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reporting of assessment outcomes</strong></td>
<td>The way in which the outcomes of assessment processes are reported to candidates, employers and other relevant groups. The unit of competency is the minimum level at which reporting takes place.</td>
</tr>
</tbody>
</table>
| **Registered Training Organisation (RTO)** | A nationally registered training organisation - TAFE institution, private provider, RPL and assessment agency, Group Training Company, industry organisation, enterprise - that is also registered with a State/Territory training authority. Registered Training Organisations may be registered for:  
  - provision of training and assessment and issuance of qualifications  
  - provision of skills recognition services (assessment only) and issuance of qualifications. |
| **Statement of attainment** | A statement of attainment will be issued to candidates where they have completed one or more units of competency but have not met all the requirements of a qualification. |
Competency Standards for the Laboratory Operations Training Package (PML 99) Revised January 2001
How do you interpret competency standards?

A description of each component of a competency standard is given below (see also pages B-18 to B-20).

Units of competency

Each set of competency standards consist of a number of units of competency. A unit of competency:
- describes a broad performance or substantial skill area
- is transferable and integrates a number of skills
- relates to realistic work activities
- is relevant to a wide range of enterprise contexts such as: workplaces, products, services, and work systems.

Each unit of competency contains:
- elements of competency which are the building blocks of the unit
- performance criteria which can be assessed
- a range of variables statement which gives the broad context for the performance criteria and elements.
- an evidence guide for trainers and assessors which provides information such as the critical knowledge and skills that underpin the unit of competency and suggested assessment strategies.

When taken together, the elements of competency, performance criteria, range of variables and evidence guide provide the basis for assessing the unit.

A group of such units can be combined to describe a person’s duties, job role or function. Because a person draws on a number of units of competency during normal work activities, it is also more cost effective and realistic to assess a group of related units of competency wherever it is practical to do so.

Elements of competency

The elements of competency define the scope of each unit and describe the key aspects of performance which are observable. They are the smallest, logical sub-groupings of skills, knowledge and attitudes that make up a unit of competency.

Performance criteria

The performance criteria for any unit outline what candidates need to demonstrate before they can be judged competent. As such, the criteria inform candidates what is expected of them and provide a transparent basis for the professional judgement of an assessor. Performance criteria should be as precise as possible and:
- describe essential aspects of performance which are observable
- refer to work requirements, work organisation and the overall work role
- avoid referring to specific standards, methods, procedures or equipment which may become rapidly obsolete.
The performance criteria for a single unit of competency should not be assessed in isolation, nor used as a lengthy assessment checklist. Rather, the criteria should be combined to form the basis for judging a candidate’s competency for the unit as a whole.

**Range of variables**

The range of variables sets out the variety of contexts and conditions in which a person could demonstrate their competency.

Variables could include the:
- range of materials, equipment, processes, methods, procedures and facilities
- variety of standards, regulations, legislation and codes of practice that may apply
- requirements of particular enterprise procedures, operating systems, quality systems, product specifications and customer service standards
- variety of locations.

Because the cross-industry standards in this Laboratory Operations Training Package apply to a very wide range of industry settings, the range of variables statement for many units has two parts:
- cross-industry variables
- specific industry variables for each of the three priority sectors, if required.

Where there is no need for this distinction, these sub-headings have been omitted.

**Evidence guide**

The evidence guide sets out the required evidence of competency, including critical aspects of competency, essential knowledge and the relationship of the unit to other units. As for the range of variables above, the evidence guide also takes account of:
- cross industry evidence
- specific industry evidence for each of the three priority sectors, if required.

Where there is no need for this distinction, these sub-headings have been omitted.

There are several parts to the evidence guide:

**Critical aspects of competency**

Candidates must meet these requirements. They should be read in conjunction with the elements and performance criteria for the unit.

**Essential knowledge**

Candidates must demonstrate their understanding of these requirements. They should be read in conjunction with the elements and performance criteria for the unit.

**Assessment context**

This statement sets out where assessment should take place.
Interdependent assessment of unit

This statement identifies opportunities for assessing related units in an integrated way and specifies whether the unit has any prerequisites. (A prerequisite is a unit of competency which must be achieved before an individual can be assessed as competent in another specified unit). A full listing of prerequisite units of competency is provided on page CS-11.

Assessment methods and resources

This statement suggests valid, cost effective methods of assessment that are particularly relevant for the unit, together with a list of materials, equipment and/or facilities that assessors and candidates may need.

“This competency in practice”

These storylines, or real case studies, were supplied by industry. They are included to illustrate the performance in a variety of workplaces. The information is NOT to be interpreted as an additional evidence requirement. Rather, it illustrates how the unit of competency fits into a person’s whole job role in each of the relevant industry sectors.

Key competencies

These are the seven generic competencies that are considered to underpin effective workplace performance. It is expected that they will be developed and achieved as a person develops competency in the unit. The key competencies are reported for all national competency standards and involve three levels of performance. In simple terms:

⇒ Level 1 is the level of competency required to undertake activities
⇒ Level 2 is the level of competency required to manage activities
⇒ Level 3 is the level of competency required to evaluate and reshape activities.

A more complete summary of the seven competencies and associated performance levels is given over the page.
<table>
<thead>
<tr>
<th>Key competency</th>
<th>Performance level 1</th>
<th>Performance level 2</th>
<th>Performance level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collecting, analysing and organising ideas</td>
<td>Access and record - single source</td>
<td>Access, select and - record more than one source</td>
<td>Access, evaluate and organise - range of sources</td>
</tr>
<tr>
<td>and information</td>
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<tr>
<td>2. Communicating ideas and information</td>
<td>Simple - familiar setting</td>
<td>Complex - particular context</td>
<td>Complex - variety of contexts</td>
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<td></td>
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<tr>
<td>3. Planning and organising activities</td>
<td>Under supervision</td>
<td>With guidance</td>
<td>Independently initiate and evaluate complex activity</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4. Working with others and in teams</td>
<td>Familiar activities</td>
<td>Help formulate and achieve goals</td>
<td>Collaborate in complex activities</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Using mathematical ideas and techniques</td>
<td>Simple tasks</td>
<td>Select appropriate - complex tasks</td>
<td>Evaluate and adapt as appropriate for task</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>6. Solving problems</td>
<td>Routine - minimal supervision</td>
<td>Routine - independently</td>
<td>Complex problems - implement systematic approach; explain</td>
</tr>
<tr>
<td></td>
<td>Exploratory - close supervision</td>
<td>Exploratory - with guidance</td>
<td>processes</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. Using technology</td>
<td>Reproduce or present basic product or service</td>
<td>Construct, organise or operate products or services</td>
<td>Design or tailor products or services</td>
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</tbody>
</table>
Mapping of the endorsed Guideline Standards for Laboratory Assistants against these competency standards

Some qualifications in existing Training Packages are based on the *Guideline Competency Standards for Laboratory Assistants* (1995) which have been superseded by the standards in this Training Package. For example:

Certificate III in Process Plant Operations  
Certificate III in Meat Processing (Laboratory)  

The table below shows how the two sets of competency standards align. Such a mapping will enable individuals holding the above qualifications to access higher qualifications in this Training Package with maximum articulation.

<table>
<thead>
<tr>
<th>Guideline Standards for Lab Assistants (Endorsed 1996)</th>
<th>Standards in this Training Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply occupational health and safety and other relevant regulations in the workplace</td>
<td>equivalent to PML OHS300 A</td>
</tr>
<tr>
<td>Assist with the maintenance of laboratory facilities, equipment and materials</td>
<td>equivalent to PML MAIN 300 A</td>
</tr>
<tr>
<td>Prepare solutions, stains, and media for general use in the laboratory</td>
<td>equivalent to PML TEST 303 A and PML TEST 304 A</td>
</tr>
<tr>
<td>Operate laboratory equipment and instruments</td>
<td>equivalent to PML TEST 302 A</td>
</tr>
<tr>
<td>Collect and prepare standard samples</td>
<td>equivalent to PML SAMP 400 A</td>
</tr>
<tr>
<td>Perform qualitative and quantitative tests</td>
<td>equivalent to PML TEST 300 A</td>
</tr>
<tr>
<td>Process data and keep accurate records</td>
<td>equivalent to PML DATA 300 A</td>
</tr>
<tr>
<td>Contribute to the achievement of quality objectives</td>
<td>equivalent to PML QUAL 300 A</td>
</tr>
<tr>
<td>Work efficiently as part of a team</td>
<td>equivalent to PML TEAM 300 A</td>
</tr>
<tr>
<td>Communicate with other people</td>
<td>equivalent to PML COM 300 A</td>
</tr>
</tbody>
</table>
Mapping of specialist laboratory units in the Food Industry Training Package (Wine) against these competency standards

Laboratory units are listed in three specialist pools of units which can be packaged for the Certificates I, II and III in Food Processing (Wine). The units stand alone and the packaging rules indicate that the laboratory units “can be selected in any combination within a given qualification”.

The following mapping illustrates a pathway by which personnel who have demonstrated competency against the listed wine units may gain recognition for units of competency listed in the Certificate III in Laboratory Skills in this Training Package. Such a pathway would enable personnel to broaden and extend their laboratory knowledge and skills and enhance their opportunities of employment as laboratory personnel in other industry sectors.

In several instances, indicated by (**) in the table below, no equivalence between units can be established as the overlap between elements and performance criteria and knowledge requirements for the units involved is incomplete.

<table>
<thead>
<tr>
<th>Specialist units (Laboratory)</th>
<th>Standards in this Training Package</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prepare laboratory solutions and stains</strong></td>
<td>equivalent to</td>
</tr>
<tr>
<td><strong>Standardise laboratory solutions</strong></td>
<td>equivalent to</td>
</tr>
<tr>
<td><strong>Prepare culture media</strong></td>
<td>equivalent to</td>
</tr>
<tr>
<td><strong>Perform microbiological tests A</strong></td>
<td>two units equivalent to</td>
</tr>
<tr>
<td><strong>Perform microbiological tests B</strong></td>
<td>no equivalence (**)</td>
</tr>
<tr>
<td><strong>Perform microbiological tests C</strong></td>
<td>no equivalence (**)</td>
</tr>
<tr>
<td><strong>Perform analytical tests A</strong></td>
<td>three units equivalent to</td>
</tr>
<tr>
<td><strong>Perform analytical tests B</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Perform packaging tests</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Perform analytical tests C</strong></td>
<td>no equivalence (**)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# List of units of competency

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML COM 300 A</td>
<td>Communicate with other people</td>
</tr>
<tr>
<td>PML DATA 300 A</td>
<td>Process and record data</td>
</tr>
<tr>
<td>PML MAIN 300 A</td>
<td>Maintain the laboratory fit for purpose</td>
</tr>
<tr>
<td>PML OHS 300 A</td>
<td>Work safely in accordance with defined policies and procedures</td>
</tr>
<tr>
<td>PML OHS 301 A</td>
<td>Work safely with instruments that emit ionising radiation</td>
</tr>
<tr>
<td>PML ORG 300 A</td>
<td>Follow established work plan</td>
</tr>
<tr>
<td>PML QUAL 300 A</td>
<td>Contribute to the achievement of quality objectives</td>
</tr>
<tr>
<td>PML QUAL 301 A</td>
<td>Apply critical control point requirements</td>
</tr>
<tr>
<td>PML SAMP 300 A</td>
<td>Handle and transport samples</td>
</tr>
<tr>
<td>PML SAMP 301 A</td>
<td>Receive and prepare a range of samples for pathology testing</td>
</tr>
<tr>
<td>PML SCIG 300 A</td>
<td>Operate basic handblowing equipment</td>
</tr>
<tr>
<td>PML SCIG 301 A</td>
<td>Repair glass apparatus</td>
</tr>
<tr>
<td>PML TEAM 300 A</td>
<td>Work effectively as part of a team</td>
</tr>
<tr>
<td>PML TEST 300 A</td>
<td>Perform basic tests</td>
</tr>
<tr>
<td>PML TEST 301 A</td>
<td>Perform biological laboratory procedures</td>
</tr>
<tr>
<td>PML TEST 302 A</td>
<td>Calibrate test equipment and assist with its maintenance</td>
</tr>
<tr>
<td>PML TEST 303 A</td>
<td>Prepare working solutions</td>
</tr>
<tr>
<td>PML TEST 304 A</td>
<td>Prepare culture media</td>
</tr>
<tr>
<td>PML TEST 305 A</td>
<td>Perform aseptic techniques</td>
</tr>
<tr>
<td>PML TEST 306 A</td>
<td>Assist with fieldwork</td>
</tr>
<tr>
<td>PML TEST 307 A</td>
<td>Prepare trial batches for evaluation</td>
</tr>
<tr>
<td>PML QUAL 400 A</td>
<td>Contribute to the ongoing development of HACCP plans</td>
</tr>
<tr>
<td>PML QUAL 401 A</td>
<td>Apply quality system and continuous improvement processes</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>Obtain representative samples in accordance with sampling plan</td>
</tr>
<tr>
<td>PML TEST 400 A</td>
<td>Perform instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 401 A</td>
<td>Perform non-instrumental tests/procedures</td>
</tr>
<tr>
<td>PML TEST 402 A</td>
<td>Prepare, standardise and use solutions</td>
</tr>
<tr>
<td>PML TEST 403 A</td>
<td>Assist with geotechnical site investigations</td>
</tr>
<tr>
<td>PML COM 500 A</td>
<td>Provide information to customers</td>
</tr>
<tr>
<td>PML DATA 500 A</td>
<td>Analyse data and report results</td>
</tr>
<tr>
<td>PML DATA 501 A</td>
<td>Use laboratory application software</td>
</tr>
<tr>
<td>PM-L MAIN 500 A</td>
<td>Maintain and control stocks</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>Assist in the maintenance of reference material</td>
</tr>
<tr>
<td>PML ORG 500 A</td>
<td>Schedule laboratory work for a small team</td>
</tr>
<tr>
<td>PML SCIG 501 A</td>
<td>Design and manufacture glass apparatus and glass systems</td>
</tr>
<tr>
<td>PML SCIG 502 A</td>
<td>Perform glass coating, grinding and finishing operations</td>
</tr>
<tr>
<td>PML SCIG 503 A</td>
<td>Construct, modify and maintain high vacuum system</td>
</tr>
<tr>
<td>PML TEST 500 A</td>
<td>Calibrate and maintain instruments</td>
</tr>
<tr>
<td>PML TEST 501 A</td>
<td>Perform microbiological tests</td>
</tr>
<tr>
<td>PML TEST 502 A</td>
<td>Perform haematological tests</td>
</tr>
<tr>
<td>PML TEST 503 A</td>
<td>Perform histological tests</td>
</tr>
<tr>
<td>PML TEST 504 A</td>
<td>Perform chemical pathology tests</td>
</tr>
<tr>
<td>PML TEST 505 A</td>
<td>Conduct sensory analysis</td>
</tr>
<tr>
<td>PML TEST 506 A</td>
<td>Apply spectrometric techniques</td>
</tr>
<tr>
<td>PML TEST 507 A</td>
<td>Apply chromatographic and electrophoretic techniques</td>
</tr>
<tr>
<td>PML TEST 508 A</td>
<td>Perform ecological techniques</td>
</tr>
<tr>
<td>PML TEST 509 A</td>
<td>Perform immunohaematological tests</td>
</tr>
<tr>
<td>PML TEST 510 A</td>
<td>Perform fieldwork</td>
</tr>
<tr>
<td>PML TEST 511 A</td>
<td>Supervise earthworks inspection, sampling and testing operations</td>
</tr>
<tr>
<td>PML COM 600 A</td>
<td>Develop and maintain laboratory documentation</td>
</tr>
<tr>
<td>PML OHS 600 A</td>
<td>Implement and monitor risk management processes associated with OHS and environmental policies and procedures</td>
</tr>
<tr>
<td>PML ORG 600 A</td>
<td>Supervise laboratory operations in work/functional area</td>
</tr>
<tr>
<td>PML ORG 601 A</td>
<td>Maintain registration and statutory or legal compliance in work/functional area</td>
</tr>
<tr>
<td>PML ORG 602 A</td>
<td>Manage complex projects</td>
</tr>
<tr>
<td>PML QUAL 600 A</td>
<td>Maintain quality system and continuous improvement processes within work/functional area</td>
</tr>
<tr>
<td>PML QUAL 601 A</td>
<td>Conduct an internal audit of the quality system</td>
</tr>
<tr>
<td>PML TEAM 600 A</td>
<td>Manage and develop teams</td>
</tr>
<tr>
<td>PML TEST 600 A</td>
<td>Select appropriate test methods and procedures</td>
</tr>
<tr>
<td>PML TEST 601 A</td>
<td>Classify building sites</td>
</tr>
</tbody>
</table>
PML TEST 700 A  Contribute to the development of products and applications
PML TEST 701 A  Troubleshoot equipment and production processes
PML TEST 702 A  Contribute to the validation of test methods
PML TEST 703 A  Develop or adapt analyses and procedures
PML TEST 704 A  Integrate data acquisition and interfacing systems

List of overlay units of competency

<table>
<thead>
<tr>
<th>Unit</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSZ 401 A</td>
<td>Plan assessment</td>
</tr>
<tr>
<td>BSZ 402 A</td>
<td>Conduct assessment</td>
</tr>
<tr>
<td>BSZ 403 A</td>
<td>Review assessment</td>
</tr>
<tr>
<td>BSZ 404 A</td>
<td>Train small groups</td>
</tr>
</tbody>
</table>

\{ Workplace assessor \}

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List of prerequisite units of competency

Although there are no strict prerequisite units for any of the units in the Training Package, the Evidence Guide for a number of units recommends that that unit be assessed after a certain other unit or units, if the other unit or units are also being undertaken.

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Recommended Prerequisite Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML COM 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML DATA 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML MAIN 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML OHS 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML OHS 301 A</td>
<td>none</td>
</tr>
<tr>
<td>PML ORG 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML QUAL 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML QUAL 301 A</td>
<td>none</td>
</tr>
<tr>
<td>PML SAMP 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML SAMP 301 A</td>
<td>none</td>
</tr>
<tr>
<td>PML SCIG 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML SCIG 301 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEAM 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEST 300 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEST 301 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEST 302 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEST 303 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEST 304 A</td>
<td>PML TEST 305 A</td>
</tr>
<tr>
<td>PML TEST 305 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEST 306 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEST 307 A</td>
<td>none</td>
</tr>
<tr>
<td>PML QUAL 400 A</td>
<td>none</td>
</tr>
<tr>
<td>PML QUAL 401 A</td>
<td>none</td>
</tr>
<tr>
<td>PML SAMP 400 A</td>
<td>none</td>
</tr>
<tr>
<td>PML TEST 400 A</td>
<td>PML DATA 300 A and PML TEST 300 A or PML TEST 301 A</td>
</tr>
<tr>
<td>PML TEST 401 A</td>
<td>PML TEST 300 A</td>
</tr>
<tr>
<td>PML TEST 402 A</td>
<td>PML DATA 300 A</td>
</tr>
<tr>
<td>PML TEST 403 A</td>
<td></td>
</tr>
</tbody>
</table>
### Recommended Prerequisite Units

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Recommended Prerequisite Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML COM 500 A</td>
<td>PML COM 300 A</td>
</tr>
<tr>
<td>PML DATA 500 A</td>
<td>PML DATA 300 A</td>
</tr>
<tr>
<td>PML DATA 501 A</td>
<td>PML DATA 300 A</td>
</tr>
<tr>
<td>PML MAIN 500 A</td>
<td>PML OHS 300 A</td>
</tr>
<tr>
<td>PML MAIN 501 A</td>
<td>PML QUAL 401 A</td>
</tr>
<tr>
<td>PML ORG 500 A</td>
<td>PML COM 300 A and PML OHS 300 A and PML ORG 300 A</td>
</tr>
<tr>
<td>PML SCIG 501 A</td>
<td>PML SCIG 300 A or PML SCIG 301 A</td>
</tr>
<tr>
<td>PML SCIG 502 A</td>
<td>PML SCIG 300 A or PML SCIG 301 A</td>
</tr>
<tr>
<td>PML SCIG 503 A</td>
<td>PML SCIG 300 A or PML SCIG 301 A</td>
</tr>
<tr>
<td>PML TEST 500 A</td>
<td>PML TEST 300 A or PML TEST 301 A</td>
</tr>
<tr>
<td>PML TEST 501 A</td>
<td>PML TEST 305 A and PML TEST 301 A and PML OHS 300 A</td>
</tr>
<tr>
<td>PML TEST 502 A</td>
<td>PML TEST 301 A and PML OHS 300 A</td>
</tr>
<tr>
<td>PML TEST 503 A</td>
<td>PML TEST 301 A and PML OHS 300 A</td>
</tr>
<tr>
<td>PML TEST 504 A</td>
<td>PML TEST 301 A and PML OHS 300 A</td>
</tr>
<tr>
<td>PML TEST 505 A</td>
<td>PML DATA 300 A and PML COM 300 A</td>
</tr>
<tr>
<td>PML TEST 506 A</td>
<td>PML TEST 400 A and PML TEST 402 A</td>
</tr>
<tr>
<td>PML TEST 507 A</td>
<td>PML TEST 400 A and PML TEST 402 A</td>
</tr>
<tr>
<td>PML TEST 508 A</td>
<td>PML TEST 301 A and PML OHS 300 A and PML TEST 305 A and PML TEST 400 A</td>
</tr>
<tr>
<td>PML TEST 509 A</td>
<td>PML TEST 301 A and PML OHS 300 A</td>
</tr>
<tr>
<td>PML TEST 510 A</td>
<td>PML TEST 301 A and PML OHS 300 A and PML TEST 305 A</td>
</tr>
<tr>
<td>PML TEST 511 A</td>
<td>none</td>
</tr>
<tr>
<td>PML COM 600 A</td>
<td>PML COM 500 A and PML QUAL 401 A</td>
</tr>
<tr>
<td>PML OHS 600 A</td>
<td>PML OHS 300 A</td>
</tr>
<tr>
<td>PML ORG 600 A</td>
<td>PML COM 500 A and PML QUAL 401 A and PML ORG 500 A</td>
</tr>
<tr>
<td>PML ORG 601 A</td>
<td>PML QUAL 401 A and PML ORG 500 A</td>
</tr>
<tr>
<td>PML ORG 602 A</td>
<td>PML QUAL 401 A</td>
</tr>
<tr>
<td>PML QUAL 600 A</td>
<td>PML COM 500 A and PML QUAL 401 A</td>
</tr>
<tr>
<td>PML QUAL 601 A</td>
<td>PML QUAL 401 A</td>
</tr>
<tr>
<td>PML TEAM 600 A</td>
<td>PML COM 500 A and PML TEAM 300 A</td>
</tr>
<tr>
<td>PML TEST 600 A</td>
<td>at least three (3) units from PML TEST 500 - 509 A series</td>
</tr>
<tr>
<td>PML TEST 601 A</td>
<td>none</td>
</tr>
</tbody>
</table>
Communicate with other people

<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Recommended Prerequisite Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PML TEST 700 A</td>
<td>PML TEST 600 A</td>
</tr>
<tr>
<td>PML TEST 701 A</td>
<td>PML TEST 500 A  and  PML TEST 600 A</td>
</tr>
<tr>
<td>PML TEST 702 A</td>
<td>PML TEST 600 A</td>
</tr>
<tr>
<td>PML TEST 703 A</td>
<td>PML TEST 600 A</td>
</tr>
<tr>
<td>PML TEST 704 A</td>
<td>PML QUAL 401 A  and  PML DATA 501 A  and  any instrumentation unit such as: PML TEST 500 A  or  PML TEST 506 A  or  PML TEST 507 A</td>
</tr>
</tbody>
</table>

**Glossary of acronyms**

- ADASC: Australian Dairy Authorities Standards Committee
- ANZFA: Australia and New Zealand Food Authority
- AQF: Australian Qualifications Framework
- GLP: Good Laboratory Practice
- GMP: Good Manufacturing Practice
- HACCP: Hazard Analysis and Critical Control Points
- NATA: National Testing Authority
- NOHSC: National Occupation Health and Safety Council
- QA: Quality assurance
- QC: Quality control
- RTO: Registered Training Organisation
- STA: State/Territory Training Authority

**Units of competency**

The units of competency for the Laboratory Operations Training Package commence on the following page.
## Unit Title:

**Communicate with other people**

### PML COM 300 A

### Unit descriptor

This unit of competency covers the ability to receive and pass on written and oral messages, provide relevant information in response to requests within timelines and demonstrate effective interpersonal skills.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Receive and act upon instructions</td>
<td>1.1 Listen attentively to instructions and respond appropriately</td>
</tr>
<tr>
<td></td>
<td>1.2 Clarify instructions to ensure a complete understanding of the task</td>
</tr>
<tr>
<td>2 Receive and convey messages</td>
<td>2.1 Receive verbal and written messages and respond appropriately</td>
</tr>
<tr>
<td></td>
<td>2.2 Record and convey information so that messages are understood</td>
</tr>
<tr>
<td>3 Demonstrate appropriate interpersonal skills</td>
<td>3.1 Follow workplace procedures which reflect equal opportunity, anti-discrimination and non-harassment legislative requirements</td>
</tr>
<tr>
<td></td>
<td>3.2 Demonstrate effective interpersonal skills during everyday interactions</td>
</tr>
</tbody>
</table>
4 Provide appropriate information

4.1 Deal with inquiries in accordance with enterprise customer service requirements

4.2 Establish details of inquiry by questioning and summarising

4.3 Access and provide relevant information that meets own authorisation and confidentiality requirements

4.4 Organise and provide information so that it is readily understood by others

4.5 Redirect inquiries to relevant personnel for resolution if beyond own area of responsibility

4.6 Complete all workplace documents legibly and accurately in accordance with enterprise procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency includes the following types of information sources and documentation:

workplace procedures that deal with:
- anti-discrimination, Equal Opportunity and anti-harassment legislative requirements
- legislative requirements (eg, Therapeutic Goods Act) and codes of practice (eg, good manufacturing practice (GMP) and Food Standards Code)
- customer service, telephone protocols
- technical tasks

information directories for staff access, (personnel, telephone), online databases, CD ROMS

workplace documents such as:
- Standard Operating Procedures (SOPs), laboratory methods
- job (batch) cards and job descriptions
- equipment manuals, service logs
- induction manuals
- supplier catalogues
- (daily) production schedules
- laboratory schedules
- calibration and maintenance schedules
- guide to relevant Acts and regulations (eg, Food Standards Code)
- material safety data sheets (MSDSs)
- non compliance reports
- quality manuals
- time sheets, logbooks
- product specifications
- text procedures
- shift handover reports
- pick lists
- HACCP procedures
libraries
information which uses:
- common scientific and technical terminology
- symbols, charts, signs, written text, tables, graphs and calculations.

This unit of competency may include communication with:
supervisors and managers
other laboratory and production personnel
members of the public, customers and clients.

This unit of competency may include the use of items of equipment such as:
telephone, two way radio, PA system, fax, computer (email)
direct display readouts
on-line information systems.

Interpersonal communication includes:
active listening
including others
effective questioning
tolerating the view of others, attempting to reduce conflict and to negotiate suitable outcomes.

Specific industry variables

Additional variables may apply for each industry sector below.

Process manufacturing and construction materials industries
- Instructions to production staff when altering production mixes as a result of laboratory analysis.

Biomedical and environmental services
- Verification and signature requirements for the receipt and release of human specimens (such as blood transfusion products, blood alcohol samples and urine for drug testing).

Food and beverage processing industries
- Instructions to production staff when altering production mixes as a result of laboratory analysis.

Updating information
Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to provide, interpret and act upon required information accurately and efficiently and in accordance with workplace requirements. In particular, the assessor should look to see that the candidate can:

- communicate effectively with people at different organisational levels and from diverse cultural backgrounds
- use available communication equipment (eg, telephone, on-line and hard copy directories, email, fax, intranet and Internet)
- listen attentively and clarify messages and instructions to confirm their meaning
- locate relevant sources of information
- provide accurate information in an effective and timely manner
- understand colloquial, scientific and technical terminology appropriate to their expected level of knowledge and their workplace
- complete relevant workplace documents legibly and accurately
- respond to calls and messages within accepted enterprise timelines
- promote cooperation through personal interactions.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain workplace procedures covering:

- customer service
- technical tasks
- interpersonal interactions, equal opportunity, anti-discrimination, anti-harassment requirements
- communication protocols and the completion of workplace documentation.
Knowledge is required of the:
products and services provided by the enterprise
layout of the enterprise and laboratory
role of laboratory services to the enterprise and customers
organisational structure.

A basic knowledge of the candidate’s job function and workplace procedures associated with his/her regular technical duties is also necessary.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit of competency may be assessed with:
PML TEAM 300 A – Work efficiently as part of a team
PML QUAL 300 A – Contribute to the achievement of quality objectives.

This unit of competency has no prerequisites.

**Assessment methods and resources**

The following assessment methods are suggested:
observation of the candidate’s performance of a wide range of technical and administrative tasks
feedback from peers, customers and supervisors
examples of messages and workplace documentation prepared by the candidate
questions to assess understanding of relevant workplace procedures.

Resources may include:
workplace procedures
workplace documents
equipment such as:
  - telephone
  - fax
  - computer (email).
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

The supervisor in a petroleum refining enterprise asked a laboratory assistant to “*go down to the cat and take a sample of the bottoms,*” not realising that the assistant had only just started work with the company. The assistant looked at the supervisor in amazement, not knowing whether to pretend to understand, maintain self esteem, or clarify the instructions for the task. The assistant decided on the latter course of action and the supervisor repeated the instructions without using jargon. The laboratory assistant then proceeded to the catalytic cracker to take the sample as per the appropriate SOP.

**Biomedical and environmental services**

The regular collection staff were not present when a flustered client came into the outpatient clinic with a domestic container full of straw coloured fluid. The receptionist knew what urine collection containers usually looked like and this was clearly not one. The receptionist called for help from the laboratory in the absence of collection staff.

A technical officer was sent. The officer quickly realised that a recollection would be requested and because this would be inconvenient to the patient, tried to seek an explanation from them as to why the correct container was not used. The technical officer then explained as clearly and gently as possible the reasons for the recollection and why the substitute container could not be used. The officer confirmed that the patient was clear on the collection procedure and checked that the labels on the new container were correct.

**Food and beverage processing industries**

The front office staff of a small food processing company were responsible for many tasks and could not always ensure that they were in the office to receive customers and answer phone calls. This meant that urgent inquiries were not always immediately attended to and some customers became irate if they were unfortunate enough to have made several sequential inquiries while the office staff were absent.

The company laboratory was adjacent to the reception area and laboratory technicians would attend to customers if they happened to see them waiting. The laboratory technicians realised that they could improve company-customer relations. They organised for a buzzer to be installed that connected the reception desk to the laboratory and the reception phone to redirect to the laboratory if it was not answered within a reasonable period of time. Since they could not always attend to the specific needs of the callers, they developed a standard format for recording messages that were passed back to the reception staff. The two laboratory assistants were also quickly trained to receive personal and phone inquiries in an appropriate manner. The company found that, even though the laboratory technicians could not always satisfy the immediate demands of customers, the customer satisfaction level was greater when customers were attended to personally than when they were connected to an answering machine or not received at all.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
Unit Title:

Process and record data

Unit descriptor

This unit of competency covers the ability to record and store data, perform basic laboratory computations and accurately present and interpret information in tables and graphs.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Record and store data</td>
<td>1.1 Code and transcribe data as directed</td>
</tr>
<tr>
<td></td>
<td>1.2 Record data in accordance with document traceability requirements</td>
</tr>
<tr>
<td></td>
<td>1.3 Enter data into laboratory information system or record sheets as directed</td>
</tr>
<tr>
<td></td>
<td>1.4 Rectify errors in data using enterprise procedures</td>
</tr>
<tr>
<td></td>
<td>1.5 Store and retrieve data using appropriate files and/or application software</td>
</tr>
<tr>
<td>2 Perform laboratory computations</td>
<td>2.1 Calculate expressions involving fractions, decimals, percentages, proportions, and concentrations</td>
</tr>
<tr>
<td></td>
<td>2.2 Calculate the mean, median, mode and standard deviation for given data</td>
</tr>
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<td></td>
<td>2.3 Calculate scientific quantities and associated uncertainties using given formulae and data</td>
</tr>
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<td></td>
<td>2.4 Ensure calculated quantities are consistent with estimations</td>
</tr>
<tr>
<td></td>
<td>2.5 Report all calculated quantities using the appropriate units and correct number of significant figures</td>
</tr>
</tbody>
</table>
3 Present data in tables, charts and graphs
  3.1 Present data accurately in clearly labelled tables and charts
  3.2 Graph data accurately using the most appropriate scales to span the range of data or display trends
  3.3 Report all data using the appropriate units and number of significant figures

4 Interpret data in tables, charts and graphs
  4.1 Retrieve data from appropriate sources
  4.2 Interpret significant features of graphs such as gradients, intercepts, maximum and minimum values, and limit lines
  4.3 Recognise and report trends in data

5 Keep accurate records and maintain their confidentiality
  5.1 Transcribe required information accurately and by the specified time
  5.2 Verify the accuracy of records following enterprise procedures
  5.3 File and store workplace records in accordance with enterprise procedures
  5.4 File all reference documents logically and keep them up to date and safely secured
  5.5 Maintain enterprise confidentiality standards.

### RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

**Cross industry variables**

The following variables may apply to all industry sectors covered by this Training Package.

Data may be recorded on worksheets or entered into spreadsheets or databases linked to information management systems. Data includes the results of:

- observations
- tests and measurements
- analyses
- surveys
- quality assurance and control assessments.
Data may be presented in the form of:
- graphs
- histograms
- bar charts
- tables
- pie charts
- control charts.

Data could also take the form of semi-quantitative observations and be expressed on a scale (eg, 1 to 4 or + to +++++).

Computations may be performed with or without a calculator or computer software. Examples of calculated scientific quantities could include:
- % and absolute uncertainties in measurements and test results
- areas (m²) and volumes (mL, L, m³) of regular shapes (eg, packaging)
- dose (mg), average weight, weight %, density, specific gravity, moisture, relative and absolute humidity, viscosity, permeability
- ratios (such as, mass to mass, mass to volume and volume to volume percentages)
- concentration (eg, molarity, g/mL, mg/L, mg/µL, ppm, ppb, dilution mL/L)
- average count, colonies per swab surface, cell counts (live and dead/total)
- process variables (such as, pressure, gauge pressure, velocity, flow rates)
- biological oxygen demand (BOD), chemical oxygen demand (COD), total organic carbons (TOC)
- % content of moisture, ash, fat, protein, alcohol, sulphur dioxide, trace metals (such as calcium or zinc)
- food properties (such as % concentration (dry), friability, bitterness, brix, free amino nitrogen, diastatic power, calorific content and yeast viability).

Records could include information associated with:
- purchase of equipment and materials, service records
- safety procedures
- history of calibration and test results.

Reference materials could include:
- material safety data sheets (MSDSs)
- equipment manuals and warranty, supplier catalogues, handbooks
- sampling and test procedures, standard operating procedures (SOPs)
- enterprise quality manual, customer quality plan
- validation of the equipment and associated software where applicable
- validation of spreadsheets developed in house for assay and process calculations
- OHS regulations, guidelines and procedures

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to process and record data in accordance with workplace procedures. In particular, the assessor should look to see that the candidate is able to:
- code, record and check the documentation of data
- use a simple spreadsheet or database program to store and retrieve data reliably
- calculate scientific quantities relevant to their laboratory work and present accurate results in the required format
- recognise anomalies and trends in data
- maintain the confidentiality of data in accordance with workplace and regulatory requirements
- keep records up to date and secure.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- procedures for coding, entering, storing, retrieving and communicating data
- procedures for verifying data and rectifying mistakes
- procedures for maintaining and filing records, security of data
- relevant scientific and technical terminology (such as: specification, precision, accuracy, “out of control”).
Competency also includes the ability to perform laboratory computations such as:

- calculations involving fractions, decimals, ratios, proportions and percent
- calculation of mean, median, mode, range and standard deviation
- calculation of perimeters, areas, volumes, angles
- calculation of scientific quantities (e.g., concentration)
- use of scientific notation, unit conversion, multiples and submultiples
- use of significant figures, rounding off, estimation, approximation
- calculation and interpretation of absolute and percentage uncertainties
- transposing and evaluating formulae
- preparation and interpretation of trends in graphs, tables and charts (pie, bar, histogram)
- preparation and interpretation of straightforward process control charts.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit may be assessed with technical units such as:

PML TEST 300 A – Perform basic tests
PML TEST 301 A – Perform biological laboratory procedures
PML TEST 303 A – Prepare working solutions
PML DATA 501 A – Use laboratory application software.

This unit of competency has no prerequisites.

**Assessment methods and resources**

The following assessment methods are suggested:

- observation of the candidate as they process and record data
- review of data work sheets, calculations, computer files, graphs, tables, and/or charts prepared by the candidate
- review of records transcribed, maintained or stored by the candidate
- questions to assess understanding of relevant procedures and trends in data
- feedback from supervisors and peers.

Resources may include:

- data sets and records
- computer and relevant software or laboratory information system
- relevant workplace procedures.

**This competency in practice**

*Industry representatives have provided storylines to illustrate the practical application of*
each unit of competency and show its relevance in a workplace setting.

**Process manufacturing and construction materials industries**

A laboratory assistant in a materials testing laboratory was performing routine tensile tests on samples of vinyl sheet. The assistant converted the readings from the machine to appropriate units using a simple calculation and recorded them in the logbook for that test method. After comparing these test results with previous results for the same type of vinyl material, the assistant found that the tensile strength was within the required range. However, it was at the lower rather than the upper end of the range as in previous testing.

The assistant discussed the results with the laboratory supervisor. The calibration file for that machine showed that it had been calibrated four months previously and had not needed adjustment. Test results for the same period showed that the machine was giving lower than normal tensile strength readings for the few higher strength materials tested over the last two months. The assistant did some more checks and confirmed this trend. The machine was re-calibrated by the instrument company and the frequency of internal calibration checks by the laboratory assistant was increased.

This problem would not have been detected or corrected as quickly without the assistant’s competent recording and retrieval of test results and calibration information, and initiative.

**Biomedical and environmental services**

A laboratory assistant often works in a team with laboratory scientists and technical officers. Analyses of electrolytes are routine and hence occur in large volume throughput even in smaller diagnostic laboratories. The assistant may be assigned tasks that contribute to the overall production of results, their reporting and the quality control evaluation of those results. An example could be the daily collection of the electrolyte analyses of the internal quality control area. In this case the results are plotted on a Levy-Jennings graph and the mean value computed and marked. The technical assistant will report immediately if the plots shows deviations indicative of out of control results. The assistant may be asked to perform simple calculations such as anion gap determinations in order that the senior staff further investigate their quality systems.

**Food and beverage processing industries**

Cooking and holding temperatures greatly affect nutrient composition of processed foods. The CSIRO provides documentation of nutrient losses with temperature variations. For cooked foods, there is the added problem of microbial growth in the so called “danger zone”. In one laboratory, the technical assistant conducts simple testing of foods using a temperature probe and also measures the temperature of the storage areas, holding trays or bainmaries, and individual tray units, etc. Careful documentation of the temperatures of the foods and times of measurement must be kept. The technical assistant supplies the data as tables and a plot of temperature versus time.

For quality control purposes, the assistant is directed to use a cross reference of mercury thermometer readings versus probe measurements for ambient temperature. The assistant plots the thermometer readings against the probe readings and reports to the supervisor if the plot shows a slope other than 45°.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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## Unit Title:

**Maintain the laboratory fit for purpose**

### Unit descriptor

This unit of competency covers the general cleaning of work surfaces, cleaning and storage of equipment, and the monitoring of laboratory stocks.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
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</table>
| 1 Clean work preparation areas | 1.1 Clean preparation areas using appropriate cleaning agents and recommended procedures  
1.2 Remove spillages as per the Australian Dangerous Goods Code, Sections 1 to 3, using appropriate agents and protective equipment  
1.3 Dispose of wastes in accordance with enterprise procedures and relevant codes and regulations  
1.4 Report large spillages and then remove material in accordance with the Australian Code for Transport of Dangerous Goods |
| 2 Clean and store glassware and equipment | 2.1 Collect contaminated glassware and equipment for cleaning and, where necessary, for sanitisation  
2.2 Examine glassware for faults and remove from service where appropriate  
2.3 Use appropriate reagents and recommended procedures to remove residues from glassware and equipment  
2.4 Operate automatic cleaning apparatus in accordance with workplace procedures  
2.5 Store clean glassware and equipment in the designated locations and manner |
| 3 Monitor stocks of laboratory materials and equipment | 3.1 Perform stock checks and maintain records of usage as directed  
3.2 Store labelled stocks for safe and efficient retrieval |
Contribute to maintenance of laboratory hygiene

4.1 Follow regulations regarding protective clothing, personal hygiene, movement of people and materials, and work/cleaning sequences to prevent contamination and cross-contamination

4.2 Inform other people of potential hazards and contamination in own work area

4.3 Perform hygiene monitoring in accordance with laboratory procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency forms a major part of the work of laboratory assistants. Equipment, material, procedures and facilities will vary according to the scope and classification of the laboratory. In particular:

Typical equipment could include:
- autoclaves
- balances
- blenders
- centrifuges and separating equipment
- dishwashers
- freezers
- fume hoods, biological safety cabinets
- gas cylinders
- glassware (burettes, pipettes)
- plasticware
- hydrometers
- glass, plastic, quartz cuvettes
- hotplates, mantles, burners
- microtomes, tissue processors
- instrument chart recorders
- incubators
- light and fluorescence microscopes
- muffle furnaces
- ovens, microwave ovens
- refrigerators
- thermo-hygrometers
- thermometers
- ultrasonic cleaners
- waterbaths
- pH meters and ion selective electrodes
- cell counters
- staining machines.

Typical materials could include:
- reagents
- disinfectants
- disposable clothing.
- agar media and plates
- detergents

Enterprise materials acquisition and laboratory procedures, documentation and quality standards will vary.
All actions (cleaning, storing, prevention of contamination) are carried out according to established laboratory procedures.

Stock records include:
- breakage - usage
- loans - maintenance history
- calibrations - catalogues
- data sheets - manuals
- handbooks - standards
- warranty documents.

Hygiene requirements will vary according to the type of laboratory.
Preparation areas include benches, sinks and fume cupboards.
Spillages include chemicals and biologically active materials.
Wastes include broken glass, sharps, microorganisms, solvents and excess test samples.
Reagents for cleaning include decontaminants, organic solvents and cleaning solutions.
Automatic cleaning apparatus include pipette washer, ultrasonic cleaner and dishwasher.

References for handling and transport of dangerous goods include:
AS 2243 - Safety in Laboratories
AS 2508 - Safe Storage and Handling Information cards
AS 3780 - Storage and Handling of Corrosive Substances
AS 1940 - Storage and Handling of Flammable and Combustible Liquids
AS 4452 - Storage and Handling of Toxic Substances
AS 4332 - Storage and Handling of Gases in Cylinders
Hazchem codes
confined space legislation.

Communication could involve:
other people such as:
- laboratory
- production
- administration
- cleaning staff
issues such as:
- spillages
- stock requirements
- potential hazards
- hygiene issues
- waste disposal.
Specific industry variables

Additional variables may apply for each industry sector below.

Process manufacturing and construction materials industries
specialised procedures for cleaning surfaces contaminated with raw materials or products (eg, bitumen)

Biomedical and environmental services
cleaning work areas and/or equipment surfaces contaminated with blood, faeces, urine or microorganisms in accordance with standard precautions and/or NHMRC guidelines
specialised procedures for cleaning and/or autoclaving glassware and equipment, for example:
- treatments required for killing/deactivating microorganisms
- treatment required for killing spores
- types of detergents used for glassware (eg, phosphates free)
- preparation of plugged pipettes
- correct disposal of infected materials (such as pipette tips, disposable containers, gloves and tubes).

Food and beverage processing industries
cleaning work areas and/or equipment surfaces contaminated with food residues (eg, fat, protein) or microorganisms
specialised procedures for cleaning and/or autoclaving glassware and equipment, for example:
- treatments required for killing/deactivating microorganisms
- treatment required for killing spores
- types of detergents used for glassware (eg, phosphates free)
- preparation of plugged pipettes
- correct disposal of waste materials (such as pipette tips, disposable containers, gloves and tubes).

Updating information

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated by the ability to safely follow work procedures relating to laboratory maintenance. In particular, the assessor should look to see that the candidate can:
safely clean work preparation areas and equipment using appropriate cleaning agents and equipment
safely remove spillages and dispose of wastes
disinfect and/or decontaminate work areas and equipment as required
minimise the risk of contamination of self, others and the laboratory
safely store laboratory equipment and materials
monitor and report stock levels and the condition of laboratory equipment
keep accurate records
report potential hazards.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain workplace procedures and protocols relating to the:
cleaning, decontamination and/or disinfection of work surfaces
cleaning, decontamination and/or disinfection and storage of equipment
minimisation and disposal of waste
monitoring of laboratory stocks.

Competency also includes the ability to apply the information contained in material safety data sheets (MSDSs) for materials handled regularly during the performance of maintenance tasks.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:

PML OHS 300 A - Work safely in accordance with defined policies and procedures.

This unit of competency has no prerequisites.

Assessment methods and resources

Competency in this unit should be assessed over sufficient time to enable the candidate to complete tasks contained in a routine maintenance cycle or schedule. The following assessment methods are suggested:

- observation of the candidate’s techniques for cleaning, decontamination, disinfection and/or removal of spillages and waste disposal
- review of stock control records completed by the candidate
- feedback from supervisors and peers
- questioning to assess underpinning knowledge of regulations and procedures where direct observation is difficult (such as dealing with hazards) and choice of reagents and equipment. Questioning techniques should be appropriate to the candidate’s language and literacy levels.

Resources may include:

- work preparation areas, stocks, glassware and equipment
- cleaning, decontamination and/or disinfection agents and apparatus
- personal protection equipment
- stock order firms, labels and records/forms.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

On receipt of a bulk container of cleaning or sanitising agent, a laboratory assistant always attached to the container a description of its method of use. The assistant also attached a list of the surfaces, apparatus, utensils and machines that could be safely treated with that chemical agent as outlined in the company’s quality manual. This practice reduced the likelihood of misuse of the chemical, wastage, damage to equipment and inadequate cleaning and sanitation.
Biomedical and environmental services

Laboratory assistants and technical officers routinely examine fluids for microorganisms using a microscope. They examine fluids such as urine, sea water, chlorinated pool water, water from catchment areas and bottled water.

To maintain microscopes in working order, they thoroughly clean the stage, oculars and each objective after use and sometimes between samples. The 100X objective requires particular care since this is the oil immersion objective. The oil is slightly acidic and will slowly corrode the objective if it's not cleaned thoroughly and regularly. After using the 100X objective they also take care not to drag the other objectives through the oil.

Food and beverage processing industries

A laboratory assistant regularly uses standard pH solutions to calibrate the laboratory's pH meters. The assistant is aware from the label that the shelf life of these solutions after opening is two months and records the opening and disposal dates on the container. The assistant is also aware that the shelf life of these particular buffer solutions is twelve months from the date of manufacture and monitors this by noting the production date on the bottle. Requests for stock replacement take into account the normal rate of use of these buffer solutions so that unopened bottles have not reached their expiry date before use.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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CS-46 © Australian National Training Authority – Laboratory Operations Training Package: PML 99, to be reviewed by 30/11/2002
**Unit Title:**

**Work safely in accordance with defined policies and procedures**

**PML OHS 300 A**

**Unit descriptor**

This unit of competency concerns the ability to apply OHS procedures and safe working practices to maintain own health and the health of others in the workplace. It also includes the application of risk control measures to minimise environmental threats.

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<th>ELEMENT OF COMPETENCY</th>
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| 1 Follow established work practices and instruction aimed at keeping immediate work environment safe | 1.1 Keep all work areas clean and free from obstacles  
1.2 Recognise and report any hazardous work situations  
1.3 Maintain workplace standards of personal hygiene at all times  
1.4 Recognise shut-off points for all services to the work area and maintain clear access |
| 2 Follow established safe work practices and procedures to maintain safe systems of work | 2.1 Recognise and observe hazard warnings and safety signs  
2.2 Check safety equipment routinely in accordance with workplace procedures  
2.3 Label all reagents and hazardous materials in accordance with workplace procedures  
2.4 Handle all hazardous materials and equipment in accordance with labelling, materials safety data sheets and manufacturer’s instructions  
2.5 Use appropriate personal protective equipment and clothing as required  
2.6 Identify and report operating problems or equipment malfunctions  
2.7 Clean and decontaminate equipment and work areas regularly using recommended procedures  
2.8 Follow established manual handling procedures for tasks involving manual handling |
### 3 Safely store, collect and dispose of hazardous materials

3.1 Secure and store all potentially hazardous materials safely

3.2 Collect, sort and dispose of hazardous waste in accordance with workplace procedures

### 4 Respond effectively to incidents, accidents and emergencies

4.1 Demonstrate or fully explain workplace fire drill, accident, and emergency evacuation procedures

4.2 Follow workplace emergency first aid procedures

4.3 Report and record all accidents or safety/environmental incidents as required

### 5 Maintain personal health in the workplace

5.1 Use appropriate equipment and procedures to avoid personal contamination and contamination of others

5.2 Avoid risk behaviour that impacts on own work practices and those of other workers

### 6 Refer to relevant regulations and procedures to ensure regulatory requirements are met

6.1 Locate and follow relevant sections of workplace procedures which reflect legislative requirements

6.2 Seek assistance to clarify obligations and procedures

6.3 Clarify work instructions that impact on safety and legal liability

6.4 Apply procedures which relate to transport and storage of dangerous goods and hazardous materials

### 7 Follow risk control measures to minimise environmental hazards

7.1 Recognise the type and severity of environmental threat posed by the materials and processes used

7.2 Use work practices which minimise waste

7.3 Follow workplace procedures for waste disposal

7.4 Report abnormal emissions to appropriate personnel

7.5 Apply containment procedures in accordance with standard operating procedures (SOPs) where appropriate.
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency is consistent with the National Occupational Health and Safety Commission’s Generic Competency A for employees without supervisory responsibilities.

At this level, personnel work in accordance with work instructions and SOPs. These incorporate all relevant aspects of OHS legislation and the codes, regulations and Australian standards applying to environmental hazards and dangerous goods.

It is expected that personnel will be provided with clear directions, information, training and appropriate supervision. Typical problems are restricted to those requiring a routine, predetermined response as specified in workplace procedures. Responses are restricted to a “first response” approach including the notification of appropriate enterprise personnel.

Enterprise policies and procedures include those that directly or indirectly cover OHS and environmental issues such as:
- hazards and control measures
- minimisation of environmental threats
- minimisation and disposal of waste
- SOPs and work instructions
- safety, emergency, fire and accidents
- selection and use of personal protective clothing and equipment.

OHS and environmental issues which may need to be raised by employees with designated personnel may include:
- identification of hazards
- assessment of risk and decisions on measures to control risk
- risk reduction measures
- implementation of controls
- investigation of injury and incidents.

Designated personnel for OHS referral may include:
- employer or supervisor
- employees elected as OHS representatives
- other personnel with OHS responsibilities.

Consultative arrangements for management of OHS issues may involve:
following OHS procedures and environmental risk control measures
information sessions on existing or new issues
meetings between employer and employees or representatives
access to relevant workplace information
use of clear and understandable language
provision for non-English speaking personnel
provision for hearing impaired personnel
awareness of databases and on line software for the inventory, manifest and information
retrieval regarding hazardous materials
formal arrangements, such as health and safety committees and health and safety
representatives (where appointed)
informal arrangements such as toolbox meetings and coffee breaks.

Personnel at this level, must be able to work safely in accordance with SOPs, instructions and
procedures developed by the enterprise which deal with:

workplace hazards such as:
- occupational overuse syndrome (OOS)
- slips, trips and falls
- chemicals, radiation, and hazardous materials (short/long term affects)
- contaminated clothing and equipment
- sharps and broken glassware
- flammable liquids
- gases and liquids under pressure, dry ice and liquid nitrogen
labelling of hazardous samples, reagents, and aliquoted samples

hazardous events (such as accidents, fires, chemical, biological and radioactive spills)
emissions, discharges and airborne contaminants such as:
- noise, light
- solids, liquids, water/waste water
- gases, smoke, vapour, fumes, odour, particulates

waste minimisation and recycling:
- solids, liquids, gases
- reclamation of chemicals
- safe storage awaiting disposal

environmental features and threats such as:
- sensitive waterways/wetlands and biota
- flows from the workplace to the environment
- particular threats posed by materials and processes used and risk control measures

selection and use of appropriate control measures (such as personal protection and
containment equipment)

regulations codes and guidelines such as:
- AS 2243 Safety in laboratories, AS 2500 Storage of goods
- Australian Code for Transport of Dangerous Goods
- State/Territory and Federal Acts (eg, clean air, waterways)
- AS/NES/ISO 1400
- AS 1678 Emergency procedures guide for hazardous materials
- Worksafe Australia National Code of Practice for the Labelling of Workplace Substances (NOHSC: 2012)

reporting requirements and lines of communication.

**Specific industry variables**

*Additional variables may apply for each industry sector below.*

**Process manufacturing and construction materials industries**

workplace hazards such as:
- pedestrian and vehicular traffic
- manual handling, working at heights and in confined spaces
- crushing, entanglement, cuts associated with moving machinery or falling objects

personal protection equipment such as:
- hard hats, hearing protection and safety boots
- gloves, safety glasses, coveralls, respirators.

**Biomedical and environmental services**

workplace hazards such as:
- blood and blood products, human or animal tissue and fluids
- pathogenic microorganisms, DNA, viruses, aerosols
- heavy metals, pesticides, anions (eg, fluoride), hydrocarbons (eg, mono-aromatics)

regulations, codes and guidelines covering:
- infection control in the health care setting, immunisation of personnel
- genetic manipulation
- transport of infected blood samples and genetically altered cell
- handling of carcinogens
- pregnancy

personal protection equipment such as:
- gloves, safety glasses, coveralls and gowns, body suit
- respirators and appropriate filters
- biohazard containers and laminar flow cabinets.

**Food and beverage processing industries**

workplace hazards such as:
- pedestrian and vehicular traffic
- manual handling, working at heights and in confined spaces
- crushing, entanglement, cuts associated with moving machinery or falling objects
- harmful microbiological agents associated with animal blood, tissue and fluids
- high pressure gases (eg, hydrogen in GLC, acetylene and nitrous oxide in AAS)
- high temperature ashing processes
- digestion of foods using sulphuric and perchloric acids, hydrogen peroxide
- heavy metals, pesticides, mycotoxins
personal protection equipment such as:
- hard hats, hearing protection and safety boots
- gloves, safety glasses, coveralls and gowns, body suit
- respirators and appropriate filters
- biohazard containers and laminar flow cabinets.

**Updating information**

Changes in codes of practice and applicable standards should be noted.

**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to follow instructions and procedures developed by the enterprise management to ensure safe systems of work and a safe work environment. In particular, the assessor should look to see that the candidate can:

- follow OHS and environmental SOPs, instructions and procedures for hazard identification and risk control
- follow workplace instructions and procedures relating to storage, transport and disposal of dangerous goods
- recognise hazards common to the industry after appropriate induction information and training
- follow instructions designed to ensure the correct labelling of samples, reagents, and aliquoted samples
- use any equipment provided to protect health and safety
- communicate health and safety and environmental issues with designated personnel.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- symbols used in OHS signs
- environmental impacts and effects of interaction with hazards in the work area
- information contained in SOPs for materials handled regularly
- workplace procedures and instructions that govern personal work, incidents and emergencies
- reporting requirements for OHS issues and potentially hazardous situations.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with any other technical units in the context of the need to perform all work safely.

This unit of competency has no prerequisites. Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
- observation of the candidate preparing for and undertaking a range of work tasks
- written and/or oral questioning to assess underpinning knowledge and likely reactions in hazardous/emergency situations (questions will be appropriate to candidate’s language and literacy levels)
- feedback from peers and supervisors.

Resources may include:
- laboratory/field work environment, equipment and materials
- personal protective equipment
- workplace procedures.
This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

A laboratory assistant working in a laboratory was asked to produce a particular solvent-borne paint. Because of the hazardous nature of the task, the assistant referred to the material safety data sheets (MSDSs) which specified that a particular respirator and gloves be used. The assistant followed the requirements and safely prepared the batch of paint.

Biomedical and environmental services

After performing and verifying cell counts of plated samples, a technical assistant proceeded to dispose of the waste. The wastes were placed in a biohazard bag. The bag was sealed with a sterilisation indicator sticker that was clearly visible, and placed in the autoclave. The assistant checked the colour of the indicator sticker to ensure that the waste was correctly processed before disposing of the bag in accordance with standard operating procedures.

Food and beverage processing industries

One task of a laboratory assistant in a food processing company is the determination of total nitrogen in food samples by the Kjeldahl method. The assay involves digestion of the food with an aliquot of 30\% H₂O₂ and several other reagents at more than 400°C. The assistant is familiar with the MSDSs for H₂O₂ and uses this chemical with appropriate caution and personal protective equipment. Small spills of H₂O₂ sometimes occur. The assistant knows to clean these up immediately by liberally diluting the spill with water, mopping it up with a cloth and washing the H₂O₂ from the cloth into a sink with copious amounts of water. This attention to cleanliness is essential to minimise the risk of injury because 30\% H₂O₂ has the appearance of water. Unlike water, it is corrosive to skin and presents a serious fire or explosion hazard if it should come into contact with many of the chemicals used in the laboratory.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
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</tbody>
</table>
Unit Title:
Work safely with instruments that emit ionising radiation

Unit descriptor
This unit of competence covers the ability to store, transport and operate instruments that emits ionising radiation, in accordance with licensing requirements. This competency is typically performed by operators, commonly in a construction materials testing or similar environment, following established work practices.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Store instruments safely and securely</td>
<td>1.1 Identify State/Territory requirements for storage facilities</td>
</tr>
<tr>
<td></td>
<td>1.2 Store instruments in accordance with documented procedures</td>
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<tr>
<td></td>
<td>1.3 Secure instruments to prevent unauthorised access</td>
</tr>
<tr>
<td></td>
<td>1.4 Record instruments movements and usage in accordance with enterprise procedures</td>
</tr>
<tr>
<td>2 Transport instruments safely and securely</td>
<td>2.1 Select vehicle suitable for the purpose</td>
</tr>
<tr>
<td></td>
<td>2.2 Attach regulation signage to indicate that radioactive sources are being carried</td>
</tr>
<tr>
<td></td>
<td>2.3 Ensure that instruments are properly located and fixed in place</td>
</tr>
<tr>
<td></td>
<td>2.4 Ensure security of instruments when the vehicle is unattended</td>
</tr>
<tr>
<td></td>
<td>Use instruments safely and maintain security</td>
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<tr>
<td></td>
<td>Monitor to detect radiation levels</td>
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<td></td>
<td>Maintain records</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Perform emergency procedures</td>
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</tr>
</tbody>
</table>
RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work conducted by laboratory or field operators working under supervision or direction of para-professionals.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- standard operating procedures (SOPs)
- equipment manuals
- equipment start-up, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications
- licensing requirements.

Operations are subject to stringent OH&S requirements. Relevant standards may include sections of the workplace health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

Tools and equipment used include:

- nuclear moisture/density gauges
- downhole logging probes
- fluid density/level detectors
- battery chargers
- radiation monitors
- motor vehicles
- storage areas for nuclear sources
- radiation dosimeters
- documentation including user manuals, enterprise safety manuals
- radiation warning signs.

Typical skills may include:

- performing radiation surveys
- using radiation dosimeters
- transporting instruments containing radioactive materials
- storing instruments containing radioactive materials
• using instruments containing radioactive materials
• maintaining instruments containing radioactive materials.

Typical problems include:
• jamming of the source rod in the exposed position
• accidents during transportation
• fire
• theft of equipment containing radioactive sources
• on-site accidents
• keeping other personnel clear of instrument
• instrument breakdown.

Updating information

This unit of competence does not contain detailed information that requires regular updating.

EVIDENCE GUIDES

Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competence

Competence must be demonstrated in the ability to store, use and transport equipment containing radioactive sources, in accordance with documented procedures.

In particular the assessor should look to see that the candidate can:
• keep other personnel clear of radiation sources
• demonstrate emergency procedures
• perform and document radiation surveys
• place the instrument into storage
• transport the instrument in a motor vehicle
• handle and use the instrument
• observe, interpret and report atypical situations
• communicate problems to appropriate personnel.
Essential knowledge

Competence includes the ability to apply and/or explain:

- enterprise health, safety and emergency procedures relevant to radioactive devices
- factors affecting radiation intensity
- methods of minimising radiation exposure
- methods of measuring and detecting ionising radiation
- radiation doses
- types of radiation, their characteristics, sources and shielding methods
- physiological effects of ionising radiation
- State or Territory licensing requirements
- national codes of practice.

Interdependent assessment of unit

This unit may be assessed with:

- PML TEST 400 A – Perform instrumental tests/procedures
- PML TEST 500 A – Calibrate and maintain instruments
- PML DATA 500 A – Analyse data and report results.

Assessment methods and resources

It is strongly recommended that assessment is conducted through observation over time. The timeframe must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of completed workplace documentation
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:

- access to tools, equipment and materials which will allow for appropriate and realistic simulation
- a bank of case studies is required where these form part of the assessment method
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.
This competency in practice

Nuclear gauges are used extensively for measuring the density of soils, cement treated roadbase, roller compacted concrete and asphalt. They provide a non-destructive means of monitoring compaction operations during construction, so that additional rolling can be provided before the material sets or is covered with another layer.

National and State codes of practice regulate the use of equipment that emits ionising radiation, with States and Territories having licensing requirements for people handling the equipment. These include people involved in owning, storing, transporting or using such equipment.

Nuclear gauges are used on construction sites, so they are transported to the test site in motor vehicles. They must be protected from damage by construction plant, and stored safely and securely while not in use. The operator must ensure that bystanders are kept clear to minimise radiation exposure. Owners of gauges are required to have documented procedures and ensure that operators are adequately trained.

To ensure the safety and integrity of the gauge, radiation surveys are required at regular intervals. A handheld radiation meter is used, and the results recorded. In addition, periodic wipe tests are required.

This competency is intended so that training can be delivered and assessed to satisfy the State or territory licensing requirements. To ensure cost effectiveness, holistic assessment involving calibration and testing of the instrument may be conducted.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:

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<tr>
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<td>Level 3</td>
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</tbody>
</table>
**Unit Title:**

**Follow established work plan**

**Unit descriptor**

This unit of competency covers the ability to complete tasks individually or in a team context. The tasks involve established routines and procedures using allocated resources with access to readily available guidelines and advice. Work plans may need to be modified with supervisor agreement to suit changing conditions and priorities.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
</table>
| 1 Organise daily work activities | 1.1 Clarify allocated work activities and required resources if necessary  
1.2 Prioritise work activities as directed  
1.3 Break down work activities into small achievable components and efficient sequences |
| 2 Follow work plan | 2.1 Locate relevant workplace procedures for required tasks  
2.2 Undertake task(s) following prescribed and routine work related sequences  
2.3 Seek assistance from relevant personnel when difficulties arise beyond own capacity  
2.4 Record completion of activities to confirm outputs in accordance with plan |
| 3 Modify work plan | 3.1 Clarify changes in requests, conditions and priorities, if required  
3.2 Review tasks and priorities in line with changed circumstances, urgent requests or with a change of instruction from appropriate personnel  
3.3 Update work plan and communicate changes to appropriate personnel  
3.4 Confirm that all tasks have been completed in the required timeframe. |
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency includes the following types of information sources and documentation:
- SOPs
- job cards, batch cards, production schedules
- job descriptions
- methods, recipes, procedures and protocols.

Workplace activities may include but are not limited to performing:
- set up and pre-use checks of laboratory equipment
- calibration checks
- sampling and testing following standard procedures
- maintenance and cleaning tasks.

This unit of competency includes communication with relevant personnel to:
- work effectively with others in teams
- clarify individual responsibilities
- modify work plan to cope with urgent tests, abnormal results, problems with equipment and reagents, problems with production and quality control.

Updating information

This competency is not expected to need rapid updating because it is not limited by current versions of legislation, procedure and practices.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to plan and achieve work objectives efficiently. In particular, the assessor should look to see that the candidate:
- clarifies job outcomes and recognises resource needs
- follows relevant procedures
- recognises non-standard behaviour in samples and equipment
- recognises potential disruptions or changed circumstances and modifies work plan in conjunction with relevant personnel
- compensates for a variety of working environments (e.g., indoor, outdoor and night work)
- seeks assistance from relevant personnel when difficulties arise
- achieves quality outcomes within timelines.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain workplace procedures covering:
- customer service
- quality
- OHS and environmental legislative requirements
- technical work that the candidate routinely performs.

The candidate requires sufficient knowledge and understanding of the organisation’s information systems, procedures, equipment and typical operational difficulties to plan daily work activities in order to meet timelines.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment. The candidate should be assessed in the context of performing routine technical tasks.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PML OHS 300 A – Work safely in accordance with defined policies and procedures
- PML TEAM 300 A – Work efficiently as part of a team
- PML COM 300 A – Communicate with other people

technical units related to the tasks undertaken.

This unit of competency has no prerequisites.

Assessment methods and resources

The following assessment methods are suggested:

- review of a flowchart prepared by the candidate to show efficient sequencing of tasks
- observation of the candidate performing a range of technical tasks over sufficient time to demonstrate their handling of a variety of contingencies
- review of documents detailing completed tasks (eg, completed job cards, a report or suggestions for quality improvement)
- feedback from peers
- feedback from supervisors
- written or oral questions to partly assess the candidate’s ability to handle a range of contingencies. Questions will be asked in a manner appropriate to the required language and literacy levels of the candidate.

Resources may include:

- workplace procedures for relevant technical tasks.
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

A laboratory assistant works in a busy chemical testing laboratory. While conducting a moisture content test, the supervisor asked the assistant to immediately process six urgent samples that had been received from a customer. The assistant modified his/her work plan to take up the urgent work and was able to reprioritise other tasks to meet the changing needs of a laboratory.

**Biomedical and environmental services**

As part of a routine sequence, a technical officer was required to perform a series of tasks including the calibration of instruments required for testing of blood samples. These tasks were to be completed within a specified timeframe to meet the output requirements of the enterprise. During the calibration of one of the instruments, the technician experienced difficulties that required expert technical assistance. The problem was referred to the appropriate person and was quickly resolved. Consequently, the officer was able to complete all necessary tasks within the prescribed timeframe and the required output was maintained.

**Food and beverage processing industries**

A large abattoir in Australia processes more than 3,000 head of cattle per day. The laboratory personnel perform a large number and variety of tests daily to support this operation. The daily work program of one technical assistant involves the testing of meat and byproducts for their moisture and fat content and particle size. The assistant also performs basic microbiology tests for coliforms. To broaden the skills of staff, the laboratory supervisor organised the assistant to train several production staff over several days to take hygiene samples from "hotspots" on the production line. The technical assistant modified his/her work plan to take up the new work and was able to reprioritise other tasks to meet the changing needs of a laboratory.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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</table>

CS-66 © Australian National Training Authority – Laboratory Operations Training Package: PML 99, to be reviewed by 30/11/2002
Follow established work plan
Unit Title:
Contribute to the achievement of quality objectives

Unit descriptor
This unit of competency covers the development of a working knowledge of quality principles and their application in laboratory work.

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<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
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<tbody>
<tr>
<td>1 Apply quality control procedures</td>
<td>1.1 Record data for quality control purposes</td>
</tr>
<tr>
<td></td>
<td>1.2 Recognise and report non-conformances in keeping with job role and quality procedures</td>
</tr>
<tr>
<td>2 Contribute to quality improvements</td>
<td>2.1 Review own work practices for opportunities to continuously improve performance</td>
</tr>
<tr>
<td></td>
<td>2.2 Identify and report opportunities for improvements in procedures, processes and equipment in work area</td>
</tr>
<tr>
<td>3 Maintain commitment to enterprise quality standards in own work</td>
<td>3.1 Maintain an objective of “right first time”</td>
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<tr>
<td></td>
<td>3.2 Conduct work in accordance with sustainable energy work practice</td>
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<td></td>
<td>3.3 Minimise waste and rework in accordance with enterprise guidelines</td>
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<td></td>
<td>3.4 Demonstrate “job ownership” for whole tasks through a commitment to finish and follow-up</td>
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<td></td>
<td>3.5 Ensure that personal actions conform with the code of ethics relevant to the workplace</td>
</tr>
<tr>
<td>4 Assist in maintaining customer relationships</td>
<td>4.1 Demonstrate an understanding of the business goals, products and services of the enterprise when dealing with customers in relation to own function</td>
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<tr>
<td></td>
<td>4.2 Communicate with customers in keeping with knowledge and authority limitations and quality requirements</td>
</tr>
<tr>
<td>5 Update knowledge and skills as required</td>
<td>5.1 Recognise own strengths and limitations and take advantage of opportunities for skill development.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

All personnel that conduct sampling and testing have defined roles and responsibilities within the enterprise’s quality system. Their roles and responsibilities are set out in quality manuals and workplace procedures.

Quality manuals and workplace procedures may be based on standards such as:
- ISO 9001, 9002 and 9003, ISO GUIDE 25, AS 2830
- NATA requirements
- Therapeutic Goods Administration requirements
- Good laboratory practice (GLP), good manufacturing practice (GMP), the British Standard BS5750 and the OECD Principles of good laboratory practice.

Quality control procedures may include:
- standards imposed by regulatory and licensing bodies
- enterprise quality procedures
- working to a customer brief and associated quality procedures
- checklists to monitor job progress against agreed time, costs and quality standards
- the use of hold points to evaluate conformance
- the use of inspection and test plans to check compliance.

Sustainable energy principles and work practices may include:
- examining work practices that use excessive electricity
- switching off equipment when not in use
- regularly cleaning filters
- insulating rooms and buildings to reduce energy use
- recycling and reusing materials wherever practicable
- minimising process waste.

Reporting may involve:
- verbal responses
- data entry into laboratory or enterprise database
- brief written reports using enterprise proformas.

Quality improvement opportunities that directly relate to the work of laboratory assistants
could include:

improved methods for sampling, testing and recording data
improved hygiene and sanitation procedures
minimisation of waste and rework
improved laboratory layout and work flow.

Specific industry variables

Food and beverage processing industries

Additional standards may apply, for example:
- Australian Food Code
- Australian and overseas food and beverage regulations
- customer specific requirements/standards
- Australia Food Standards Act
- ADAC regulations.

Updating information

Changes in quality standards should be noted. It is anticipated that from the year 2000 onwards ISO Guide 25 will be superseded by ISO IIEC 17025.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Consistent performance at the required standard should be demonstrated. In particular, assessors should look to see that the candidate:

- applies required quality control procedures during sampling, testing and the recording of data
- provides quality products and services to customers in keeping with their role
- resolves simple customer requirements
- minimises waste and rework
- contributes to improvements in productivity and quality through teamwork and commitment to personal work standards
- applies sustainable energy principles and work practices.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and/or explain:

- role of internal and external audits
- quality requirements of the candidate’s job role and function(s)
- continuous improvement and waste minimisation principles
- recording, reporting and document control requirements
- sustainable energy principles.
Knowledge is also required of the:
products and services provided by the enterprise
layout of the enterprise, divisions, and laboratory
organisational structure of the enterprise
lines of communication
role of laboratory services to the enterprise and customers
scheduling of tests and procedures to meet customer requirements
workplace procedures associated with the candidate's regular technical duties.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML COM 300 A - Communicate with other people
technical units of competency dealing with sampling and testing.

This unit of competency has no prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
review of quality control data collected by the candidate
review of quality improvements suggested by the candidate
feedback from supervisors and peers
oral and written questions that are appropriate to the candidate’s language and literacy levels
flow charts or diagrams prepared by the candidate to describe work flows and workplace
layout (alternatively, the candidate could explain existing charts or diagrams).

Resources may include:
enterprise quality manual and procedures.
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

Laboratory assistants must have a good working knowledge of quality control procedures and of the contribution they can make by following these procedures.

For example, an assistant was measuring the moisture content of coke by a standard method. The SOP for this test stated that the limits for moisture are between 2% and 5% by weight. The assistant obtained a result of 5.8%. The assistant had followed the SOP correctly and performed the determination in triplicate and thus had confidence in the precision of the result. The assistant “recognised and reported the non-conformance” to the laboratory supervisor. The production manager took corrective action and modified the drying process to reduce the moisture content and provide a product which met the customer's requirements.

**Biomedical and environmental services**

A laboratory assistant working in the pathology department of a rural hospital was responsible for serum lithium estimations by flame photometry. When asked by the office staff when the lithium results would be ready, the assistant replied that the testing schedule of the laboratory meant that the test would not be done until the following week and asked why the office staff needed to know. The answer was that an outpatient clinic was being held, and the results were needed for a consultation. Although samples were often taken a week before the clinic was to be held, the assistant realised that results were not always ready for the clinic because of the testing schedule of the laboratory.

The assistant reported the situation to the laboratory supervisor. The supervisor rescheduled lithium testing to match the clinic times, so that results would always be ready for the clinic consultation. This pleased the clinic staff, the patient did not waste a visit, the office staff no longer got irate phone calls and the quality of service was improved overall.

**Food and beverage processing industries**

A fruit processing company produced many tonnes of solid vegetable waste annually. This was dumped as landfill at considerable cost and the local council was concerned that the method of disposal was not sustainable. The laboratory assistants at the company were included in a quality improvement team to investigate the problem. The team concentrated on alternative production methods to minimise waste yields and additional production methods that would enable the waste to be profitably utilised. They identified four potential uses of the waste: a source of pectin, alcohol and sugar and conversion of raw fruit peel to glazed peel. A cost-benefit analysis was performed in consultation with supporting industries including a local winery to assess the merits of these value adding activities.
The outcome was that the amount of waste produced by the company has been significantly reduced and much of the waste has been channelled into marketable products with full cost recovery. After some initial doubts, the laboratory personnel realised that they were able to make useful contributions to the project. They are part of an ongoing investigation of waste minimisation and value adding practices.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

<table>
<thead>
<tr>
<th>Competency</th>
<th>Level 1</th>
<th>Level 2</th>
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<tbody>
<tr>
<td>Communicating ideas &amp; information</td>
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<td>Working with others and in teams</td>
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<tr>
<td>Using mathematical ideas and techniques</td>
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<td>Using technology</td>
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</table>
Unit Title:

Apply critical control point requirements

Unit descriptor

This unit of competency covers the ability to monitor control points related to a person’s work responsibilities. This unit of competency also covers support for ongoing improvement of the enterprise HACCP (Hazard Analysis & Critical Control Points) plan.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Provide routine input to the HACCP plan</td>
</tr>
<tr>
<td></td>
<td>1.5 Obtain information about critical and control points in the manufacturing process</td>
</tr>
<tr>
<td></td>
<td>1.6 Locate critical points and control points for own work responsibilities</td>
</tr>
<tr>
<td></td>
<td>1.7 Perform relevant checks and inspections on materials and equipment to establish conformance to meet food safety requirements</td>
</tr>
<tr>
<td></td>
<td>1.8 Identify variations or common faults</td>
</tr>
<tr>
<td></td>
<td>1.9 Record inspection results and report to appropriate personnel</td>
</tr>
<tr>
<td>2</td>
<td>Contribute to the continuous improvement of the HACCP plan</td>
</tr>
<tr>
<td></td>
<td>2.5 Recognise non-conformance to the HACCP plan</td>
</tr>
<tr>
<td></td>
<td>2.6 Identify likely causes for non-conformance</td>
</tr>
<tr>
<td></td>
<td>2.7 Record and report non-conformances to appropriate personnel.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Access to the following documentation, such as:
- HACCP plans/documents/procedures
- product safety plan
- production/quality procedures/requirements
- State/national legislation
- standard operating procedures (SOPs)
- quality manuals
- food safety plans
- good manufacturing practice (GMP).

Products/materials handled by laboratory assistants could include:
- raw materials
- ingredients
- consumables
- finished product
- chemicals
- food additives.

Control points refer to those key points in a work process that must be monitored and controlled. This includes critical, quality and regulatory control points.

Updating information

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Competency must be demonstrated in the ability to identify, check and control critical control points related to the candidate’s work responsibilities. In particular, the assessor should look to see that the candidate:

- correctly monitors the critical control points in the manufacturing process
- prevents contamination from occurring or recurring
- records information through the enterprise reporting system
- collects and analyses data to identify variation from limits
- takes corrective action as required
- supports continuous improvement through observation and communication.

Essential knowledge

Competency includes the ability to apply and explain:

- the HACCP plan including:
  - the critical control points, control limits
  - consequences of non-conforming products being identified
- continuous improvement practices
- quality policy, procedures and responsibilities
- the methods used to monitor each critical control point
- equipment and instrument calibration requirement
- methods for systematically investigating and responding to problems
- control points and their potential impact on work systems
- food safety requirements.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.
Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 300A – Process and record data
PML QUAL 300A – Contribute to the achievement of quality objectives.

This unit of competency has no prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
observation of the candidate monitoring control points in the work area
feedback from supervisors and peers
review of corrective action suggestions by the candidate
flow charts or diagrams prepared by the candidate, alternatively, the candidate could explain existing charts or diagrams.

Resources may include:
quality manuals and procedures
HACCP plans
HACCP records
recording equipment
case studies to illustrate a range of HACCP issues.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Food and beverage processing industries

The laboratory is responsible for the monitoring of the more complex and time consuming critical control points in the food production process. The laboratory assistant gathers data at these points for the recording and checking of the process. All data outside the critical limits are immediately communicated to the laboratory manager and the production manager. Any corrective action appropriate for the laboratory assistant is completed and recorded in the laboratory log. Suggestions for improvement of the system are also recorded for discussion at the fortnightly staff meeting.
### Key competencies

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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</tbody>
</table>
Apply critical control point requirements
## Unit Title:

Handle and transport samples

### Unit descriptor

This unit of competency covers the ability to pick up and transport samples in accordance with enterprise procedures designed to ensure that subsequent test results reflect the state of a sample source at the time it was sampled. The person transporting the samples is not responsible for sampling or testing. This unit does not cover the ability to handle and transport animals as might be defined under prevailing animal care and ethics legislation and practices.

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<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1 Prepare for sample pickup</td>
<td>1.1 Confirm pickup sequence with supervisor</td>
</tr>
<tr>
<td></td>
<td>1.2 Check that vehicle and communication devices are in working order</td>
</tr>
<tr>
<td></td>
<td>1.3 Check that required transport containers and materials are in the vehicle</td>
</tr>
<tr>
<td>2 Pick up samples</td>
<td>2.1 Confirm the number and nature of samples to be picked up on arrival</td>
</tr>
<tr>
<td></td>
<td>2.2 Ensure samples match paperwork</td>
</tr>
<tr>
<td></td>
<td>2.3 Apply enterprise requirements to the transport of biological samples</td>
</tr>
<tr>
<td></td>
<td>2.4 Alert laboratory personnel to any special needs that are identified on sample documents</td>
</tr>
<tr>
<td></td>
<td>2.5 Complete required documentation at pickup point</td>
</tr>
<tr>
<td></td>
<td>2.6 Stow samples at the required temperature in the specified transport containers</td>
</tr>
</tbody>
</table>
3 Transport samples

3.1 Drive in a safe manner at all times
3.2 Check sample viability during transport where required, avoiding unnecessary handling
3.3 Deliver samples to reception point in accordance with enterprise procedures
3.4 Maintain confidentiality of all information
3.5 Clean up spills using appropriate techniques to protect personnel, work area and environment
3.6 Report any misadventures to supervisor

4 Maintain equipment

4.1 Maintain vehicle according to enterprise requirement
4.2 Maintain state of transport containers to ensure they are fit for purpose
4.3 Requisition stocks of consumable materials as required
4.4 Replenish stocks of collecting equipment at collection centres.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the pickup and transport of samples of biological or non-biological nature. The unit also describes skills and knowledge required of a courier who may or may not collect samples. Sample collection is covered in other units of competency.

The worker would have access to:
enterprise protocols regarding customer liaison and communication
vehicle log books
protocols for use of pagers, mobile telephones and two way radios
precautions for safe handling and handling of biological materials
precautions for the transport of volatile and unstable fluids
incident/accident report forms
spillage and waste containment and disposal protocols and containment materials.

Where a laboratory routinely posts or couriers samples for testing, the International Air Transport Association (IATA) Dangerous Goods Regulations and Australia Post Regulations
must be met.

**Updating information**

Changes in codes of practice and applicable standards should be noted.

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**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to safely pick up and transport samples to a reception centre for processing or testing and/or further referral within the required timeframe. In particular, the assessor should look to see that the candidate can:

- plan the picking up of samples in conjunction with a supervisor
- prepare the vehicle for the required journey
- check communication devices so contact is possible between the courier, reception centre, and routine pickup locations (as necessary)
- deal with individuals, customers, clients and reception staff effectively and courteously
- record details of sample exchange in relevant sections of chain of custody forms (as required)
- maintain the integrity of collected samples during transport
- contain and clean up spillage or breakages
- use appropriate techniques and equipment to safely dispose of waste materials
- maintain confidentiality in all aspects of work
- report difficulties and misadventures to supervisors.
Essential knowledge

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
the relationship between effective communication with clients and customers and enterprise business
the need for appropriate and timely transport
labile nature of biological and environmental samples
effect of heat or cold, or changes in environmental conditions, on samples
possible infectivity of biological materials
procedures for the containment and cleanup of spillages and breakages
need for efficient waste containment and disposal practices
need for maintenance of equipment used in the processes of handling and transporting samples.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML OHS 300 A – Work safely in accordance with defined policies and procedures.

This unit of competency has no prerequisites. Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
direct observation of work as a sample courier
journal of rostered activities
oral or written questions to assess underpinning knowledge or handling of unforeseen circumstances
simulated role plays between a courier and personnel at a sample reception desk or customer’s pickup centre.
Resources may include:
vehicle
standard operating procedures (SOPs)
communication devices
sample containers
sample transporting containers.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

During transit, samples must be handled and maintained under conditions which will ensure that their potency and efficacy are maintained. A courier has been asked to transport vaccine samples from the airport to the enterprise for laboratory evaluation. The supervisor faxes the courier company detailed instructions regarding pickup and handling/storage conditions during transit. In this case the samples are in insulated containers and the temperature is monitored and recorded continuously.

The courier collects the samples, puts them in the coolest part of the vehicle, ensuring that the package will not be subject to any sudden jolts, and transports them to the enterprise. After the samples arrive they are checked by the enterprise and appropriate documentation completed.

**Biomedical and environmental services**

At 8 am the courier commences the day shift. The shift supervisor identifies the collection centres to be visited. The courier takes the mobile phone from the charger and checks his/her pager while walking to the vehicle. In the vehicle, the courier logs in the odometer reading, makes a mental note of the fuel level, checks the cooler boxes and other equipment and carefully drives out. Today, there are pickups from four private hospitals and 12 collecting centres in a 200 sq km zone. As he/she approaches St Lucian’s, there is a call from base with instructions to collect a tissue biopsy and bring it back immediately. He/she asks the base contact to tell haematology that their 10 am specimen arrival will be 40 minutes late because of this unforeseen diversion. Eventually, he/she completes the round, having remembered to replenish specimen collecting stock at each centre visited.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
Unit Title:

Receive and prepare a range of samples for pathology testing

Unit descriptor

This unit of competency covers the ability to receive and prepare a range of samples for pathology testing. This unit does not include testing, tissue processing or similar techniques.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1 Log samples</td>
<td>1.1 Record date and time of arrival of specimens at enterprise</td>
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<td></td>
<td>1.2 Check and match samples with request forms before they are accepted</td>
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<td></td>
<td>1.3 Enter samples into the laboratory information system</td>
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<td></td>
<td>1.4 Apply required document tracking mechanisms</td>
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<td>1.5 Process ‘urgent’ samples according to enterprise requirements</td>
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<td>1.6 Ensure security of all information and laboratory data and records</td>
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<tr>
<td>2 Address customer service issues</td>
<td>2.1 Report to referring client when samples and request forms do not comply with enterprise requirements</td>
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<td></td>
<td>2.2 Refer to supervisor for instruction where ‘return to source’ is inappropriate or not possible</td>
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<td></td>
<td>2.3 Maintain confidentiality of all clinical and laboratory data and information</td>
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<td></td>
<td>2.4 Follow results security protocol to ensure results are not inadvertently issued to patients</td>
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<td>2.5 Ensure polite customer service when telephoning referring client</td>
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<td></td>
<td>Prepare samples for analysis</td>
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<td>4</td>
<td>Distribute sample</td>
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<td>5</td>
<td>Maintain a safe work area and environment</td>
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</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competency typically applies to laboratory assistants who receive and prepare samples as part of their job in a pathology service specimen reception area. All operations are performed in accordance with standard operating procedures and other enterprise documentation. All accidents (e.g., needle stick injuries) must be followed up to allow for appropriate medical treatment for the injured worker.

Staff working in an area where a spillage has occurred should be notified immediately and the area isolated while the spillage is cleaned up using appropriate techniques and precautions. Spillages will range from those at the bench or over a small space to those involving a whole room.

This unit of competency does not include any testing or tissue processing or similar techniques.

All operations assume the potential infectivity of samples and require standard precautions (e.g., National Health and Medical Research Council) to be applied. All operations are performed in accordance with standard operating procedures. Where there is apparent conflict between performance criteria and OHS requirements, the OHS requirements take precedence.

Information sources could include:
enterprise operating procedures
safety manuals describing, for example, protective apparel requirements; indications for use of biohazard and laminar flow cabinets; containment and cleanup of spillages; disposal of wastes
procedure sheets indicating how samples and sub-samples are to be labelled, processed, distributed or flagged for urgent testing or for other non-routine requirements, including referral to extramural laboratories
procedure sheets indicating transport and storage requirements
procedure sheets for physical and chemical separation, describing processes for centrifugation, serum and plasma separation
enterprise quality manuals
material safety data sheets.

Where a laboratory routinely posts or couriers samples for testing, the International Air Transport Association (IATA) Dangerous Goods Regulations and Australia Post Regulations must be met.

Updating information

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Competency must be demonstrated in the ability to:

- receive and process samples in accordance with enterprise specifications and checking, where plasma is required, that the appropriate anticoagulant has been used
- promptly relay to laboratory staff specific requirements as advised by referring client, where such requirements have been given to reception staff seeking clarification of clients’ requests
- perform sample preparation and sub-sampling in accordance with workplace procedures.

In particular, the assessor should look to see that the candidate:

- checks samples visually for history and acceptable transport conditions
- applies standard precautions when dealing with biological materials
- prepares, labels and stores samples following required procedures, and maintains sample integrity (and sterility if applicable)
- follows required sample disposal procedures
- maintains all equipment and surrounds in a clean and safe condition.

Essential knowledge

Competency includes the ability to apply and explain workplace procedures relating to the:

- importance of maintaining effective customer relations
- potentially infective nature of all biological materials
- nature of unstable solutions such as anticoagulated whole blood
- paramount importance of labelling and the unacceptability of poorly labelled or unlabelled specimens
- non-conformance of clotted samples for procedures such as routine haematological tests
- requirement of specified sample types for specific tests
- sample storage and transport requirements.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.
Interdependent assessment of unit

This unit of competency may be assessed with:
- PML COM 300 A – Communicate with other people
- PML OHS 300 A – Work safely in accordance with defined policies and procedures.

This unit of competency has no prerequisites. Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
- direct observation of sample receipt and preparation
- review of sample receipt and preparation records
- feedback from supervisors and peers
- questioning to assess underpinning knowledge procedures where direct observation is difficult (such as sample receipt and preparation in the field). Questioning techniques should be appropriate to the candidate’s language and literacy levels.

Resources may include:
- a selection of specimen containers, tubes and forms
- simulated specimens when an authentic specimen is unavailable or inappropriate.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Biomedical and environmental services

A technical assistant has just started a shift in specimen reception and puts on a coat and gloves before touching anything. There is a pile of samples and forms in the specimen box. In some cases, the samples and forms are enclosed in a plastic bag. In other cases, they are seemingly unconnected. The assistant notices that one of the samples has a bloodstained label. She/he quickly examines the samples, isolates the apparently leaking sample in a lockable plastic bag and places the related request form in the bag’s separate compartment. The assistant then disposes of her/his dirty gloves. The assistant now logs all samples into the computer, placing to one side a sample and request form that is inadequately labelled. She/he makes a note to call the referring doctor within the next ten minutes. The assistant places the haematology samples in the colour-coded tray and calls the laboratory for their pickup. While waiting, she/he starts centrifuging some of the Biochem tubes. While the tubes are spinning she/he calls the doctor of the patient whose sample is inadequately labelled. She/he records the missing date of birth on the request form, and then barcode/labels tubes for the samples’ serum. Within 30 minutes, she/he has cleared the first rush of samples. She/he takes the time to carefully empty the bin of wastes.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
# Unit Title:

**Operate basic handblowing equipment**

## Unit descriptor

This unit of competence covers the ability to operate handblowing equipment to perform basic glasswork. This competency will sometimes be performed by less experienced workers working under the guidance of an experienced scientific glassblower.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prepare for handblowing operations</td>
<td>1.1 Identify job, appropriate procedure and safety requirements</td>
</tr>
<tr>
<td></td>
<td>1.2 Use personal protective equipment and safety procedures as specified for job and materials to be used</td>
</tr>
<tr>
<td></td>
<td>1.3 Record description of the job to be undertaken, compare with specification and report any variations</td>
</tr>
<tr>
<td></td>
<td>1.4 Select and prepare tools and equipment in accordance with job requirements</td>
</tr>
<tr>
<td></td>
<td>1.5 Identify glass stocks and components required for the job</td>
</tr>
<tr>
<td>2 Operate equipment</td>
<td>2.1 Follow sequence of operations for glasswork procedure to be performed</td>
</tr>
<tr>
<td></td>
<td>2.2 Prepare glass stocks and components as required for job</td>
</tr>
<tr>
<td></td>
<td>2.3 Check and adjust equipment and tools for the job as applicable</td>
</tr>
<tr>
<td></td>
<td>2.4 Start up equipment as per standard procedure</td>
</tr>
<tr>
<td></td>
<td>2.5 Carry out glasswork procedure as per standard method</td>
</tr>
<tr>
<td></td>
<td>2.6 Monitor process and rectify routine problems</td>
</tr>
<tr>
<td></td>
<td>2.7 Follow equipment shutdown procedures</td>
</tr>
<tr>
<td>3 Use annealing</td>
<td>3.1 Prepare annealing equipment</td>
</tr>
</tbody>
</table>
### RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work typically conducted by less experienced glassblowers.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- material safety data sheets
- standard operating procedures (SOPs)
- equipment manuals
- equipment start-up, operation and shutdown procedures
calibration and maintenance schedules
quality manuals
enterprise recording and reporting procedures
production and laboratory schedules
material, production and product specifications.

All operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

This competency includes tools and equipment such as:
bench burner, hand torch, micro torch and ribbon burners, gas supplies and gas economisers
dydimium glasses, polariscope
glass working lathes
annealing ovens
measuring and recording equipment
hand tools such as carbon paddles and mandrels, range of forceps, glass tubing gauges, angle setting jigs, calipers, glass support rollers, brass shapers, carbon rods, glass knife, stainless steel gauze, eye protection and heat resistant mittens, vernier calipers and other measuring tools, strain viewer
mechanical glass cutters and saws
mechanical glass grinding equipment
communication equipment
safety clothing and equipment.

Typical skills may include:
working safely with glass
setting up and maintaining tools and equipment
using tools and equipment to perform basic glassblowing operations
using appropriate glass blowing hand manipulation techniques
cutting, heating, bending, shaping, sealing and related glass working techniques
minimising strain by using appropriate techniques
using coefficients of expansion appropriately
maintaining safe working pressures
storing glass appropriately
making and grinding components such as stopcocks.

Typical problems include:
temperature and strain problems
devitrification
non-uniform thickness of seals or joints
equipment problems
quality problems such as poor optics, distortion, excessive breakage, non-uniform break pattern, incorrect cross bend, excessive bow, scratches and poor glass shape
loss of utilities.
Updating information

This unit of competence does not contain detailed information that requires regular updating.

EVIDENCE GUIDES

Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competence

Competence must be demonstrated in the ability to use basic bench/hand glasswork techniques and equipment to fabricate general glass apparatus.

In particular the assessor should look to see that the candidate can:

• start up, set up and shut down equipment in accordance with work instructions
• maintain temperature and stress parameters
• select appropriate grades of glass and prepare for use
• optimise operating parameters and use equipment
• observe, interpret and report atypical situations
• communicate problems to appropriate personnel
• record and communicate work results
• follow correct OH&S and GLP practice.

Essential knowledge

Competence includes the ability to apply and/or explain:

• composition and nature of glass types
• basic theory of function and correct use of apparatus
• basic theoretical knowledge in chemistry and physics relating to properties and behaviour of glass
• startup and shutdown procedures
• critical material properties and appropriate glass working parameters
• pre-heating procedures
• basic theory of re-entry angles and stress points
• setup and annealing/conditioning process
• relationship of temperature and temporary and permanent stress
• pre-annealing, annealing and post-annealing processes
• potential quality problems.
Assessment context

This unit of competence is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

Although there is some overlap in the knowledge and skills in this unit with the unit of competence ‘repair glass apparatus using general glass blowing equipment’, competence in this unit should be demonstrated before the other unit is assessed.

Assessment methods and resources

It is strongly recommended that assessment is conducted through observation over time. The time frame must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of glasswork and workplace documentation completed
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:

- access to an operating laboratory which will allow for appropriate and realistic simulation
- a bank of case studies is required where these form part of the assessment method
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
<th>Communicating ideas &amp; information</th>
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<td>Level 1</td>
<td>Level 2</td>
</tr>
</tbody>
</table>
Unit Title:

Repair glass apparatus using simple glassblowing equipment

Unit descriptor

This unit of competence covers the ability to perform basic repairs to glass apparatus using simple glassblowing equipment.

It includes the ability to assess the economics of salvage, and to lay down a procedure of disassembly/assembly of the apparatus in accordance with specifications.

This competency will sometimes be performed by less experienced workers working under the guidance of an experienced scientific glassblower.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prepare for repair operations</td>
<td>1.1. Identify job, appropriate procedure and safety requirements, and apparatus required</td>
</tr>
<tr>
<td></td>
<td>1.2. Establish correct contaminate cleaning procedure before commencing repair operations</td>
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<td></td>
<td>1.3. Use personal protective equipment and safety procedures as specified for job and materials to be used</td>
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<td></td>
<td>1.4. Record job description, compare with blueprint, drawing, sketch, design or similar specification and report perceived difficulties</td>
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<td>1.5. Prepare equipment for repair operation in accordance with job requirements</td>
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<td>1.6. Identify, select and prepare glass stocks and components for job</td>
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<tr>
<td>Section</td>
<td>Task</td>
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<td>---------</td>
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<td>2</td>
<td>Repair apparatus</td>
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<tr>
<td>3</td>
<td>Operate annealing equipment</td>
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<tr>
<td>4</td>
<td>Maintain a safe work</td>
</tr>
<tr>
<td></td>
<td>environment</td>
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<tr>
<td>5</td>
<td>Maintain records</td>
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RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work typically conducted by less experienced scientific glassblowers.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- material safety data sheets
- standard operating procedures (SOPs)
- equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

All operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

This competency includes tools, materials and equipment such as:

- burners, gas supplies and gas economisers
- glass working lathes
- mechanical glass cutters and saws
- mechanical glass grinding equipment
- annealing ovens
- measuring and recording equipment
- hand tools such as carbon paddles and mandrels, range of forceps, glass tubing gauges, angle setting jigs, calipers, glass support rollers, brass shapers, carbon rods, glass knife, stainless steel gauze, eye protection and heat resistant mittens, vernier calipers and other measuring tools, strain viewer
- various glass types, including soda-lime, borosilicate, quartz, silica and special formula glasses
- glass to metal seals
- communication equipment
- safety clothing and equipment.

Updating information

This unit of competence does not contain detailed information that requires regular updating.
EVIDENCE GUIDES

Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competence

Competence must be demonstrated in the ability to use basic bench/hand glasswork techniques and equipment to do basic repair work to glass apparatus.

In particular the assessor should look to see that the candidate can:

- demonstrate a knowledge and awareness of contamination cleaning techniques to be carried out before repair operations are undertaken
- demonstrate a knowledge of the use and function of the broken apparatus
- apply appropriate glassblowing techniques to repair apparatus
- follow blueprints, drawings, sketches and designs relevant to repair work
- select appropriate grades of glass and prepare for use
- determine types of contaminants present on/in apparatus and use appropriate treatment process, with particular attention to risks associated with blowing used and possibly contaminated glass
- prepare apparatus for repair
- optimise and use glassblowing equipment
- identify atypical or out of normal repair problems
- communicate problems to either supervisor or outside service technician
- record and communicate work results
- follow correct OH&S practice.

Essential knowledge

Competence includes the ability to apply and explain:

- glassblowing techniques
- contamination cleaning techniques to be carried out before repair operations are undertaken
- repair materials and reason for their choice
- use of appropriate tools and equipment
- basic theoretical knowledge in chemistry and physics
- basic knowledge of how apparatus to be repaired is used
- critical material properties and appropriate glassworking parameters
- pre-repair apparatus preparation procedures
- annealing procedures
- methods of minimising potential quality problems.
Assessment context

This unit of competence is to be assessed in the workplace or a simulated workplace environment.

Interdependent assessment of unit

This unit may be assessed after:
- Operate basic handblowing equipment.

Assessment methods and resources

It is strongly recommended that assessment is conducted through observation over time. The time frame must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:
- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of glasswork and workplace documentation completed
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:
- access to an operating laboratory which will allow for appropriate and realistic simulation
- a bank of case studies where these form part of the assessment method.
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:

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</tr>
</tbody>
</table>
Repair glass apparatus using simple glassblowing equipment
### Unit Title:

**Work efficiently as part of a team**

### Unit descriptor

This unit of competency covers the ability to participate in a team and contribute to the achievement of team and enterprise goals.

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<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Work in a team environment</td>
<td>1.1 Cooperate with team members to negotiate and achieve agreed outcomes, timelines and priorities</td>
</tr>
<tr>
<td></td>
<td>1.2 Recognise personal abilities and limitations when undertaking team tasks</td>
</tr>
<tr>
<td></td>
<td>1.3 Confirm personal role and responsibility within the team for particular outputs</td>
</tr>
<tr>
<td></td>
<td>1.4 Demonstrate sensitivity to the diversity of other team members’ backgrounds and beliefs</td>
</tr>
<tr>
<td></td>
<td>1.5 Demonstrate awareness of the impact of personal work on the team’s output.</td>
</tr>
<tr>
<td>2 Complete allocated work</td>
<td>2.1 Organise and manage allocated work to meet time and resource constraints</td>
</tr>
<tr>
<td></td>
<td>2.2 Adapt tasks in response to new information, changed situations or instructions</td>
</tr>
<tr>
<td></td>
<td>2.3 Follow enterprise standards of quality, safety and ethical practice in all work</td>
</tr>
<tr>
<td>3 Identify and resolve work problems</td>
<td>3.1 Recognise problems or examples of sub-optimal performance within the work of the team</td>
</tr>
<tr>
<td></td>
<td>3.2 Apply agreed problem solving strategies to consider possible causes and solutions</td>
</tr>
<tr>
<td></td>
<td>3.3 Identify and access appropriate sources of help</td>
</tr>
<tr>
<td></td>
<td>3.4 Consider available alternatives and keep them open before agreeing on the most appropriate action.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

Every team member assists the rest of the team to organise and manage its workload. The team may:
be ongoing with responsibility for particular services or functions, or project based
have a mixture of full and part-time employees and contractors, laboratory, construction and production personnel
be separated by distance and work at sites outside laboratory facilities.

The team operates within:
small, medium and large contexts
internal and external environments
enterprise guidelines covering access and equity principles and practices, licensing requirements, industrial awards, enterprise bargaining agreements, codes of practice agreed responsibility and accountability requirements
appropriate goals, objectives
given resource parameters.

The work tasks of individual team members will vary according to the size of enterprise, the scope of the laboratory and their level of responsibility.

The team gains feedback from:

• team members
customers
other personnel within the enterprise.

The team uses a variety of learning strategies:

• coaching, mentoring, shadowing
task rotation
structured training.
The team uses a variety of strategies to maintain work flow:

- communicating critical events on shift
- recognising shortages in reagents and problems with equipment
- communicating quality breakdowns
- recognising urgent and abnormal results to be processed
- communicating and behaving in a courteous manner
- being punctual.

**Updating information**

This competency is not expected to require rapid updating as it is not limited by current versions of legislation, procedures and practice.

**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated by the ability to work effectively with team members who may have diverse work styles, cultures and perspectives to achieve agreed work objectives. In particular, assessors should look to see that the candidate:

- accepts responsibility for their own work output by, for example:
  - working to requirements for quality, customer service, resources and timelines
  - performing duties in line with enterprise policies and procedures
  - recognising personal abilities and limitations
  - organising and prioritising tasks

- participates by, for example:
  - promoting co-operation and good relations in the team
  - active listening and using inclusive language
  - sharing information
  - helping to overcome problems and conflict by tolerating the views of others
works well with other people within the enterprise by, for example:
- communicating clearly
- comprehending and implementing instructions

participates in workplace change by, for example:
- accepting changes
- making suggestions for improvement
- working safely

identifies and resolves problems by, for example:
- accessing relevant documentation
- identifying inputs and outputs
- sequencing a process
- identifying and rectifying a problem step
- obtaining timely help
- implementing preventative strategies whenever possible.

**Essential knowledge**

**Cross industry**

*The following knowledge requirements apply to all industry sectors covered by this Training Package.*

Competency includes the ability to apply and explain:

the organisational structure and layout of the laboratory workplace
- enterprise/statutory policies, procedures, agreements which affect the team such as:
  - equal opportunity
  - anti-harassment
  - anti-discrimination
  - industrial awards, enterprise agreements
- performance standards which affect the team such as:
  - quality customer service
- staff/workgroup practices
- teamwork techniques
- problem solving strategies
- interpersonal communication and conflict resolution techniques.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated workplace environment. It should also be assessed in the context of the performance of team based technical tasks.
Interdependent assessment of unit

This unit of competency may be assessed with:
PML OHS 300 A – Work safely in accordance with defined policies and procedures
PML COM 300 A – Communicate with other people.

This unit of competency should be assessed concurrently with the technical units of competency relevant to the tasks performed by the team.

This unit of competency has no prerequisites.

Assessment methods and resources

Competency in this unit should be assessed over a sufficient period of time to enable the candidate to demonstrate a range of team roles and to initiate and implement improvements.

The following assessment methods are suggested:
observation of the candidate performing team based technical tasks
feedback from supervisors and other team members on team effectiveness
review of documentation for completed tasks (eg, job cards, reports on projects completed safely, on time and within budget)
review of quality improvements suggested by the candidate.

Resources may include:
equipment and materials relevant to the team based technical tasks.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

A plastic processing plant had to halt production because of a suspect raw material. The plant manager immediately requested the polymer testing laboratory to test identified batches of polypropylene additives and colouring agents. The laboratory team of three assistants and one technical officer allocated the workload amongst themselves to conduct the twelve different tests within a period of four hours to identify the “out of specification” materials and report them to the production supervisor. All laboratory assistants had to reschedule their workplan, perform the required tests and assist each other to solve the production problem.
Biomedical and environmental services

A team was assigned to collect botanical samples and meet a ranger at a designated time and place. Due to poor planning, one of the team members did not arrive on time. Consequently, not all the required samples could be collected and another visit had to be arranged. Additional resources had to be allocated to this project and it was not completed within the scheduled timeframe and budget.

Food and beverage processing industries

Each of the technical assistants working in the laboratory of a food processing company was dedicated to performing specific analyses. As a result, they often alternated between periods of inactivity and excessive workload (the latter case had the potential to compromise their health and safety and the accuracy of their food analyses.)

One of the contributing factors to the periods of intense activity was the need to quickly prepare standard solutions and reagents. The team discussed this problem and agreed that while it was not appropriate for each assistant to become competent to perform every analytical procedure, it was feasible for each person to be able to prepare solutions and reagents used by others. The team developed a central register in which impending shortages of these materials were noted. Each assistant referred to this register when no other work was due and prepared the materials on a “first in, first out” basis unless a task was given a priority rating. The team found that this strategy more evenly distributed the workload over their shift, improved safety in the laboratory and reduced the risk of error.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
# Unit Title:

**Perform basic tests**

## Unit descriptor

This unit of competency covers the ability to perform basic tests and/or procedures using standard methods.

## ELEMENT OF COMPETENCY | PERFORMANCE CRITERIA
--- | ---
1 | Receive, label and store samples for testing
   | 1.1 Label laboratory samples to ensure all required information is transcribed accurately and legibly
   | 1.2 Register samples into laboratory system
   | 1.3 Record sample testing requirements
   | 1.4 Maintain sample integrity and eliminate cross-contamination
2 | Prepare sample
   | 2.1 Identify materials to be tested, appropriate standard method and safety requirements
   | 2.2 Use personal protective equipment as specified for standard method and material to be tested
   | 2.3 Record sample description, compare with specification, record and report discrepancies
   | 2.4 Prepare sample in accordance with appropriate standard methods
3 Perform tests on samples

3.1 Check calibration status of equipment and calibrate if applicable
3.2 Perform sequence of tests to be performed as per standard method
3.3 Identify, prepare and weigh or measure sample and standards to be tested
3.4 Set up test reagents or equipment/instrumentation as per standard method
3.5 Conduct tests in accordance with enterprise procedures
3.6 Record results in accordance with enterprise procedures
3.7 Identify and report “out of specification” or atypical results promptly to appropriate personnel
3.8 Clean and care for test equipment
3.9 Store unused reagents as required by relevant regulations and codes
3.10 Dispose of wastes in accordance with safety, enterprise and environmental requirements.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by supervised laboratory assistants who receive samples, prepare them for laboratory testing and perform a range of basic tests and measurements.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

Australian and international standards, such as:
- AS/NZS 2243.2 Chemical aspects
- AS 2243.6 Mechanical aspects
- AS 2243.10 Storage of chemicals
- AS 2830 Good laboratory practice

codes of practice (such as GLP and GMP)

National Measurement Act
material safety data sheets (MSDSs)
standard operating procedures (SOPs)
equipment manuals
equipment startup, operation and shutdown procedures
calibration and maintenance schedules
quality manuals
enterprise recording and reporting procedures
production and laboratory schedules
material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include:
sections of the Occupational Health and Safety legislation
enterprise safety rules and procedures
relevant State and Federal legislation
national standards
codes of practice.

Preparation of samples can include:
sub-sampling or splitting using procedures such as riffling, coning and quartering, manual and mechanical splitters
physical treatments such as ashing, dissolving, filtration, sieving, centrifugation and comminution.

Typical tests carried out by personnel at this level include:
appearance, colour, identity
melting points, boiling points, refractive indices, densities including compacted densities, viscosity measurements
ashes including sulfated ashes
Emerson class, pinhole dispersion, wet dry variation, Los Angeles abrasion, compression strength and flexural strength
spot tests, gravimetric tests, time/temperature, texture, pH and dipsticks.

**Updating information**

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to receive and prepare samples, and perform tests on samples to obtain accurate and reliable results within the required timeframe. In particular, the assessor should look to see that the candidate:

- applies SOPs to efficiently prepare samples for test and analyses
- uses safety information (eg, MSDSs) and performs procedures safely
- checks testing equipment calibration status
- completes all tests within required timeline without sacrificing safety, accuracy or quality
- calculates, records and presents results accurately and legibly
- cleans and maintains equipment.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain the:

- purpose of test
- principles of the standard method
- calibration procedures and their basis
- relevant standards/specifications and their interpretation
- source of uncertainty in measurement and methods for control
- importance and appropriate use of certified reference materials
- relevance of the National Measurement Act to laboratory measurement
- interpretation and recording of test result, including calculation of results from test data where required
- procedures for recognition of unexpected or unusual results and likely causes
- OHS procedures for sample testing.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 300 A – Process and record data
PML TEST 302 A – Calibrate test equipment and assist with its maintenance.

This unit of competency has no prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
observation of the candidate performing a range of basic tests
oral or written questioning to check underpinning knowledge of test procedures
feedback from peers and supervisors
examples of records and workplace documentation completed by the candidate
analysis of results achieved by the candidate over time.

Resources may include:
standard laboratory equipped with appropriate equipment and calibration standards
SOPs, calibration and testing procedures.

This competency in practice

_Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting._

Process manufacturing and construction materials industries

Standard testing methods may be viewed as “legal” requirements that must be followed to ensure that a product manufactured in a chemical plant meets the specification by which it is sold to the customer. Technical assistants perform tests in a quality control laboratory to ensure that material meets “legal” requirements and the material is safe and effective in use.

Peroxides may be present in ether as a result of light-catalysed air oxidation. Peroxides are toxic and can give rise to mixtures which are explosive when distilled. Technical assistants test ether to ensure that the level of peroxide is within acceptable limits. The test is done by shaking ether with a solution of potassium iodide. After standing for 30 minutes in the dark the yellow colour of the aqueous phase, due to the liberation of iodine, must not be more intense than a prepared standard solution. These tests ensure the quality and safety of the ether.
Food and beverage processing industries

The Eldorado Snack Food Company produces a range of high quality, impulse purchase snack foods. Some of these products are moisture and/or oxygen sensitive and are therefore packaged in multi-layer flexible packaging to provide optimum shelf-life. The packaging must also be able to withstand the rigours of the production and distribution process.

While the packaging is purchased to meet the shelf-life and distribution specifications, the quality assurance program requires the periodic evaluation of the packaging materials against these specifications. The tests conducted include tearing resistance, bursting strength, impact resistance and permeability and/or leakage. Tests are also conducted on aspects of the manufacturing process that can affect shelf-life. These tests involve the measuring of the heat-seam strength and the sealing performance of the closure process.

The test results are recorded by the laboratory assistant to verify the conformance of the materials to the supplier specifications and of the process to the manufacturing specifications. The assistant reports any anomalies or non-conformances to the appropriate personnel.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
Unit Title:
Perform biological laboratory procedures

Unit descriptor
This unit of competency covers the ability to perform a range of biological laboratory procedures that are part of diagnostic testing, scientific research, product development and quality assurance. The performance of some procedures in the field may be applicable and can be accommodated within this unit.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prepare specimens for microscopic examination</td>
<td>1.1 Ensure microscope slides are clean and scratch free to reduce production of artefacts</td>
</tr>
<tr>
<td></td>
<td>1.2 Mix samples where relevant to achieve homogeneous suspension</td>
</tr>
<tr>
<td></td>
<td>1.3 Prepare thin films of blood or other particulate samples to achieve monolayer</td>
</tr>
<tr>
<td></td>
<td>1.4 Minimise generation of aerosols as smears or films are prepared</td>
</tr>
<tr>
<td></td>
<td>1.5 Prepare whole mounts to demonstrate intact organisms</td>
</tr>
<tr>
<td></td>
<td>1.6 Label smears, films, and sections to ensure reliable identification during and after processing</td>
</tr>
<tr>
<td>2 Stain smears, films, sections and whole mounts</td>
<td>2.1 Fix smears of films to minimise cell damage and the production of artefacts</td>
</tr>
<tr>
<td></td>
<td>2.2 Stain fixed material to illustrate required tissue or cell characteristics</td>
</tr>
<tr>
<td></td>
<td>2.3 Mount stained films, sections and whole mounts to ensure long term preservation</td>
</tr>
<tr>
<td></td>
<td>2.4 Prepare permanent labels for smears, films and sections according to enterprise requirements for presentation, storage and retrieval</td>
</tr>
<tr>
<td></td>
<td>Process plant and animal tissue</td>
</tr>
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<tr>
<td></td>
<td>Cut sections of plant and animal tissue</td>
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<tr>
<td></td>
<td>Count cells</td>
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</tbody>
</table>
6 Work safely to protect the safety of self and other workers

6.1 Ensure personal safety and minimise cross contamination through the use of protective apparel
6.2 Handle all specimens and equipment in accordance with enterprise safety protocols
6.3 Perform aseptic transfer of specimen when necessary
6.4 Clean up spills using appropriate techniques to protect personnel, work area and environment
6.5 Minimise generation of waste
6.6 Dispose of biological and non-biological wastes safely.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency typically applies to laboratory assistants who perform biological laboratory procedures as part of their job in a biology, environment testing, food or pathology laboratory. All operations are performed in accordance with standard operating procedures and other enterprise documentation.

All operations assume the potential infectivity of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures. Where there is apparent conflict between performance criteria and occupational health and safety requirements, the occupational health and safety requirements take precedence.

Information sources could include:
- enterprise operating procedures
- safety manuals describing (eg, protective apparel requirements, indications for use of biohazard and laminar flow cabinets, containment and cleanup of spillages, and disposal of wastes
- procedures for the labelling and processing of samples and sub-samples
- storage requirement procedures
- enterprise quality manuals
- material safety data sheets (MSDSs).
Biological procedures could include the following:

- preparation of smears, impression smears, squashes, films and whole mounts
- staining fixed smears for demonstration of bacteria by the methylene blue and Gram staining techniques
- cutting paraffin sections of kidney, liver, small intestine, stomach and tongue
- cutting paraffin sections of dicotyledon and monocotyledon stems as seasonally available
- staining fixed blood films by a Romanowsky technique
- staining of animal or plant tissues to differentiate cytoplasmic and nuclear detail
- preparation of whole mounts such as liver flukes, planaria and samples of animal faeces to demonstrate ova, cysts and larvae
- counting cells in blood or other particulate samples (eg, a yeast suspension).

**Updating information**

Changes in codes of practice and applicable standards should be noted.

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**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package*

Competency must be demonstrated in the ability to prepare a range of biological specimens for microscopic examination. In particular the assessor should look to see that the candidate can:

- maintain personal safety and minimise cross contamination
- trace specimen identification through all steps from receiving a specimen through to completion of a procedure
- remove proteinaceous material and clean reusable glassware
- prepare a squash to demonstrate organelles as appropriate
- prepare blemish free sections according to enterprise procedures
- perform regressive haematoxylin and eosin staining on a range of animal tissues to show cytoplasmic and nuclear detail of an acceptable intensity
- perform differential staining techniques on selected monocotyledon and dicotyledon stem sections to demonstrate the structure of vascular bundles (xylem, phloem and cambium)
produce stained smears of bacteria that illustrate Gram positive and Gram negative reactions for organisms of known Gram reaction
stain blood films with a Romanowsky technique to clearly show differentiation of granulocytes
stain whole mounts of helminths
set up light paths on a microscope for bright field illumination for microscopic examination up to 1000 magnification.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain the:
relationship of procedures to the investigation of normal and abnormal anatomy physiology, and other related aspects of the biology and pathology of specimens and samples analysed in life science laboratories
importance of obtaining a monolayer of cells in smears and films
importance of rapid fixation of smears and films
theory of the Gram reaction related to cell membrane structure and chemistry
importance of a clear light path for microscopic identifications
functions of the components of a rotary microtome
safety precautions relevant to microtomy
theory of regressive haematoxylin and eosin staining
importance of isotonicity in maintaining cell membranes
importance of the correct filling of counting chambers
importance of counting cells in a systematic way
relevant standards/specifications and their interpretation
sources of uncertainty in measurement and methods for control
importance and appropriate use of certified reference materials
relevance of the National Measurement Act to laboratory measurement.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.
Interdependent assessment of unit

This unit of competency may be assessed with:
PML TEST 305 A – Perform aseptic techniques
PML DATA 300 A – Process and record data
PML OHS 300 A – Work safely in accordance with defined policies and procedures.

This unit of competency has no prerequisites. Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
preparation and staining of smears, impression smears, squashes, films, sections and whole mounts
counts of cells in particulate suspensions and calculation of numbers of cells per volume
feedback from supervisors and peers on adherence to enterprise/technical procedures
questioning to assess underpinning knowledge. Questioning techniques should be appropriate to the candidate’s language and literacy levels.

Resources may include:
broth and agar cultures of suitable bacteria and yeasts
animal and plant tissues and paraffin blocks
animal faeces containing selected helminth ova, cysts and larvae.

Under duty of care requirements, off job training providers should ensure that blood samples are known to be antibody free for hepatitis B and C, syphilis and human immunodeficiency viruses.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Biomedical and environmental services

A laboratory assistant works in the microbiology laboratory of a public hospital and is responsible for preparing and staining smears from patients to check for chest infections. The assistant puts on a clean gown and gloves before collecting the specimens from the reception area of the laboratory. The assistant prepares cultures of the sputum specimens on simple and selective media before preparing, fixing and staining smears for microscopic examination. She/he then examines the smears and cultures to identify any organisms present.

Food and beverage processing industries

A customer complaint was received about the baking properties of a flour delivery. The
laboratory assistant at the flour mill was given the task of preparing iodine stains of the returned flour and a range of baked and partially baked products prepared from it. The assistant made up fresh iodine staining solution and then prepared slides of each sample for microscopic examination. She/he identified the characteristic starch granules of the flour sample and recorded the degree of gelatinisation under the microscope in the starch granules in the baked samples.

Key competencies

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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</table>
Perform biological laboratory procedures
Unit Title:
Calibrate testing equipment and assist with its maintenance

Unit descriptor
This unit of competency covers the ability to perform setup and pre-use checks, calibrate testing equipment and assist with its maintenance.

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<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Perform setup and pre-use checks of laboratory equipment</td>
<td>1.1 Perform laboratory equipment setup and pre-use checks in accordance with enterprise procedures</td>
</tr>
<tr>
<td></td>
<td>1.2 Perform safety checks in accordance with relevant enterprise and instrumental procedures</td>
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<tr>
<td></td>
<td>1.3 Identify faulty or unsafe components and equipment and report to appropriate personnel</td>
</tr>
<tr>
<td></td>
<td>1.4 Complete instrument log books to enterprise requirements</td>
</tr>
<tr>
<td>2 Perform calibration checks</td>
<td>2.1 Start up equipment according to operating procedures</td>
</tr>
<tr>
<td></td>
<td>2.2 Use specified standards for calibration check</td>
</tr>
<tr>
<td></td>
<td>2.3 Check equipment as per calibration procedures and schedules</td>
</tr>
<tr>
<td></td>
<td>2.4 Record all calibration data accurately and legibly</td>
</tr>
<tr>
<td></td>
<td>2.5 Quarantine out of calibration equipment</td>
</tr>
<tr>
<td>3 Assist with equipment maintenance</td>
<td>3.1 Ensure all equipment work areas are clean during and after equipment use</td>
</tr>
<tr>
<td></td>
<td>3.2 Perform basic maintenance in accordance with enterprise procedures</td>
</tr>
<tr>
<td></td>
<td>3.3 Clean and store equipment as per enterprise and/or manufacturer’s specifications/procedures</td>
</tr>
<tr>
<td></td>
<td>3.4 Identify and replace, repair or dispose of damaged/worn equipment as appropriate</td>
</tr>
<tr>
<td>4 Maintain records</td>
<td>4.1 Record and report information on unsafe or faulty equipment as per enterprise procedures</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by supervised laboratory assistants who operate a range of laboratory equipment and instruments as part of their job.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

- Australian and international standards such as: AS 2243.10 Storage of chemicals, AS 2830 Good laboratory practice, AS 2243 Safety in laboratories
- codes of practice (such as GLP and GMP)
- material safety data sheets (MSDSs)
- National Measurement Act
- standard operating procedures (SOPs)
- equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the OHS legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

Laboratory equipment and instruments will depend on the nature of the enterprise and the range of testing carried out. Typical equipment may include:

- balances, pipettes, burettes and volumetric glassware
- optical microscopes
- melting point apparatus, viscometers, hardness testing equipment
- conductivity meters, pH meters
- noise meters, blasting meters
- disintegration apparatus, thermometers, incubators, waterbaths
- colorimeters/spectrometers, polarimeters
- compaction rammers, soil classification equipment
instrument chart recorders, penetrometers, force measuring equipment, tensiometers mixing and separating equipment such as centrifuges, rifflers and splitters, mixers.

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.

**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to calibrate test equipment and assist with its maintenance. In particular the assessor should look to see that the candidate can:

- perform setup pre-use checks and shutdown procedures
- calibrate basic equipment using standard procedures
- obtain readings of the required accuracy and precision
- recognise non-standard behaviour of instruments
- assist with maintaining equipment in working order
- follow all relevant OHS requirements
- follow enterprise recording and reporting procedures.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- operational principles and methods for equipment use
- basic sources of error in equipment operation and their control
- role and importance of correct calibration
- basic equipment maintenance procedures
- correct OHS procedures
- enterprise communication and reporting procedures.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
- PML TEST 300 A – Perform basic tests
- PML TEST 301 A – Perform biological laboratory procedures.

This unit of competency has no prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
- observation of the candidate calibrating and maintaining equipment
- oral or written questioning to assess underpinning knowledge of procedures and problem solving
- feedback from peers, and supervisors
- examples of equipment records and workplace documentation completed by the candidate.

Resources may include:
- standard laboratory equipped with appropriate equipment and reference manuals
- SOPs, calibration standards and procedures, maintenance procedures.
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

Laboratory assistants calibrate and operate a range of laboratory equipment and use these to ensure the quality of enterprise products. For example, the labelling on fertilisers specifies the total percentage of nitrogen \([N \text{ or } N(t)]\), the total percentage of phosphorus \([P \text{ or } P(t)]\) in all forms and the total percentage of potassium \([K]\). A 5-10-5 fertiliser contains 5% N, 10% P and 5% K. During the manufacture of fertiliser, an assistant in a quality control laboratory measures the concentration of nitrogen, phosphorus and potassium using standard analytical methods to ensure that the final products are within prescribed specifications. The assistant must pay particular attention to the equipment calibration. If the equipment is out of calibration no amount of testing skill will result in accurate results. Selling out-of-specification fertiliser could result in a product recall or claims from users against the manufacturer.

**Biomedical and environmental services**

Laboratory assistants are quite often involved in routine collections and culturing of cells. Bacterial cells are often cultured and grown to large populations in order to provide material from which to extract biological materials. A quick method of determining when the cell growth has yielded enough cells is to determine the absorbance of the cell culture by measuring absorbance at 600 nm. An absorbance of 1 to 1.5 will give a good cell harvest. This method relies on the assistant being able to perform calibration checks on a uv-vis spectrometer.

**Food and beverage processing industries**

A laboratory assistant in the quality control laboratory of a fruit canning company is required to calibrate, maintain and operate a range of equipment, including a pH meter. Canned pears, for example, are routinely checked for pH to ensure safe heat processing. While calibrating the pH meter with the standard buffer solutions, the laboratory assistant identified that stable pH readings could not be obtained. On closer inspection, it was found that the pH probe was damaged. This was reported to the supervisor. The probe was replaced and the meter was calibrated in readiness for routine testing.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</tbody>
</table>
Unit Title:
Prepare working solutions

Unit descriptor

This unit of competency covers the ability to prepare working solutions and to check that existing stocks are suitable for use. This unit assumes that calculations of quantities, choice of reagent grades and required dilutions will be specified by the supervisor.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Safely use laboratory chemicals, glassware and equipment</td>
<td>1.1 Apply appropriate safety precautions for use of laboratory equipment and hazardous chemical materials</td>
</tr>
<tr>
<td></td>
<td>1.2 Use appropriate laboratory glassware and measuring equipment</td>
</tr>
<tr>
<td></td>
<td>1.3 Clean and store glassware and equipment in accordance with enterprise procedures</td>
</tr>
<tr>
<td>2 Make up working solutions</td>
<td>2.1 Identify the relevant standard methods for solution preparation</td>
</tr>
<tr>
<td></td>
<td>2.2 Assemble specified laboratory equipment</td>
</tr>
<tr>
<td></td>
<td>2.3 Select and prepare materials and solvent of specified purity</td>
</tr>
<tr>
<td></td>
<td>2.4 Measure appropriate quantities of reagents for solution preparation and record data</td>
</tr>
<tr>
<td></td>
<td>2.5 Prepare labels and log solution details in laboratory register</td>
</tr>
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<td>2.6 Transfer solutions to appropriately labelled containers</td>
</tr>
<tr>
<td>3 Check existing stock solutions</td>
<td>3.1 Monitor shelf-life of working solutions as per laboratory procedures</td>
</tr>
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<td></td>
<td>3.2 Replace out-of-date or reject solutions as per laboratory procedures</td>
</tr>
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<td></td>
<td>3.3 Conduct routine titrimetric analyses, if appropriate, to determine if solutions are fit for purpose.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by supervised laboratory assistants who prepare a range of working solutions for laboratory use. Test solutions include those required to perform laboratory tests. All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

Australian and international standards such as:
- AS 2162.1 General – volumetric glassware
- AS 2163 Laboratory glassware – measuring cylinders
- AS 2165 Laboratory glassware – burettes

codes of practice (such as GLP and GMP)
material safety data sheets (MSDSs)
National Measurement Act
standard operating procedures (SOPs)
equipment manuals
equipment startup, operation and shutdown procedures
calibration and maintenance schedules
quality manuals
enterprise recording and reporting procedures
production and laboratory schedules
material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

The nature of test solutions covered by this competency will depend on the enterprise and the range of testing carried out. Typical test solutions may include:

solutions required for diagnostic/analytical and limit tests in food and chemical laboratories (eg, sulphates, chlorides, heavy metals)
solutions such as stains for standard diagnostic/analytical procedures in biomedical/environmental laboratories (eg, cell staining, fixation of cells and tissues, suspension of cells, titrimetric indicators)
solutions required for laboratory maintenance and disinfection (eg, 70% ethanol, hypochlorite).
This unit of competency may include the use of items of equipment such as:

- pH meters
- balances
- magnetic stirrers, waterbaths and hot plates
- measuring cylinders, beakers, conical flasks, volumetric flasks, pipettes, burettes
- filter papers and funnels
- fume cupboards.

Monitoring quality of solutions can include:

- noting turbidity to exclude absorption of moisture
- noting deposits to exclude microbial contamination or chemical degradation
- noting crystals to exclude evaporation
- titration to check concentration
- colour changes indicating a pH shift with solutions containing indicators.

Concentration terms may include:

- % w/w
- % w/v
- % v/v
- ppm (mg/L)
- molarity.

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to prepare working solutions and check solution stocks to ensure that they are suitable for use. In particular, the assessor should look to see that the candidate:

- uses appropriate materials, equipment and procedures to prepare solutions
- follows appropriate OHS and hygiene procedures
- uses all equipment safely, appropriately and efficiently
- uses enterprise procedures to calculate concentrations
- identifies solutions not fit for use
- uses titrations to determine the concentration of solutions
- label and stores solutions appropriately
- records and present data appropriately.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- relevant biological, chemical, food and laboratory terminology as applicable
- basic theory of acids, bases, salts, buffers and neutralisation
- enterprise procedures for preparing solutions
- calculations required to prepare specified amounts of solutions of specified concentration
- appropriate OHS procedure for preparing, handling and disposal of solutions
- use of MSDSs.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 300 A – Process and record data
PML OHS 300 A – Work safely in accordance with defined policies and procedures.

This unit of competency has no prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
observation of the candidate preparing working solutions
oral or written questioning
feedback from peers, and supervisors
examples of solution records and workplace documentation completed.

Resources may include:
standard laboratory equipped with appropriate equipment and reagents
standard operating procedures and testing methods.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

When starting materials used for the manufacture of common household materials are in transit from the supplier to the manufacturer, they may degrade if subjected to conditions such as heat, moisture, light and oxygen. Even when the supplier ships quality materials to the manufacturing plant, the materials may be substandard when they arrive.

Quality control tests are designed to test starting materials to ensure they are within specification. For example, aspirin forms salicylic acid when stored under adverse conditions. Laboratory assistants prepare and monitor the quality of solutions, such as ferric chloride solution, which gives an intense violet colour when added to salicylic acid but gives no colour with aspirin. Absence of the violet colouration indicates that breakdown of the aspirin hasn’t occurred.
Biomedical and environmental services

A laboratory assistant made up 1 litre of buffer solution using buffer tablets and a 1 litre volumetric flask as specified in the method. To ensure the solution was suitable for use, the assistant measured the pH and found it was within acceptable range. The assistant then appropriately labelled a storage vessel and stored the buffer according to requirements. By following enterprise procedures the shelf life of the buffer was maximised.

Food and beverage processing industries

A laboratory assistant is required to determine the percentage of ethanol by volume in a new brand of beer. The assistant cleans a specific gravity bottle in chromic acid, thoroughly dries it at room temperature and then fills the bottle with degassed beer. The assistant measures the mass of the bottle on an analytical balance, looks up the alcohol content of the beer using specific gravity tables and records these results as per enterprise procedures.

Key competencies

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</tbody>
</table>
**Unit Title:**

**Prepare culture media**

**PML TEST 304 A**

**Unit descriptor**

This unit of competency covers the ability to prepare culture media free of contamination, and facilitate optimal growth of organisms and cells. It also includes the ability to organise the materials, equipment and environment.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prepare culture media</td>
<td>1.1 Prepare mixture of media and solvent to ensure solution and even settling of heat soluble materials</td>
</tr>
<tr>
<td></td>
<td>1.2 Label media to allow tracking in subsequent processes</td>
</tr>
<tr>
<td></td>
<td>1.3 Dispense media into vessels for sterilisation, leaving room for expansion during heating and cooling</td>
</tr>
<tr>
<td>2 Sterilise media</td>
<td>2.1 Load the steriliser in keeping with maximum permitted loads and appropriate positioning of materials</td>
</tr>
<tr>
<td></td>
<td>2.2 Ensure a sterilisation indicator is correctly placed with the load to monitor sterilisation process</td>
</tr>
<tr>
<td></td>
<td>2.3 Operate sterilisation cycle in accordance with manufacturer’s requirements to achieve sterilisation at the required settings</td>
</tr>
<tr>
<td></td>
<td>2.4 Wear appropriate personal protective equipment when removing molten or hot media</td>
</tr>
<tr>
<td></td>
<td>2.5 Cool media to the temperature specified in the media formulation procedures</td>
</tr>
<tr>
<td></td>
<td>Pour, label and store media</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>4</td>
<td>Perform quality control checks</td>
</tr>
<tr>
<td>5</td>
<td>Maintain work area and equipment to prevent cross-infection and contamination</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency may be performed by laboratory assistants in the biomedical, environmental, food, pharmaceuticals and general biological industry sectors.

The range of equipment may include:

- balance
- pH meter
- hot plate stirrer
- autoclave
- Arnold steamer
- membrane filtration equipment
- measuring cylinders
- distilled water
- automatic agar pourers
- flasks and glass wear
- media storage bottles
- labelling equipment
- refrigerators
- consumables
- sterilisation indicators
- self refilling syringes
- bunsen burners
- petri dishes
- Falcon dishes
- tissue culture bottles.

Workplace information may include:

- standard operating procedures (SOPs)
- specifications
- AQIS requirements for safe disposal of plates and media
- operation and maintenance manuals for automated media preparation equipment
- production schedules and instructions
- material safety data sheets (MSDSs)
- good laboratory practice (GLP) and good manufacturing practice (GMP)
- manufacturer’s instructions or verbal direction from laboratory manager, supervisor or senior technician
- Food Standards Code.

The media could be prepared from formulated powders obtained from microbiological companies or from first principles under supervision of a technical officer or scientist.
Cell and tissue culture media may include:
agars
broths
solutions
slopes
basic balanced salt solutions such as Hank's or Kerb-Ringer's
deeps
enriched media such as blood sugar, chocolate agar, tetrathionate broth, selenite broth
control media
differential media such as eosin-methylene blue agar, MacConkey's agar.
selective media such as deoxycholate-citrate agar, Lowenstein-Jensen medium.

Labile constituents could include blood, hormones or antibodies.

Sterilising techniques could include autoclaves, steamers and membrane filtration equipment.

**Updating information**

Changes in codes of practice and applicable standards should be noted.

**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to prepare culture media to specification and within the required timeframe. In particular, the assessor should look to see that the candidate is able to:
use appropriate personal protective clothing and/or equipment
use a vessel large enough to endure adequate mixing and heating of the media
prevent cross contamination
follow procedures consistently
confirm sterility of media, by using appropriate sterilisation techniques
maintain adequate space between containers to ensure efficient sterilisation
allow the chamber pressure of the autoclave to return to zero and temperature to cool to 80 - 90°C before opening autoclave door to prevent boil over or plugs/caps being blown off flasks or tubes.
carry out post sterilisation procedures such as dispensing or adding using aseptic technique to ensure the sterilised media has cooled down sufficiently to ensure that heat labile constituents such as blood, hormones or antibodies are not inactivated when added to the media.
select media suitable for isolating and/or growth of a specified organism.
label and store culture media according to enterprise procedures.
accurately record data.
report non-compliance, anomalies or out-of-specification results.
sort, collect, treat, recycle or dispose of waste.
demonstrate ability of media to support growth of relevant microorganism.

**Essential knowledge**

**Cross industry**

Competency includes the ability to apply and/or explain:
the relationship between the correct preparation of culture media and the optimal growth of organisms or cells.
the purpose and features of culture media.
range of biological media.
accurate measuring techniques.
mathematical skills to calculate mass and volume.
the relationship between sterile practices, hygiene procedures and the ability to obtain growth free of contamination.
temperature control requirements.
basic microbiological concepts and terminology.
the importance of physical requirements such as pH and isotonicity on optimal growth of organisms and cells.
importance of D, L isomers in media ingredients.
methods for purifying water for use in the preparation of culture media.
role of cell growth regulators/inhibitors in the culture medium.
role of macronutrients and micronutrients in the culture medium.
the effect of inappropriate storage on culture media quality and performance.
cleaning and sanitising requirements of equipment and work area.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment and over sufficient time to allow the candidate to demonstrate the preparation of a range of media and recognition of a variety of non-conformances.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML TEST 301 A – Perform biological laboratory procedures
PML OHS 300 A – Work safely in accordance with defined policies and procedures.

This unit of competency should be assessed after:
PML TEST 305 A – Perform aseptic techniques.

Assessment methods and resources

The following assessment methods are suggested:
observation of the candidate preparing culture media
written and/or oral questioning to assess underpinning knowledge
results of quality assurance and batches of media prepared.

Resources may include:
work schedule and work procedures including advice on safe work practices
relevant equipment
relevant OHS clothing and personal protective equipment
material safety data sheets (MSDSs).

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Biomedical and environmental services

Media preparation is a routine task of the technical assistant. The methods and standard procedures are all documented but common working knowledge and standard “don’ts” are not always written into the methods. Some ingredients such as labile nutrients and antibiotics must be added under sterile conditions after the basic ingredients have been mixed and autoclaved. In one laboratory there is a list of ingredients not to be autoclaved posted on the notice board, in the media recipe book and for good measure on the autoclave itself. One day, a technical assistant who was preparing media added all the ingredients including the glucose, then autoclaved all 20L of it. The technical assistant learned the consequences of not paying full attention to the
procedure the hard way and spent most of the day removing the toffee from inside the autoclave!

**Food and beverage processing industries**

A laboratory assistant’s task was to prepare and pour agar plates in readiness for milk sampling. The assistant collected all the equipment and material needed to make an agar plate and ensured the working area was suitable. The agar solution was carefully prepared and poured into a large conical flask prior to sterilisation in the autoclave. On completion of the sterilisation cycle the agar cooled to 42°C in a water bath. It was poured into the plates after flaming the neck of the flask. The lids were quickly replaced on the plates to minimise contamination. The plates were then stored. Any excess plates were bagged in a laminar flow unit and then placed in the fridge. The equipment was hot washed and the benches swabbed with 70% ethanol solution.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

<table>
<thead>
<tr>
<th>Communicating ideas &amp; information</th>
<th>Collecting, analysing &amp; organising information</th>
<th>Planning &amp; organising activities</th>
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<td>Level 2</td>
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<td>Level 2</td>
<td>Level 2</td>
</tr>
</tbody>
</table>
# Unit Title:

**Perform aseptic techniques**

## Unit descriptor

This unit of competency covers the ability to perform aseptic techniques during sampling, and generic microbiological procedures in field and laboratory work, to maintain the integrity of the sample source and the sample and to produce reliable microbiological test data.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prepare for aseptic sampling or transfer</td>
<td>1.1 Ensure that any sampling procedure conforms with the requirements of the sampling plan</td>
</tr>
<tr>
<td></td>
<td>1.2 Wear required protective apparel suitable to the procedure</td>
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<tr>
<td></td>
<td>1.3 Prepare the work area for safe and effective sample transfer</td>
</tr>
<tr>
<td></td>
<td>1.4 Select equipment and materials specified by the procedure</td>
</tr>
<tr>
<td></td>
<td>1.5 Organise equipment to minimise contamination during manipulations</td>
</tr>
<tr>
<td></td>
<td>1.6 Label containers for clear identification</td>
</tr>
<tr>
<td></td>
<td>1.7 Record details in relevant log or database</td>
</tr>
</tbody>
</table>
2 Transfer materials aseptically

2.1 Protect the integrity of the sample source by sterilising the sampling site and flaming the mouth of transport or culture vessel

2.2 Sterilise inoculating loops and/or pipette where used to prevent contamination

2.3 Perform transfer minimising opportunities for contamination and cross-infection

2.4 After transfer, and before sealing the transport or culture vessel, flame the vessel mouth to maintain sterility

2.5 Re-sterilise inoculating loops, minimising the generation of aerosols

2.6 Streak plate inoculations to maximise potential for single colony growth and to avoid contamination

2.7 Label transport or culture vessels for clear identification

3 Maintain work area and equipment to prevent cross-infection and contamination

3.1 Place disposable and reusable items into relevant receptacles

3.2 Clean and disinfect work area and equipment after use

3.3 Transport disposable and reusable contaminated materials to relevant areas for disinfection, sterilisation and cleaning or disposal.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the performance of aseptic techniques used in microbiological tasks performed by laboratory technicians in the biomedical, environmental, food and beverage industry sectors.

All work assumes the potential infectivity of samples and materials presented for laboratory processing. Facilities, equipment and processes would conform to the recommendations of AS/NZ 2243.3 Safety in laboratories, Part 3: Microbiology, and National Health and Medical Research Council guidelines on infection control.
Aseptic sampling and transfers will typically involve accessing a sample source, using specified equipment to remove a sample and transferring it to a specified vessel without:

- contamination of the sample source
- contamination of the sample
- cross contamination.

Sampling transfers may include sample pot and transfer media and the subculturing and/or passaging of culture to:

- sterile broth
- media for isolation of colony
- tissue culture media
- media for continuous culture systems.

Samples could include:

- body fluids and liquids
- water and soil
- sterile pharmaceuticals
- yeasts and moulds
- milk and yoghurt
- swabs and smears
- propagation tissue
- plant material
- bacterial cultures
- fermented foods and beverages.

Equipment may include:

- transfer equipment, such as inoculating loops, pipettes (quantitative and qualitative), flasks, tubes and spatulas
- bunsen burners and bench incinerators
- anaerobic jars
- incubators, waterbaths, refrigerators, freezers and possibly dry ice and liquid nitrogen cylinders
- laminar flow units and biohazard cabinets
- personal protective equipment such as gloves, gown, mask and safety glasses
- autoclave or pressure cooker
- swabs
- continuous culture systems.

The range of material may involve:

- solid and/or liquid media
- supplied media (eg, media manufactured in the enterprise or raw material supplies for media)
- disinfecting and sterilising agents and materials (eg, Methylated spirits, ethanol and ether)
- disposable equipment and clothing
- tissue culture media
- growth media in broths, plates, deeps or slopes
- receptacles for safe disposal of wastes and for processing of reuseable materials
- bar coding material and labels.
Workplace hazards and hazardous events may include:
accessing the sample from difficult or dangerous areas
dry ice and liquid nitrogen vapour
UV light sources
bunsen burners
molten agar
sharps
chemical, biological and radioactive spills.

Workplace information may include:
standard operating procedures (SOPs)
specifications for safe waste disposal of biohazardous materials
production schedules and instructions
work notes
material safety data sheets (MSDSs)
manufacturer’s instructions
verbal instructions from laboratory manager, supervisor or senior technician
Guidelines for small scale genetic manipulation work.

It is expected that all procedures including recording of samples, operation of equipment and cleaning/decontamination will be carried out according to established laboratory procedures and these may vary across sectors. All sterilising equipment must meet Workcover requirements. All samples and wastes must be handled in accordance with OHS guidelines and Australian Standard (AS) 2243.3.

**Updating information**

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to perform aseptic techniques to preserve the integrity of samples and preventing contamination of personnel, work area and environment. In particular, the assessor should look to see that the candidate:

- prevents cross contamination of sample source and sample
- manipulates equipment to prevent contamination of culture medium during transfer
- sterilises equipment as required to prevent cross contamination of work area, personnel and environment.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- principles of infection control related to occupational health and safety and to sampling and transfer of materials in microbiological investigations
- disinfection and sterilisation procedures used in the collection, processing and safe disposal of samples and materials
- importance of pure culture techniques and aseptic transfer to the successful microbiological investigation and correct interpretation of laboratory results
- growth requirements of micro-organisms (bacteria, fungi, protozoans, viruses and multicellular parasites) in terms of their laboratory culture
- effects of physical and chemical agents on microbial growth and death.
The candidate must be able to follow defined OHS policies and procedures. In some instances the candidate may also need to apply:

- environmental requirements
- infection control procedures
- food safety principles.

**Specific industry**

*Additional knowledge requirements apply for each industry sector below.*

**Food and beverage processing industries**

- food spoilage symptoms
- beneficial/detrimental organisms relevant to specific food industry sector.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit of competency may be assessed with:

- PML OHS 300 A – Work safely in accordance with defined policies and procedures.

This unit of competency has no prerequisites.

**Assessment methods and resources**

The following assessment methods are suggested:

- observation of the candidate successfully transferring a range of samples
- written and/or oral questioning to assess underpinning knowledge. Questioning will be appropriate to the language and literacy levels of the candidate.

Resources may include:

- workplace procedures
- Food Standards Code
- State Dairy Corporation standards
- medical/pathology documentation
- material safety data sheets (MSDSs).

**This competency in practice**

*Industry representatives have provided storylines to illustrate the practical application of*
each unit of competency and show its relevance in a workplace setting.

**Biomedical and environmental services**

As a preparation for antibiotic sensitivity testing and biochemical identification of presumed pathogenic bacteria, a technical assistant was asked to prepare a sterile peptone suspension of a lactose fermenting colony, previously identified by the supervisor on a MacConkey’s agar plate.

The assistant labelled a 5mL tube of peptone broth with the sample number and a code for the identified colony and then donned a pair of disposable gloves. Bringing the labelled tube and the MacConkey’s plate near to the Bunsen, (s)he took an inoculating loop and sterilised it in the incandescent flame. (S)he carefully cooled the loop in a sterile area of the agar and gently scraped off half the colony. With the other hand, and in the vicinity of the heated air of the Bunsen, (s)he removed the cover of the peptone tube in her/his crooked finger. In a continuous and coordinated way (s)he flamed the lip of the tube and emulsified the colony in the broth. (S)he then flamed the lip of the tube and replaced its cover. Finally, (s)he resterilised the inoculating loop introducing and holding it in the bunsen flame to minimise the generation of bacterial aerosols.

**Food and beverage processing industries**

As part of the quality assurance program at an ice-cream manufacturer, six ice-creams were removed from the production line and placed in sterile bags then stored in the freezer in the microbiology laboratory. Later in the morning, the laboratory assistant removed the samples from the freezer, registered the samples with the date received and test code and signed the register book. The samples were then placed into a water bath set at 42°C. While the samples were melting the laboratory assistant labelled the respective agar plates with the registered codes. Using aseptic techniques the assistant carefully transferred 1ml of ice-cream mix into the total plate count agar. The plates were then placed in the incubator and recorded.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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<td>Level 1</td>
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<td>Level 1</td>
</tr>
</tbody>
</table>
Unit Title:
Assist with fieldwork

Unit descriptor

This unit of competency describes the ability to perform tasks associated with organisation of fieldwork, field surveys and field camp operations. It also covers basic field survival skills. This unit of competency does not include gaining clearance for animal trapping, tagging, keeping or experimentation. It does not cover animal handling techniques. The worker would only perform these tasks under the guidance and supervision of a scientific officer.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Assist with organisation of fieldwork</td>
<td>1.1 Purchase supplies and equipment as specified by senior staff</td>
</tr>
<tr>
<td></td>
<td>1.2 Assemble supplies and equipment and check against inventory</td>
</tr>
<tr>
<td></td>
<td>1.3 Pack supplies and equipment appropriately for safe transport</td>
</tr>
<tr>
<td>2 Perform tasks related to field camp operations</td>
<td>2.1 Check unpacked items against inventory</td>
</tr>
<tr>
<td></td>
<td>2.2 Store supplies and equipment as specified</td>
</tr>
<tr>
<td></td>
<td>2.3 Restock supplies as necessary</td>
</tr>
<tr>
<td></td>
<td>2.4 Check sanitation facilities as required</td>
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<td></td>
<td>2.5 Dispose of camp waste in accordance with safety and environmental requirements</td>
</tr>
</tbody>
</table>
### Assist with fieldwork

<table>
<thead>
<tr>
<th>Range of Variables</th>
</tr>
</thead>
</table>

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competency describes the ability of the worker to assist in the collection of samples such as animals, plants, soil and water in the field; with the monitoring of biological systems by observation and documentation; with the maintenance and storage of samples suitable to performance of subsequent procedures; and with the testing of samples as directed.
All aspects of field and laboratory work would be supervised by a scientific officer or technical officer. Though a supervisor may not always actually be present, the worker will follow standard operating procedures that clearly describe the permitted scope of practice.

All field work will be performed according to legislative and environmental requirements and industry guidelines and codes of practice.

In the field the worker and supervisor would generally have access to the following:

- fieldwork procedures, standard operating procedures and operating manuals
- test procedures (validated and authorised)
- sampling procedures (labelling, preparation, storage, transport and disposal)
- safety requirements for equipment, materials or products
- permits for wildlife capture and handling
- animal welfare and ethics codes of practice
- cleaning, hygiene and personal hygiene requirements
- environmental requirements related to disposal of waste
- incident and accident/injury reports
- instructions to comply with new legislation, standards, guidelines and codes
- first aid kit and survival manual
- navigation and communication equipment, including global positioning system.

This unit of competency may include the use of items of equipment such as:

- pH meters, dissolved oxygen probes, portable colourimeters, field microscopes, hand centrifuges, sieves and filters
- rapid chemical field test kits
- environmental monitoring systems
- equipment required for the collection of samples and animals
- equipment required for ensuring the wellbeing of animals
- equipment suitable for the safe collection and disposal of biological and non-biological wastes
- basic first aid equipment
- data loggers
- communication systems such as two-way radio, conventional codes and symbols for signalling
- tools, vehicle recovery equipment and spare parts.

**Updating information**

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Competency must be demonstrated in the ability to:

collect samples in accordance with enterprise procedures and legislative requirements
maintain and store samples in accordance with special requirements for continued wellbeing, viability and integrity of sample
handle animal in accordance with codes governing animal care and ethics
record data according to enterprise procedures and legislative requirements
perform all fieldwork in accordance with safety and environmental requirements.

The tests and procedures that the worker uses would be clearly described in enterprise manuals, legislative documents and relevant codes of practice and ethics. The worker only operates within the permitted scope of practice. In particular the assessor should look to see that the candidate:

follows enterprise standard operating procedures
prepares documentation accurately and in accordance with requirements
follows relevant legislature and codes of practice
follows relevant safety practices when using equipment and materials.
disposes of wastes in accordance with safety and environmental requirements.

Essential knowledge

Competency includes the ability to apply and explain:
terminology relevant to the physical chemistry, biology and ecology of samples and specimens
enterprise procedures relating to sample collection, maintenance and storage
enterprise procedures relating to testing of samples
specific legislation and codes of practice related to sample and animal collection
principles of safety relating to fieldwork such as use of LPG, operation of generators, use of protective clothing
communication procedures using two-way radio and satellite phone
basic field survival strategies such as map reading, use of compass, “stay with vehicle” in the event of accident or emergency
documentation in accordance with enterprise procedures and legislative requirements.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment such as fieldwork arranged by a training provider.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML TEAM 300 A – Work effectively as part of a team
PML COM 300 A – Communicate with other people.

This unit of competency has no prerequisites. Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
field trips with a focus on sample collection and storage, accurate documentation, field testing of samples, collection of environmental data, safety aspects of fieldwork and basic field survival skills
paper exercises associated with organisation of fieldwork, fieldwork operations and basic field survival strategies
role plays with a focus on accident and emergency situations requiring use of communication procedures and basic field survival strategies
participation in cooperative teamwork processes
oral, written and practical tests.

Resources may include:
enterprise and legislative documents and codes of practice
enterprise procedures
relevant equipment, samples, test kits and reagents.
This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Biomedical and environmental services

On a field trip to determine the biodiversity of an island fringing reef, a technical assistant assisted in constructing a grid map of the study area. The assistant was then asked to count the number of each species in part of the grid, taking care to minimise the impact on the environment. The assistant was also required to accurately record the data on a map to show the location of each organism using a predetermined key. The survey was successfully completed because enterprise procedures were followed.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
### Unit Title:

**Prepare trial batches for evaluation**

### Unit descriptor

This unit of competence covers the ability to prepare trial batches of materials for evaluation. Materials can be manufactured products including concrete, asphalt, food, plastics, paint, and other industrial chemicals. This competency is typically performed by a laboratory operator working under the guidance of a professional or para-professional.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
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<tbody>
<tr>
<td>1 Prepare for trial batch mixing</td>
<td>1.1 Identify the job, materials, appropriate procedures and safety requirements</td>
</tr>
<tr>
<td></td>
<td>1.2 Identify and use personal protective equipment and safety procedures required for the job and for the materials to be used</td>
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<tr>
<td></td>
<td>1.3 Record description of the job to be undertaken, compare with specification and report any variations</td>
</tr>
<tr>
<td></td>
<td>1.4 Select and prepare tools, equipment and materials in accordance with job requirements</td>
</tr>
<tr>
<td></td>
<td>1.5 Confirm the properties and quantities of materials to be used</td>
</tr>
<tr>
<td></td>
<td>1.6 Confirm that the required materials are available and ready for use</td>
</tr>
<tr>
<td>2 Mix trial batch for evaluation</td>
<td>2.1 Measure out quantities of materials ready for mixing</td>
</tr>
<tr>
<td></td>
<td>2.2 Mix the materials according to established practices</td>
</tr>
<tr>
<td></td>
<td>2.3 Discharge the mixture ready for inspection and testing according to established practices</td>
</tr>
<tr>
<td></td>
<td>2.4 Record details of the mix and any observations according to established practices</td>
</tr>
<tr>
<td>3</td>
<td>Evaluate properties of the mixture by inspection and standard test methods</td>
</tr>
<tr>
<td>3.1</td>
<td>Obtain representative samples of the mix for testing</td>
</tr>
<tr>
<td>3.2</td>
<td>Perform specified tests according to established practices</td>
</tr>
<tr>
<td>3.3</td>
<td>Handle and transport samples in accordance with established practices</td>
</tr>
<tr>
<td>3.4</td>
<td>Label samples and record details in accordance with established practices</td>
</tr>
<tr>
<td>4</td>
<td>Clean equipment and dispose of materials</td>
</tr>
<tr>
<td>4.1</td>
<td>Clean mixing, measuring, sampling and testing equipment after use</td>
</tr>
<tr>
<td>4.2</td>
<td>Return unused materials to storage</td>
</tr>
<tr>
<td>4.3</td>
<td>Dispose of excess materials safely and ethically</td>
</tr>
<tr>
<td>5</td>
<td>Maintain records</td>
</tr>
<tr>
<td>5.1</td>
<td>Record data in accordance with established practices</td>
</tr>
<tr>
<td>5.2</td>
<td>Maintain equipment records in accordance with established practices</td>
</tr>
<tr>
<td>5.3</td>
<td>Maintain confidentiality of enterprise information</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work conducted by trainee laboratory assistants.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- standard operating procedures (SOPs)
- equipment manuals
- equipment start-up, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

Operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

Materials, tools and equipment used include:

- soils, concrete, asphalt, aggregates, polymers, ceramics, metals, foodstuffs, solvents
- ovens, sieves, balances, volumetric measures, mixers
- hand tools including shovels, scoops, spatulas
- consumables including sample bags, labels
- documentation including specifications, manufacturers’ handbooks, worksheets
- test equipment appropriate to the various materials
- safety clothing and equipment including gloves, boots, earmuffs, glasses.

Typical skills may include:

- working safely with equipment and hazardous materials
- working safely in laboratory conditions
- setting up and maintaining tools and equipment
- using tools and equipment to perform basic sampling techniques
- using tools and equipment to perform basic testing techniques
- basic calculations
- observing and recording information on testing and sampling
- making basic measurements of volume and mass
- handling and storing materials appropriately.
Typical problems include:

- materials hazards including dust, solvents, toxicity, corrosivity
- measurement errors
- calculation errors
- materials of unreliable quality
- insufficient mixing
- poor sampling procedures
- equipment breakdown and breakage.

**Updating information**

This unit of competence does not contain detailed information that requires regular updating.

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**EVIDENCE GUIDES**

*Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competence**

Competence must be demonstrated in the ability to produce trial batches of material according to specification.

In particular the assessor should look to see that the candidate can:

- calculate batch quantities, concentrations and other relevant parameters
- measure quantities accurately
- take representative samples
- identify and describe materials accurately
- handle and transport samples correctly
- record sampling and testing information
- use tools and equipment effectively and efficiently
- observe, interpret and report atypical situations
- communicate problems to appropriate personnel
- record and communicate work results
- work safely
- interpret information from materials safety data sheets.
Essential knowledge

Competence includes the ability to apply and/or explain:

- the properties of mixing materials and how they affect the properties of the final product
- hazards involved in using materials
- measurement of mass and volume
- basic calculations involving SI units, proportion, ratio, and percentage
- representative sampling
- uses of various materials in the relevant industry
- basic testing methods for relevant materials.

Interdependent assessment of unit

This unit may be assessed with:

- PML SAMP 300 A – Handle and transport samples
- PML SAMP 400 A – Obtain representative samples in accordance with sampling plan
- PML TEST 300 A – Perform basic tests.

Assessment methods and resources

It is strongly recommended that assessment is conducted through observation over time. The timeframe must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of completed workplace documentation
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:

- access to tools, equipment and materials which will allow for appropriate and realistic simulation
- a bank of case studies is required where these form part of the assessment method
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.
This competency in practice

A laboratory assistant works for a concrete manufacturer. A client requires concrete for a specific project that cannot be supplied using existing standard mixes. The manufacturer must use special aggregates and cement to meet the durability and strength specifications for the project.

The laboratory manager obtains quantities of the materials for evaluation purposes. He has the assistant test the aggregates to determine their grading properties. From these results, he designs a mix to satisfy the project specifications, using a standard design method. The mix requires the use of pozzolanic materials and admixtures that he obtains from the suppliers.

The manager provides the assistant with the batch quantities required to produce one cubic metre of concrete. To test the mix design, the assistant will produce a 20-litre batch in the laboratory. She calculates that this quantity will provide sufficient material for the required tests, without undue waste. She calculates the quantity of each material required for the trial batch.

The assistant selects and prepares the tools and equipment she needs to mix, sample and test the concrete. She wears overalls, safety boots and glasses, and uses a barrier cream. She measures out the quantities required for the trial batch, charges the mixer and allows it to mix for the specified time. She then discharges the concrete onto a suitable surface.

She checks its slump, cohesiveness and air content, recording the data on standard enterprise forms. The manager inspects the concrete, and decides that it is over-sanded and has excessive slump. She adjusts the batch quantities and issues the assistant with the amended values. The assistant disposes of the excess concrete and cleans the equipment and tools.

She then mixes a new batch using the amended figures. This process continues until the manager is satisfied with the concrete quality. She then mixes a larger batch so that she can prepare specimens for testing its hardened-state properties.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
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</table>
## Unit Title

Contribute to the ongoing development of HACCP plans

**PML QUAL 400 A**

## Unit descriptor

This unit of competency covers the ability to collect and analyse data obtained from HACCP records. This unit of competency also covers the knowledge and skills required to perform corrective action and complete the review and update of documents and systems related to HACCP plans.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Review HACCP plans</td>
<td>1.1 Collect data and results from HACCP records</td>
</tr>
<tr>
<td></td>
<td>1.2 Identify major and minor non-conformances to the HACCP plan</td>
</tr>
<tr>
<td></td>
<td>1.3 Monitor critical control points to confirm performance</td>
</tr>
<tr>
<td></td>
<td>1.4 Analyse problem areas using appropriate quality improvement tools and techniques</td>
</tr>
<tr>
<td></td>
<td>1.5 Suggest corrective action(s) and strategies to prevent recurrence of the problem</td>
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<td></td>
<td>1.6 Document required amendments to the HACCP plan</td>
</tr>
<tr>
<td></td>
<td>1.7 Report and present recommendations to appropriate personnel</td>
</tr>
<tr>
<td>2 Provide support for the implementation of HACCP plans</td>
<td>2.1 Analyse roles, duties and current competency of associated personnel in relation to HACCP responsibilities</td>
</tr>
<tr>
<td></td>
<td>2.2 Identify training needs and skill development in relation to the successful implementation of the HACCP plan</td>
</tr>
<tr>
<td></td>
<td>2.3 Maintain resource requirements to support HACCP plan</td>
</tr>
<tr>
<td>3 Review the implementation plan</td>
<td>3.1 Implement any approved recommendations</td>
</tr>
<tr>
<td></td>
<td>3.2 Update any changes to the document(s)</td>
</tr>
<tr>
<td></td>
<td>3.3 Validate the effectiveness of changes to the HACCP plan.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Documents that may need to be followed, reviewed or updated include:
- manufacturers/suppliers specifications
- recording sheets
- equipment instructions
- relevant legislation
- equipment operation manuals
- standard operating procedures (SOPs)
- work instructions
- result forms
- Food Standards Codes.

The computer software packages used for the development and implementation of HACCP plans will vary between and within food and beverage industry sectors.

Members of a HACCP team may contribute a range of expertise and relevant technical support. They would normally share responsibilities for the development of a HACCP plan.

Updating information

Changes in codes of practice and applicable standards should be noted (eg, ANZFA guidelines and State legislation).
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Competency must be demonstrated in the ability to analyse data, identify corrective action and monitor and evaluate effectiveness of any changes suggested within the context of the ongoing development of HACCP plans. In particular, the assessor should look to see that the candidate is able to:

- consult and communicate with associated personnel
- obtain necessary data and results
- recognise major and minor non-conformities
- construct flow diagrams, hazard analysis tables
- develop a corrective action plan
- deliver training to workplace personnel to assist their understanding of their roles and responsibilities for the implementation of HACCP
- document and present recommendations and changes.

Essential knowledge

Competency includes the ability to apply and explain:

- the principles of HACCP and relationship to food safety
- communication channels and consultative arrangements
- flow chart symbols
- problem solving techniques to identify cause and options to remedy problems
- the production process
- control charts, control limits and control measures
- microbiological and chemical safety hazards
- risk assessment
- critical control points
- quality improvement tools and techniques, including statistical process control
- procedures for addressing non-compliance.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
- PML QUAL 301 A – Apply critical control point requirements
- PML QUAL 300 A – Contribute to the achievement of quality objectives.

This unit of competency has no prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
- review of documentation completed by the candidate as part of the development of HACCP plans
- review of data and reports obtained from HACCP records
- feedback obtained from managers on implementation and review of HACCP plans.

In all cases, practical assessment should be supported by targeted questions to assess essential knowledge and those aspects of competency which are difficult to assess directly.

Resources may include:
- access to all appropriate documentation (eg, HACCP plan and quality manuals).

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Food and beverage processing industries

The milk room at a dairy processing plant was receiving continuing high microbiological counts that were affecting the safety of the final product. The laboratory supervisor began to collect and analyse information obtained from data production records, laboratory results and corrective action reports. From the information obtained, the technician produced graphs to show the microbiological count over the past three weeks.
The technician found that the contamination occurred due to the ineffectiveness of a sanitiser. Recommendations were given to the Quality Review Committee. These recommendations included a review of the:

- quality of the sanitising product and an investigation of alternatives
- amount of sanitiser ordered to ensure that it is not being stored beyond its recommended use by date
- reliability of the suppliers to provide quality products.

Following the Quality Review Committee’s agreement, the laboratory technician updated the relevant documents and implemented the recommendations.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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</table>
Contribute to the ongoing development of HACCP plans
Unit Title:
Apply quality systems and continuous improvement processes

Unit descriptor
This unit of competency covers the exercise of good laboratory practice and effective participation in quality improvement teams.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Satisfy quality system requirements in daily work</td>
<td>1.1 Access information on quality system requirements for own job function</td>
</tr>
<tr>
<td></td>
<td>1.2 Record and report quality control data in accordance with quality system</td>
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<td></td>
<td>1.3 Follow quality control procedures to ensure products, or data, are of a defined quality as an aid to acceptance or rejection</td>
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<td></td>
<td>1.4 Recognise and report non conformance or problems that affect productivity and quality</td>
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<tr>
<td></td>
<td>1.5 Conduct work in accordance with sustainable energy work practice</td>
</tr>
<tr>
<td></td>
<td>1.6 Promote sustainable energy principles and work practice to other workers</td>
</tr>
<tr>
<td>2 Analyse opportunities for corrective and/or optimisation action</td>
<td>2.1 Compare current work practices, procedures and process or equipment performance with requirements and/or historical data or records</td>
</tr>
<tr>
<td></td>
<td>2.2 Recognise variances that indicate abnormal or sub-optimal performance</td>
</tr>
<tr>
<td></td>
<td>2.3 Collect and/or evaluate batch and/or historical records to determine possible causes for sub-optimal performance</td>
</tr>
<tr>
<td></td>
<td>2.4 Use appropriate quality improvement techniques to rank the probabilities of possible causes</td>
</tr>
<tr>
<td></td>
<td>Recommend corrective and/or optimisation actions</td>
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<tr>
<td>4</td>
<td>Participate in the implementation of recommended action(s)</td>
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<tr>
<td>5</td>
<td>Participate in the development of continuous improvement strategies</td>
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</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency is relevant to experienced technical officers who may work individually or as part of a team. They are most likely to contribute to quality improvements in areas or processes associated with their own job function and/or specialisation.

Quality manuals and procedures may be based on standards such as:
ISO 9001, 9002 and 9003, ISO GUIDE 25
NATA requirements of signatories
Good laboratory practice (GLP), good manufacturing practice (GMP), the British Standard BS 5750 and the OECD Principles of good laboratory practice
enterprise and customer product specifications
AS1199 Sampling procedures and tables for inspection by attributes
AS1399 Guide to AS1199.

Quality control procedures may include:
standards imposed by regulatory and licensing bodies
enterprise quality procedures
working to a customer brief or batch card and associated quality procedures
checklists to monitor job progress against agreed time, costs and quality standards
preparation of sampling plans
the use of hold points to evaluate conformance
the use of inspection and test plans to check compliance.

Sustainable energy principles and work practices may include:
examining work practices that use excessive electricity
switching off equipment when not in use
regularly cleaning filters
insulating rooms and buildings to reduce energy use
recycling and reusing materials wherever practicable
minimising process waste.
Communication may involve:
- supervisors, managers and quality managers
- laboratory and production personnel
- customers and suppliers.

Reporting may involve:
- verbal responses
- data entry into laboratory or enterprise database
- brief written reports using enterprise proformas.

Quality improvement opportunities that directly relate to the work of technical officers could include improved:
- production processes
- hygiene and sanitation procedures
- reductions in waste and re-work
- laboratory layout and work flow
- safety procedures
- communication with customers
- methods for sampling, testing and recording data.

**Updating information**

Changes in quality standards should be noted. It is anticipated that from the year 2000 onwards ISO Guide 25 will be superseded by ISO IIEC 17025.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to consistently perform at the required standard. In particular, assessors should look to see that the candidate:

- applies all relevant procedures and regulatory requirements to ensure the quality and integrity of the products/services or data they provide
- applies and promotes sustainable energy principles and work practices
- detects non-conforming products or services in the work area
- follows enterprise procedures for documenting and reporting information about quality
- contributes effectively within a team to recognise and recommend improvements in productivity and quality
- applies effective problem solving strategies
- implements and monitors improved practices and procedures.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- specifications for laboratory products and services in the candidate's work area
- quality requirements associated with the individual’s job function and/or work area
- scientific and technical knowledge underpinning the processes, procedures, equipment and instrumentation associated with the candidate’s work tasks and duties
- workplace procedures associated with the candidate's regular technical duties
- methods for statistical analysis (means, ranges, standard deviations) and statistical sampling procedures
- sustainable energy principles
problem solving techniques such as:
- identifying inputs and outputs
- sequencing a process
- identifying and rectifying a problem step
- root cause analysis
- implementing preventative strategies.

The candidate should also demonstrate the ability to select and apply quality improvement tools and techniques, for example:
run charts, control charts, histograms and scattergrams to present routine QC data
PDCA (plan, do, check, act)
Ishikawa fishbone diagrams, cause and effect diagrams
logic tree
similarity/difference analysis
Pareto charts and analysis
force field/SWOT analysis.

Knowledge is also required of the:
layout of the enterprise, divisions and laboratory
organisational structure of the enterprise
lines of communication
role of laboratory services to the enterprise and customers.

Knowledge of relevant OHS and environmental requirements is necessary together with an ability to apply them when determining corrective actions and recommending improvement strategies.

An appreciation of the link between the enterprise’s quality systems and business goals is required as a basis for decisionmaking and action.

**Specific industry**

_Additional knowledge requirements apply for each industry sector below._

**Biomedical and environmental services**

ethical requirements dealing with patient confidentiality
regulations pertaining to trapping, tagging and handling of animals (Code 64)
guidelines for pre-transfusion testing
guidelines for large scale, small scale and planned release of genetically manipulated organisms (Genetic Manipulation Advisory Committee).
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with “500 series” competencies dealing with sampling, tests and measurements.

This unit of competency may be assessed with:
PML TEAM 300 A – Work efficiently as part of a team.

Assessment methods and resources

The following assessment methods are suggested:
review of documentation completed by the candidate as part of regular quality control
feedback from supervisors and/or customers regarding quality of products/services and/or data regularly provided by the candidate
observation of the candidate’s performance and participation in quality improvement teams over time in the workplace
review of reports from quality improvement teams where the candidate’s role is clearly outlined and verified
verified reports of improvements suggested and implemented by the candidate individually.

Those aspects of competency dealing with improvement processes could be assessed by the use of suitable simulations and/or a pilot plant and/or a range of case studies and scenarios.

In all cases, practical assessment should be supported by questions to assess essential knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Resources may include:
enterprise quality manual and procedures.
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

A quality improvement team at a chemical manufacturing plant was asked to propose a way of minimising the cost of waste disposal. Using fishbone diagrams and Pareto charts, the team narrowed the alternatives down to the option of burning the waste stream. An experienced technician agreed that this was feasible, but suggested that because the waste was petroleum based the team should first consider the environmental implications. Subsequent research indicated that the permitted chromium levels in incinerated waste could not exceed 10 ppm. The technician analysed samples of the waste stream, determined that the chromium levels were below the regulatory threshold and then supported the team’s suggestion.

**Biomedical and environmental services**

The manager of an environmental testing laboratory believed that the team of laboratory technicians relied too much on external direction. As a result, the manager requested that whenever technicians asked for assistance they should also be ready to suggest a solution to the problem if at all possible. This strategy was implemented in a non-threatening manner and was accepted by the team. In time, the manager noted that many of the suggestions for solving problems and improving work practices that came from the team were effective and reasonable. Their skill in making realistic recommendations came from their familiarity with many of the issues that needed to be considered. It became the norm that the laboratory technicians were given public credit for suggesting successful strategies that improved safety, productivity and staff morale.

**Food and beverage processing industries**

A company that produces apple juice uses 30-35% hydrogen peroxide (H₂O₂) to sterilise packaging. A mist of atomised H₂O₂ is sprayed into preformed cartons and later removed with a jet of hot sterile air. The laboratory manager was concerned that some batches of product were not sterile after standing at room temperature for several days. The cause of the failure in the sterilisation procedure was not apparent and a technical officer was asked to investigate this problem.

The technical officer examined each unit operation of juice manufacture and determined that the application of H₂O₂ was a critical sterilisation point where failure could occur. The concentration of H₂O₂ in the atomiser and in opened containers was unpredictable and several problems were found to contribute to this. H₂O₂ was left in the atomiser for up to several days between packaging runs. Containers of H₂O₂ were not always used sequentially, some being opened and then not used for a long time. The containers were stored at room temperature after opening and some may have become contaminated with atmospheric particulates that catalyse the breakdown of H₂O₂.
The recommendations that emerged from the investigation were that:

- fresh H₂O₂ be used at the beginning of each packaging run
- only one stock container of H₂O₂ should be open at any one time and stored chilled, with residuals discarded after 14 days
- care should be taken to exclude foreign material from the opened vessels of H₂O₂ and the atomiser.

In summary, the intolerance of the company to even low incidences of faulty product and the competency of the technical officer to investigate the processing stream resulted in increased product quality without significant cost.

**Key competencies**

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</tbody>
</table>
Apply quality systems and continuous improvement processes
## Unit Title:
Obtain representative samples in accordance with a sampling plan

### Unit descriptor
This unit of competency covers the ability to obtain a range of samples that are representative of the source material in a state suitable for further processing and testing.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prepare for sampling</td>
<td>1.1 Receive and confirm instructions from appropriate sampling plan, safety procedures and reporting procedures</td>
</tr>
<tr>
<td></td>
<td>1.2 Select sampling equipment and conditions to preserve sample integrity during collection, storage and transit</td>
</tr>
<tr>
<td></td>
<td>1.3 Ensure equipment is in working order</td>
</tr>
<tr>
<td></td>
<td>1.4 Confirm the procedure and frequency of sampling in accordance with enterprise requirements and/or relevant standards</td>
</tr>
<tr>
<td>2 Obtain the samples</td>
<td>2.1 Inspect materials to ensure materials are fit for sampling</td>
</tr>
<tr>
<td></td>
<td>2.2 Recognise and report atypical observations made during sampling</td>
</tr>
<tr>
<td></td>
<td>2.3 Collect samples ensuring that sample types, sampling locations and sampling times are in accordance with sampling plan</td>
</tr>
<tr>
<td></td>
<td>2.4 Record all information in accordance with chain of custody requirements</td>
</tr>
<tr>
<td></td>
<td>2.5 Maintain the integrity of the samples and source during sampling</td>
</tr>
<tr>
<td>3 Prepare sample for testing</td>
<td>3.1 Prepare subsample(s) to ensure that they are representative</td>
</tr>
<tr>
<td></td>
<td>3.2 Follow approved safety procedures to limit hazard or contamination to self, work area and environment</td>
</tr>
<tr>
<td></td>
<td>3.3 Prepare sample for transport in accordance with</td>
</tr>
</tbody>
</table>
4 Store backup samples

4.1 Prepare subsample as a backup

4.2 Label backup sample(s) and record information to maintain chain of custody

5 Dispose of waste and spent samples

5.1 Dispose of waste and surplus/spent samples in accordance with enterprise procedures

5.2 Clean equipment, containers and work area in accordance with enterprise procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

A representative sample is a sample obtained using a suitable sampling technique, which may include subsampling, to provide an accurate representative of the original source or population.

This unit of competency may cover laboratories or processing sites which may involve:

- a range of sampling plans, tests and procedure, which apply to the enterprise site, plant laboratory or field sites
- different products/materials
- a range of sampling points
- test methods and enterprise procedures, which may be written to meet enterprise and/or regulatory/certifying body requirements.

Samplers usually have access to information such as:

- enterprise procedures
- material safety data sheets (MSDSs)
- Australian Standards
- enterprise sampling schemes and sampling plans
- enterprise recording and reporting procedures.
Sampling tools and equipment may include but are not limited to:

- shovels
- sampling frames
- sampling tubes
- front-end loader
- weighted sample bottles
- dip tubes
- spears
- flexible bladders
- syringes
- access valves
- sample thief
- bottles, plastic containers and disposable buckets
- scalpel or surgical knife
- traps and cages
- sterile containers, pipettes, inoculating loops, disposable spoons.

Maintenance of integrity of samples could include:

- appropriate container:
  - glass
  - plastic
  - amber
  - opaque
- sampling tools
- preservatives (such as sodium azide, toluene or antibiotics)
- wrapping container in foil
- temperature control, which may involve insulation of sample without direct contact with coolant
- transfer of sterile sample into sterile container
- monitoring of storage conditions.

**Updating information**

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to follow a sampling plan to collect a sufficient representative sample that has been properly labelled and has the intact properties of the original sample source.

In particular, the assessor should look to see that the candidate is able to:

- take the specified quantity of sample to enable all processing and testing to occur and backup samples to be stored
- obtain a sample that is representative to the rest of the material not sampled
- preserve or protect the sample to minimise change by closely adhering to procedures
- supply enough information on the label to link the sample to its origins in the bulk material
- identify atypical materials and samples and take appropriate action
- maintain sampling equipment in appropriate condition
- complete sampling records
- follow safety regulations
- follow relevant legislative requirements for the disposal of waste and the preservation of the environment.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- the links between correct OHS procedures and personal and environmental safety particularly at high risk sites
the basic principles of sampling including:
- representative samples
- preservation of integrity of samples
- maintaining identification of samples relative to their source
- cost effectiveness of sampling
- consistency of sampling procedures

characteristics of product/material to be sampled and likely contaminants
links between quality control, quality assurance and quality management systems and sampling procedures
workplace procedures dealing with legislative requirements for the handling, labelling and transport of hazardous goods.

Specific industry

Additional knowledge requirements apply for each industry sector below.

Biomedical and environmental services

specific legislation on biohazards
guidelines for infection control in the health care setting
guidelines for the handling of genetically manipulated cells
documentation procedures for the chain of custody for samples to be used as evidence or for blood transfusion.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 300 A – Process and record data
PML OHS 300 A – Work safely in accordance with defined policies and procedures.

This unit of competency has no prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
observation of the candidate taking a range of samples
feedback from peers, customers and supervisors that sampling plans were followed
examples of workplace documentation completed by the candidate
questioning to assess underpinning knowledge.
Resources may include:

- variety of sample types
- sampling plans
- a selection of sampling containers and sampling equipment.

## This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

### Process manufacturing and construction materials industries

Careful and responsible sampling is essential to any testing process. If sampling is not performed correctly, high quality materials could be mistaken for poor quality materials leading to rejection and perhaps rework. On the other hand, if poor quality materials are approved for production, finished products will be faulty.

For example, representative samples must be taken from starting materials before they can be approved for manufacture. When 50 drums of a batch of starting material arrive, the drums are inspected for any visible damage, then labelled and numbered according to enterprise procedures. The sampler follows a sampling plan which indicates how many drums are to be sampled. If 10 drums are to be sampled, a random number generator may be used to pick which 10 of the 50 will be sampled. The surface of the drums is cleaned to prevent surface dust and particulate matter falling into the drum during sampling and a sample is taken from each drum. The sampling plan will tell the sampler if these 10 samples are to be placed in individual bottles or compositied, depending on the types of testing required and the quality profile of the supplier.

### Biomedical and environmental services

Water quality testing is a service offered by State government regional laboratories. In particular, quality monitoring programs of irrigation water is a useful service to local farmers in times of drought, when the water supplies are low in the dams.

The job of a laboratory assistant in such an organisation is to collect water samples from the various parts of the dam (near the irrigation channel exits) for water quality testing. It is essential that strict adherence to sampling procedure is observed and that the samples are carefully labelled. There is no guarantee that all sites of water supply at the dam are of equal quality during a drought. The test results may result in some farmers being instructed not to use the water for their irrigation. The impact on their crop harvest is significant and the farmers will question any result that impacts on their livelihood.

Backup samples for retesting must be available so the laboratory assistant must collect sufficient sample for retesting and/or mishap. The coding on each sample and the documentation on its collection must withstand challenge. For such a quality management system to work it is essential that the laboratory assistant follows enterprise procedures during the collection, preservation, storage and logging of the samples.
Food and beverage processing industries

The laboratory assistant has been supplied with a sampling plan to obtain a range of representative samples from a pet food production line. S(he) checks the plan for the:

- location of sampling and access points
- required quantity of sample(s) and sampling frequency
- required equipment and containers
- procedures to be followed when obtaining, preserving, transporting and labelling the samples.

The assistant follows the procedures, conveys the samples to the laboratory and then uses the barcode reader to log them into the Laboratory Information Management System (LIMS).

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</tr>
</tbody>
</table>
Obtain representative samples in accordance with sampling plan.
Unit Title:
Perform instrumental tests/procedures

Unit descriptor
This unit of competency covers the ability to prepare samples and perform instrumental tests/procedures to test materials.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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<td></td>
<td>1.2 Use personal protective equipment and safety procedures as specified for test method and materials to be tested</td>
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<td>1.3 Record sample description, compare with specification and note and report discrepancies</td>
</tr>
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<td></td>
<td>1.4 Prepare sample in accordance with testing requirements</td>
</tr>
<tr>
<td>2 Test sample</td>
<td>2.1 Weigh or measure sample and standards (if appropriate) to be tested</td>
</tr>
<tr>
<td></td>
<td>2.2 Set up and operate equipment/instrumentation in accordance with test method requirements</td>
</tr>
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<td></td>
<td>2.3 Check calibration status of equipment and check calibration if applicable</td>
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<td></td>
<td>2.4 Perform tests/procedures in accordance with laboratory methods</td>
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<td></td>
<td>2.5 Shut down equipment in accordance with operating procedures</td>
</tr>
<tr>
<td>Process data</td>
<td>3.1 Record test data noting atypical observations</td>
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<tr>
<td>3.2 Ensure calculated quantities are consistent with estimations</td>
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<tr>
<td>3.3 Record and report results in accordance with enterprise procedures</td>
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<td>3.4 Interpret trends in data and/or results and report “out of specification” or atypical results promptly to appropriate personnel</td>
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<td>3.5 Troubleshoot basic procedure or equipment problems which have led to atypical data or results</td>
<td></td>
</tr>
<tr>
<td>Maintain a safe work environment</td>
<td>4.1 Use established work practices to ensure personal safety and that of other laboratory personnel</td>
</tr>
<tr>
<td>4.2 Minimise the generation of wastes</td>
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<tr>
<td>4.3 Ensure the safe disposal of laboratory wastes, including biohazardous wastes</td>
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<tr>
<td>4.4 Clean, care for and store equipment and reagents as required</td>
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</tr>
<tr>
<td>Maintain laboratory records</td>
<td>5.1 Record approved data into enterprise system</td>
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<tr>
<td>5.2 Maintain confidentiality of enterprise information and laboratory data</td>
<td></td>
</tr>
<tr>
<td>5.3 Ensure security of enterprise information and laboratory data</td>
<td></td>
</tr>
<tr>
<td>5.4 Maintain equipment logs in accordance with enterprise procedures</td>
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</tr>
</tbody>
</table>

### RANGE OF VARIABLES

*The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.*

**Cross industry variables**

*The following variables may apply to all industry sectors covered by this Training Package.*

This unit of competency describes the work conducted by laboratory technicians who use basic instrumental tests/procedures to evaluate materials.
All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

- Australian and international standards such as:
  - AS/NZS 2243 Chemical aspects
  - AS 2830 Good laboratory practice
  - AS 2162.1 General – Volumetric glassware
  - AS 2134.1 Flame atomic absorption spectrometry
  - AS 3753 Recommended practice for chemical analysis by ultraviolet/visible spectrophotometry
- codes of practice (such as GLP and GMP)
- material safety data sheets (MSDSs)
- National Measurement Act
- standard operating procedures (SOPs)
- equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

Preparation of samples may include processes such as: grinding, mulling, preparation of discs dissolving, ashing, refluxing, extracting, filtration, evaporation, flocculation, precipitation and centrifugation.

Instrumental methods may include spectrometric, chromatography and electrochemical methods. This competency addresses the following types of instrumentation and instrumental procedures:

- spectrometric, for example:
  - ultraviolet/visible, fluorimetric, infrared, flame atomic absorption spectrometry
- chromatographic, for example:
  - column and thin layer analytical and preparative chromatography
  - paper, gas, liquid chromatography and HPLC
  - gel filtration chromatography (purification of proteins)
  - affinity chromatography (purification of immunoglobulins)
- electrochemical, for example:
  - pH, ion selective electrodes and polarography
- electrophoretic, for example:
  - DNA patterns and determination of protein purity.
Tests may include methods for:
control of starting materials, in-process materials and finished products
environmental monitoring
basic troubleshooting of enterprise processes
environmental monitoring
discrete diagnostic pathology tests.

Updating information
This unit of competency does not contain detailed information that requires regular updating.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to use instrumental methods to test materials, interpret and use test data appropriately, and report data in the appropriate format. In particular, the assessor should look to see that the candidate can:

start up, set up and shut down equipment
check calibration status of equipment and calibrate if required
prepare and test samples using procedures appropriate to the nature of sample
optimise and use equipment and spectrometers to enterprise standards
prepare calibration graphs and calculate results in appropriate units
apply basic theoretical knowledge to interpret data and make relevant conclusions
identify atypical results as out of normal range of an artefact
trace and source the cause of an artefact
communicate problem(s) to either supervisor or outside service technician
record and communicates results as per enterprise procedures
maintain security, integrity, traceability and identity of samples, sub-samples and documentation
follow OHS procedures and GLP.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
principles and concepts related to instrumentation operation and testing
modes of separation and the concepts related to instrument operation and testing (where relevant)
function of key components of the instrument
effect(s) of modifying instrumental variables on output
procedure for optimising equipment through changing operation parameters
sample preparation procedures
equipment and testing method troubleshooting procedures
use of instrumentation for qualitative and/or quantitative analysis
use of calibration charts
calculation steps to give results in appropriate units
OHS procedures and GLP.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 500 A – Analyse data and report results
PML TEST 500 A – Calibrate and maintain instruments
PML TEST 402 A – Prepare, standardise and use solutions.

This unit of competency should be assessed after:
• PML TEST 300 A – Perform basic tests
or
PML TEST 301 A – Perform biological laboratory procedures
and
PML DATA 300 A – Process and record data.
Assessment methods and resources

The following assessment methods are suggested:
observation of candidate conducting a range of instrumental test/procedures
oral or written questioning
feedback from peers and supervisors
examples of testing records and workplace documentation completed
review of results obtained by the candidate over a period of time to ensure accurate and consistent results are obtained within required timelines.

Resources may include:
standard laboratory equipped with appropriate spectrometers
laboratory reagents and equipment
standard operating procedures and testing methods.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

Process manufacturing and construction materials

Ultraviolet spectroscopy is a suitable method for determining the concentration of sulphanilamide in pharmaceutical preparations. The ultraviolet absorption spectrum is pH dependent, with the wavelength maximum different in acid and alkaline solutions.

For example, a technician was conducting an analysis and noted that the wavelength maxima had moved from approximately 250nm to below 230nm. After reviewing the procedure being used and checking for possible errors, the technician found that an incorrect solvent had been used for the analysis. The hydrochloric acid solvent was replaced with sodium hydroxide, as per the standard method, and the correct absorption spectrum was obtained.

Biomedical and environmental services

A technical officer set up an agarose gel electrophoresis for a 30 minute separation. After the time had elapsed, the gel was removed and stained only to find that the protein sample had not moved from the application point. No separation had occurred. The officer concluded that there were three possible reasons for this:
- the fuse had blown and there was no voltage across the gel
- the power pack was faulty
- the salt bridge between the gel and the buffer was not fully connected.
The technical officer checked the electrophoresis chamber and noted that it was warm and that there was condensate on the lid, all indicative that electrophoresis of something had occurred. The technician quickly set up the gel again, checking the salt bridge connection, correct insertion of the power leads, the readout on the power pack and that bubbles were coming off the submerged electrodes. The separation was successful and the technical officer concluded that the most likely fault was the connection between the gel, the salt bridge and the buffer.

**Food and beverage processing industries**

Regular checks are conducted on the percentage of salt in cheese at a dairy company’s laboratory. A technical assistant checks the results from the airomatic salt-titration equipment and if the results are abnormal, notifies the supervisor before taking appropriate action.

For example, after obtaining a high result, the assistant notified the supervisor and then began checking the machine to identify a possible reason for the high reading. The assistant found that the supply bottle of silver nitrate used in the test was almost empty. This had resulted in less solution being pumped through the equipment than required, leading to graph readings that indicated a high percentage of salt. After replacing the silver nitrate bottle and recalibrating the equipment, the assistant retested the cheese samples and found that they contained the expected 1-2% salt.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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</table>
Perform instrumental tests/procedures
Unit Title:
Perform non-instrumental tests/procedures

Unit descriptor
This unit of competency covers the ability to prepare samples and use non-instrumental tests and procedures to test materials.

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4 Maintain a safe work environment

4.1 Use established work practices to ensure personal safety and that of other laboratory personnel
4.2 Minimise the generation of wastes
4.3 Ensure the safe disposal of laboratory wastes
4.4 Clean, care for and store equipment and reagents as required

5 Maintain laboratory records

5.1 Record approved results into enterprise system
5.2 Maintain confidentiality of enterprise information and laboratory data
5.3 Ensure security of enterprise information and laboratory data.
5.4 Maintain equipment logs as per enterprise procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by laboratory technicians who use non-instrumental methods/procedures to evaluate materials as part of their job.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

- Australian and international standards
- codes of practice (such as GLP and GMP)
- material safety data sheets (MSDSs)
- National Measurement Act
- standard operating procedures (SOPs)
- quality manuals and equipment and procedure manuals
- equipment startup, operation and shutdown procedures
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

© Australian National Training Authority – Laboratory Operations Training Package: PML 99, to be reviewed by 30/11/2002 CS-199
All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

Non-instrumental testing methods may include:
- physical tests such as appearance, colour, odour, texture, melting point, boiling point, refractive index, density/specific gravity and viscosity
- particle size tests including sieve analysis
- gravimetric analysis including loss on drying, ashes such as sulfated and gravimetric assays
- qualitative tests such as identity tests
- limit tests.

Test methods may be required for:
- control of starting materials, in-process materials and finished products
- environmental monitoring
- basic troubleshooting of enterprise processes.

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.

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**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to use non-instrumental methods to test materials, interpret and use test data appropriately, and report data in the appropriate format.
In particular, the assessor should look to see that the candidate:

- prepares and test samples using procedures appropriate to the nature of sample
- performs tests to appropriate standards
- applies theoretical knowledge to interpret data and make relevant conclusions
- calculates results in appropriate units if applicable
- records and communicates results as per enterprise procedures
- maintains security, integrity, traceability and identity of samples, sub-samples and documentation at all times
- follows OHS procedures and GLP.

**Essential knowledge**

**Cross industry**

*The following knowledge requirements apply to all industry sectors covered by this Training Package.*

Competency includes the ability to apply and explain:

- chemical/physical/biological principles underpinning test method
- function of key components/reagents used in the test method
- effects on test of modifying test variables
- sample preparation procedures
- test method troubleshooting procedures
- reagent maintenance and evaluation procedures
- OHS procedures and GLP.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit of competency may be assessed with:

PML DATA 300 A – Process and record data.

This unit of competency should be assessed after:

PML TEST 300 A – Perform basic tests.
Assessment methods and resources

The following assessment methods are suggested:

- observation of the candidate performing a range of non-instrumental tests/procedures
- oral or written questioning
- feedback from peers and supervisors
- examples of testing records and workplace documentation completed by the candidate
- review of results obtained by the candidate over a period of time to ensure accurate and consistent results are obtained within required timelines.

Resources may include:

- standard laboratory equipped with appropriate equipment
- laboratory reagents
- standard operating procedures (SOPs) and testing methods.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

The accurate measurement of physical properties is a routine but important function of all laboratory technicians. Technicians must use the required equipment and procedures to get accurate results.

For example, a technical assistant was measuring the specific density of a shipment of glycerol using a standard laboratory procedure. The result did not agree with the manufacturer’s certificate of analysis. The assistant notified the manufacturer who came to the plant and checked the delivered material. It had been raining while the glycerol was in transit and rain water had entered the drum, diluting the glycerol. The drum was returned to the manufacturer and a new drum was supplied to the manufacturing plant. The manufacturer investigated the seals on the glycerol drums and took action to ensure that new seals would protect the product in transit.

Biomedical and environmental services

A technical assistant is employed at a laboratory doing environmental testing. The assistant is assisting with a survey of a town water supply which includes checking water quality in the distribution and storage network. The assistant is responsible for testing the water for chemical and biological contamination caused by run-off of fertilisers and animal faeces. When reporting the results to the laboratory supervisor, (s)he also suggests measures which could be taken to protect the water catchment area.
Food and beverage processing industries

A technician was testing the melt flow index of a new type of polymer that was to be used as a sealant for packages of freeze dried coffee. The technician measured the melt flow rate and found it was much too high. The technician then checked the melt flow equipment as per the manufacturer’s directions and found the machine was out of calibration. After recalibration using recommended standards, another sample was obtained and retested. This time the polymer was within specification and was released for use in production.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
**Unit Title:**

Prepare, standardise and use solutions

**Unit descriptor**

This unit of competency covers the ability to prepare, standardise and use solutions to monitor the quality of prepared solutions.

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<tr>
<td>1 Prepare solutions</td>
<td>1.1 Select appropriate procedure for solution preparation</td>
</tr>
<tr>
<td></td>
<td>1.2 Select equipment, materials and solvent of specified purity</td>
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<td></td>
<td>1.3 Measure appropriate quantities of reagents for solution preparation and record data.</td>
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<td></td>
<td>1.4 Select and assemble specified laboratory equipment and appropriate grade of glassware</td>
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<td></td>
<td>1.5 Perform specified dilutions</td>
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<tr>
<td></td>
<td>1.6 Prepare solutions to achieve homogeneous mix of the specified concentration</td>
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<tr>
<td></td>
<td>1.7 Label and store solutions to maintain identity and stability</td>
</tr>
<tr>
<td>2 Standardise and use volumetric solutions</td>
<td>2.1 Assemble appropriate laboratory equipment</td>
</tr>
<tr>
<td></td>
<td>2.2 Perform serial dilutions as required</td>
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<td></td>
<td>2.3 Standardise the solution to the required specified range and precision</td>
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<tr>
<td></td>
<td>2.5 Use standard volumetric solutions to determine concentration of unknown solutions</td>
</tr>
</tbody>
</table>
3 Calculate and record data

3.1 Calculate specified concentrations
3.2 Use authorised procedure if data is to be modified
3.3 Record all relevant details as per laboratory procedures and report results
3.4 Report concentration with appropriate units

4 Monitor the quality of laboratory solutions

4.1 Check solutions for visual deterioration and expiry date
4.2 Restandardise or dispose of dated or deteriorated solutions
4.3 Record details and label solutions as per laboratory procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by laboratory technicians who prepare, standardise and use solutions and monitor the quality of the prepared solutions.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

- Australian and international standards
- codes of practice (such as GLP and GMP)
- material safety data sheets (MSDSs)
- National Measurement Act
- standard operating procedures (SOPs)
- quality manuals
- enterprise and reporting procedures
- production and laboratory schedules
- material, production, product and solution specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.
Solutions may include but are not limited to:
solutions of strong/weak acids and bases
oxidising/reducing agents
solutions used for complexometric or precipitation titrations
stains for cells and tissues, enzymes, buffers and antibodies
diluents for maintaining isotonicity
organic solutions and histological fixatives.

Apparatus and reagents which may be used to prepare standard solutions include:
balances
pipettes, burettes, volumetric glassware, weighing bottles
dessicators, filtering media
ovens, muffle furnaces
solutions, indicators, primary and secondary standards
auto titrators, pH meters and other related meters and electrodes for determining equivalence
points, top pan and analytical balances
magnetic stirrers and heaters, water baths.

Checking useability of solutions could include:
examining stained samples for correct staining reactions
performing pH checks
confirming enzyme activity
checking red cell suspensions for haemolysis.

**Updating information**

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to prepare, standardise and use standardised solutions. In particular, the assessor should look to see that the candidate can:

- use balances and volumetric glassware appropriately
- select and use primary and secondary standards appropriately
- select and use indicators appropriately
- select and care for electrodes appropriately
- perform QA checks for solution performance (e.g., enzyme activity, ferric chloride for phenolic solutions, isotonicity for saline)
- perform titrations using laboratory procedures with required accuracy and precision and within required timelines
- calculate the concentration of the solution given the chemical reaction for the titration
- recognise control results that are not within acceptable range
- record results to enterprise standards
- interpret and use safety information, such as that provided by material safety data sheets (MSDSs) and follow relevant safety procedures.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- solution terminology, chemistry of acids, bases, buffers, redox reactions and complexometric reactions
- grades of glassware, reagents and their use
- reactions used for standardisation and desirable characteristics
- determination of equivalence points using indicators and graphical methods
- calculation methods including appropriate units, uncertainties and balancing equations
- enterprise communication and reporting procedure
- OHS procedures, including those for using corrosive materials.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
- PML TEST 400 A – Perform instrumental tests procedures.

This unit of competency should be assessed after:
- PML DATA 300 A – Process and record data.

Assessment methods and resources

The following assessment methods are suggested:
- observation of the candidate preparing, standardising and using a range of solutions
- oral or written questioning
- feedback from peers and supervisors
- examples of records and workplace documentation completed by candidate
- analysis of results obtained by the candidate over time to ensure accuracy, consistency and that work is completed within the required timelines.
Resources may include:
standard laboratory equipped with appropriate volumetric equipment
laboratory reagents and equipment
standard operating procedures (SOPs) and testing methods.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

A standard solution is usually used to determine the concentration of unknown solutions. The quality of these analyses is critically related to the accuracy with which the concentration of the standard solution is known. Therefore, the laboratory technician spends considerable effort to ensure that the materials and methods used for the preparation and standardisation will lead to a solution of accurately known concentration.

For example, anhydrous sodium carbonate is often used to prepare solutions to determine the concentrations of acids. The sodium carbonate is heated at a suitable temperature to remove any trace of moisture, cooled in a dessicator, and an appropriate quantity is dissolved in distilled water and made up to volume in a volumetric flask. This solution of known concentration is then titrated with acids of unknown concentration and the concentration of the acids determined.

Biomedical and environmental services

A technical officer arrived at work on Monday morning and discovered that the freezer had been turned off over the weekend and the restriction nucleases had thawed. These enzymes were to be used that morning. The technician needed to check the enzyme activity to determine whether the enzymes had been denatured by the rise in temperature. The technician quickly set up a digestion mix of affected enzyme with some viral DNA of known sequence. The digest produced DNA fragments of expected length, showing the enzyme still had activity. The technician reported the incident along with the results to the supervisor, who decided that the enzymes could be used for that day.

Food and beverage processing industries

At the beginning of the day, it is the first task of the laboratory technician to determine the strength of the sodium hydroxide standard used for measuring total acidity. The sodium hydroxide solution is volumetrically titrated against the primary standard of potassium hydrogen phthalate. The molarity of the sodium hydroxide is then calculated using the standard method. The molarity is recorded in the logbook and used by all analysts for the remainder of the day for calculating the total acidity of products.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
<th>Communicating ideas &amp; information</th>
<th>Collecting, analysing &amp; organising information</th>
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<tr>
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</table>
Unit Title:

Assist with geotechnical site investigations

Unit descriptor

This unit of competence covers the ability to assist with geotechnical site investigations. This competency is typically performed by laboratory operators or technicians working under the guidance of a geotechnical engineering para-professional or professional.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1 Prepare for on-site operations</td>
<td>1.1 Identify the job, location, appropriate procedures and safety requirements</td>
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<td></td>
<td>1.2 Identify and use appropriate personal protective equipment and safety procedures as specified for job and materials to be used</td>
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<td>1.3 Record description of the job to be undertaken, compare with specification and report any variations</td>
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<td></td>
<td>1.4 Select and prepare tools, equipment and materials in accordance with job requirements</td>
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<td></td>
<td>1.5 Select suitable transport for site access</td>
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<td></td>
<td>1.6 Ensure site access requirements such as entry permits and safety inductions have been organised</td>
</tr>
<tr>
<td>2 Assist with excavation of boreholes, test pits and/or trenches</td>
<td>2.1 Identify the sampling/testing location</td>
</tr>
<tr>
<td></td>
<td>2.2 Excavate or supervise excavation to the sampling/testing depth, minimising disturbance and potential contamination of the site</td>
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<tr>
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<td>2.3 Identify materials and record changes of strata, test results, and other relevant information</td>
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<td>2.4 Ensure materials from different strata are kept separate</td>
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<td>2.5 Terminate the excavation at the appropriate depth, recording the reason for termination</td>
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<td>2.6 Clean up on completion, backfilling or sealing the excavation or ensuring that it is left in a safe and uncontaminated condition</td>
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</table>
| **3** | **Assist with sampling** | 3.1 Prepare sampling equipment and materials  
3.2 Take disturbed and undisturbed samples in accordance with established practices  
3.3 Label samples and record details in accordance with established practices  
3.4 Handle and transport samples in accordance with established practices  
3.5 Clean and maintain sampling equipment, avoiding environmental damage including stormwater contamination |
| **4** | **Assist with testing** | 4.1 Prepare test equipment and materials  
4.2 Perform or assist in performing tests in accordance with established practices  
4.3 Record test data in accordance with established practices  
4.4 Clean and maintain testing equipment, avoiding environmental damage including stormwater contamination |
| **5** | **Maintain records** | 5.1 Record data in accordance with established practices  
5.2 Maintain equipment records in accordance with established practices  
5.3 Maintain confidentiality of enterprise information |
RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work conducted by laboratory operators or technicians.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- standard operating procedures (SOPs)
- equipment manuals
- equipment start-up, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

Operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

This competency includes tools and equipment such as:

- excavation equipment including truck-mounted drilling rigs, hand and power augers, backhoe, excavator
- hand tools including shovels, crowbars, scoops, spanners, wrenches, tape measure
- consumables including sample bags, labels, sample tubes, wax
- documentation including maps, plans, worksheets
- field test equipment including DCP, SPT, shear vane, pocket penetrometer, water level indicator
- safety clothing and equipment including helmet, boots, gloves, earmuffs, glasses.

Typical skills may include:

- working safely with equipment and around earthmoving plant
- driving safely on- and off-road
- working safely in field conditions
- setting up and maintaining tools and equipment
- using tools and equipment to perform basic sampling techniques
- using tools and equipment to perform basic in-situ testing techniques
• cleaning equipment before leaving site in compliance with environmental authority requirements
• reading site plans and operating GPS equipment to locate sampling positions
• identification of soil, rock and fill materials
• observing and recording information on testing and sampling
• making basic measurements of plan location and depth
• handling and storing samples appropriately.

Typical problems include:
• caving of the excavation
• drilling difficulties
• not knowing the requirements of the design engineer
• not understanding the nature of the item being designed (e.g., retaining wall, piled structure, earthworks)
• sample loss during retrieval
• knowing when to stop a hole, or what and when to test and sample
• misidentification of samples and sampling locations
• equipment breakdown and breakage
• environmental problems and issues including site access, inclement weather, traffic, wildlife, vegetation, construction activities.

**Updating information**

This unit of competence does not contain detailed information that requires regular updating. However, frequent reference to the Geotechnical Site Investigations code is highly recommended.
EVIDENCE GUIDES

Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competence

Competence must be demonstrated in the ability to use or direct excavation, sampling and testing equipment for geotechnical site investigation.

In particular the assessor should look to see that the candidate can:

• identify and locate sampling and testing sites
• identify problems in siting (eg, services) immediately
• take representative samples
• identify and describe materials accurately
• handle and transport samples correctly
• record sampling and testing information
• use tools and equipment effectively and efficiently
• observe, interpret and report on the geotechnical conditions
• communicate problems to appropriate personnel
• record and communicate work results
• work safely.

Essential knowledge

Competence includes the ability to apply and/or explain:

• the basic concepts, purposes and principles of geotechnical site investigation
• identification and classification of materials
• engineering properties of soil and rock materials
• representative sampling and testing
• map and drawing interpretation
• uses of soil and rock materials in engineering and construction
• in-situ testing methods.

Interdependent assessment of unit

This unit may be assessed with:

• PML SAMP 300 A – Handle and transport samples
• PML SAMP 400 A – Obtain representative samples in accordance with sampling plan
• PML TEST 300 A – Perform basic tests.
Assessment methods and resources

It is strongly recommended that assessment is conducted through observation over time. The timeframe must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of completed workplace documentation
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:

- access to tools, equipment and materials which will allow for appropriate and realistic simulation
- a bank of case studies is required where these form part of the assessment method
- reference texts
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.

This competency in practice

A geotechnical consultancy is carrying out the investigation for the construction of an industrial complex involving building pads and roadways. A contract drilling company has been hired to carry out auger drilling for the building pad foundations. The drill rig will be used to perform standard penetration tests in some boreholes to determine bearing capacities. Undisturbed sample tubes will be pushed to obtain samples for consolidation testing in the laboratory.

A senior technician is in charge of site activities, and arranges for a drill rig. She plans a program of drilling, sampling and testing. A laboratory assistant is allocated to carry out the majority of site activities. These include overseeing drilling and testing operations, and sampling. He is provided with a marked-up plan of the site showing borehole locations so that he can direct where to drill. The senior technician makes site visits every second day to oversee the work.

The drilling contractor operates the drill rig, takes tube samples, performs the standard penetration tests, and cases the hole if required, as directed by the senior technician. The assistant records and samples the soil profile, seals the sample tubes with wax and labels them. He also records the SPT readings, and bags and labels the material from the split-spoon sampler. Each borehole is capped to prevent access by unauthorised persons so that the assistant can record standing water level 24 hours after the hole has been drilled. He wears a
helmet, work boots and earmuffs while working near the rig. He covers up and wears sunscreen while working in the sun, and drinks large quantities of water.

The assistant also excavates hand auger holes to a depth of one metre at regular intervals in the proposed roadways to obtain samples for California Bearing Ratio tests. Adjacent to each, he performs a dynamic cone penetrometer test to two metres to assess the in-situ material. He records the logs of the auger holes and the test results on the company’s standard data sheets. He backfills each auger hole immediately after sampling.

He reports each day’s activities to the senior technician using the company’s standard summary form. She is confident of his ability to identify soil types, minimising the need for laboratory testing of the samples taken. Based on the field logs, cross-sections of the site can be drawn so that the designer can assess its geotechnical characteristics and determine the extent of any further investigations.

**Key competencies**

This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:

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</table>
Assist with geotechnical site investigations
Unit Title:
Provide information to customers

PML COM 500 A

Unit descriptor

This unit of competency covers the ability to respond to both internal and external inquiries of a specialised technical nature. The advice and information requested should require the gathering of information such as: trend analysis, collection of data and samples, confirmation of validity of results, revision of plans, or product advice additional to that on data sheets.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Assess the request for information and/or advice</td>
<td>1.1 Clarify and confirm the source, nature and priority of the request</td>
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<td></td>
<td>1.2 Redirect the request to the relevant section, department or person if appropriate</td>
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<td>1.3 Record the receipt of the request in accordance with enterprise procedures</td>
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<tr>
<td>2 Prepare response</td>
<td>2.1 Locate and obtain required information if available</td>
</tr>
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<td></td>
<td>2.2 If not available, decide whether to obtain or generate the required information given the priority and costs involved</td>
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<td>2.3 Seek required approval/authority to release information before proceeding</td>
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<td></td>
<td>Provide information and/or advice</td>
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<thead>
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<th>4</th>
<th>Record details of the request and response</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>4.1 Record all information details accurately in accordance with enterprise procedures</td>
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<td></td>
<td></td>
<td>4.2 Ensure that all written information is accurate and/or legible</td>
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<td>4.3 File all records in the designated place and in accordance with enterprise procedures.</td>
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</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency includes the following types of information sources and documentation:

information directories (organisational structure, telephone), online database and CD ROMS
personnel such as:
- scientists
- technical experts
- quality managers
workplace documents such as:
- equipment manuals
- laboratory records
- NATA requirements
- Australian Standards
workplace procedures governing, for example:
- receipt of request
- release of information and results, confidentiality needs of clients and customers
- sample collection protocols and techniques for preserving sample integrity
- handling and collection of native fauna and flora (Code 64)
- filing systems, databases, laboratory records.

This unit of competency may also include the use of items of equipment such as:

telephone
fax
computer equipment (email).

Information may be provided to:

internal and external customers
members of the public
authorities including regulatory authorities
other enterprises, municipalities
engineers, scientists, other specialist staff.
Information may be provided regarding:
material classification and characteristics
technical and/or manufacturing knowledge of procedures
analytical, chemical, biomedical and/or mechanical test results and their interpretation where authority permits
risk assessment, monitoring and minimisation
cost, quantity, time estimation
contractual variations and claims
site assessment and problems
data analysis, statistical interpretation.

**Specific industry variables**

*Additional variables may apply for each industry sector below.*

**Process manufacturing and construction materials industries**
Assessing requests for:
- changes to formulations and alterations to production process
- variations and their significance for compliance with relevant standards.

**Biomedical and environmental services**
Response to inquiries regarding sample collection and recollection protocol from:
- patients, doctors, nurses and environmental health officers
- collection staff and couriers.

**Food and beverage processing industries**
Assessing requests for:
- changes to formulations and alterations to production process
- variations and their significance for compliance with relevant standards.

**Updating information**
This unit of competency does not contain detailed information that requires regular updating.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to assess requests for information and provide all verbal and written responses in a format that is easily understood by others and in accordance with workplace requirements.

In particular, the assessor should look to see that the candidate:
correctly prioritises requests for information
locates and synthesises the required information using appropriate sources
provides authorised information that is accurate, relevant, and in the required format
uses technical terminology appropriate to customer and avoids jargon
communicates in an efficient and polite manner
maintains confidentiality of information as required by workplace procedures
records and files records of the request and information provided as required by enterprise procedures.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
workplace procedures relating to:
  - customer service
  - communication protocols
  - OHS and environmental regulations
customer information about enterprise products and services
technical details of methods, data and sample collection and the key features of laboratory results.
An awareness of the laboratory’s business goals and key performance indicators is required as a basis for dealing with customers.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated work environment.

**Interdependent assessment of unit**

This unit of competency should be assessed after:

PML COM 300 A – Communicate with other people.

Individual enterprises may choose to add other relevant prerequisites.

**Assessment methods and resources**

The following assessment methods are suggested:

- examination of written records of advice and information given to a range of customers
- feedback from customers that the information/advice provided was accurate, timely and in a useful format
- feedback from supervisors that enterprise procedures were followed.

Resources may include:

- information directories and databases
- workplace documents
- equipment such as telephone, fax, computer equipment (email or online information systems).

**This competency in practice**

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

A sales office representative submitted a sample from a customer who had complained that the product was contaminated. A technical officer discussed the problem with the representative and traced the history of the product sample from production batch to the customer’s tank. It was found that the product had been delivered to a distributor, who had then sold it to the customer. The technical officer was able to show that the sample should be taken from the distributor’s tank rather than the customer’s. With a clear understanding of sampling protocols and procedures, the technical officer was able to ensure effort was not wasted on analysing a sample that would not identify the cause of the problem. Direct communication with the representative made sure there were guidelines to prevent the problem happening again.
Biomedical and environmental services

A technical officer in a government analytical laboratory often provides information to others about how a sample should be collected, received, labelled and its receipt recorded. This may occur when samples are collected:
- for forensic analysis from a crime scene
- at sporting events for the purpose of testing urine for performance enhancing drugs
- for blood-alcohol determination.

The technical officer conveys instructions using a minimum of jargon about the method and times of collection, the holding temperature, labelling requirements and documentation of the sample source. In some cases, the officer may also specify additional requirements governing the safe storage and transport of infectious or hazardous materials.

Food and beverage processing industries

A food processing company has a team of laboratory personnel that perform analysis of food products both for the company and on a fee-for-service basis for other enterprises. The laboratory often received phone requests for the early release of results when they were needed urgently. Sometimes when this occurred, the individual who performed the analyses was unavailable and no one else was sufficiently informed to provide a verbal report on the data. The laboratory personnel realised that they should organise the way they recorded their results so that everyone could access, understand and report them quickly. The team developed a centralised system of recording and filing the results. They also organised a series of brief training sessions to share information about the analyses that they performed.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
Provide information to customers
Unit Title:
Analyse data and report results

Unit descriptor
This unit of competency covers the ability to perform laboratory computations, analyse trends and uncertainty in data and report results within the required timeframe.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Perform laboratory computations</td>
<td>1.1 Ensure raw data are consistent with expectations and reasonable ranges</td>
</tr>
<tr>
<td></td>
<td>1.2 Calculate scientific quantities involving ratios and proportions</td>
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<td></td>
<td>1.3 Calculate scientific quantities involving algebraic, logarithmic, exponential, trigonometric and power functions</td>
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<td>1.4 Ensure calculated quantities are consistent with estimations</td>
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<td>1.5 Present results using the appropriate units, uncertainties and number of significant figures</td>
</tr>
<tr>
<td>2 Analyse trends and relationships in data</td>
<td>2.1 Determine linear and non-linear relationships between sets of data</td>
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<tr>
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<td>2.2 Prepare and analyse control charts to determine if a process is in control</td>
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<td>2.3 Identify possible causes for out-of-control condition</td>
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<td>2.4 Follow enterprise procedures to return process to in-control operation</td>
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<td>3</td>
<td>Determine variation and/or uncertainty in data distributions</td>
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</tr>
<tr>
<td>3.1</td>
<td>Organise raw data into appropriate frequency distributions</td>
</tr>
<tr>
<td>3.2</td>
<td>Calculate means, medians, modes, ranges and standard deviations for ungrouped and group data</td>
</tr>
<tr>
<td>3.3</td>
<td>Interpret frequency distributions to determine the characteristics of the sample or population</td>
</tr>
<tr>
<td>3.4</td>
<td>Calculate standard deviations and confidence limits for means and replicates</td>
</tr>
<tr>
<td>3.5</td>
<td>Determine the uncertainty in measurements using statistical analysis</td>
</tr>
<tr>
<td>3.6</td>
<td>Determine data acceptability using statistical tests and enterprise procedures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4</th>
<th>Check for aberrant results</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Identify results that cannot be reconciled with sample, sample documentation, testing procedures and/or expected outcomes</td>
</tr>
<tr>
<td>4.2</td>
<td>Determine appropriate actions in consultation with supervisor as required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5</th>
<th>Report results</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Use charts, tables and graphs to present results in the required format</td>
</tr>
<tr>
<td>5.2</td>
<td>Verify that entry of data and results is correct</td>
</tr>
<tr>
<td>5.3</td>
<td>Prepare reports in a format and style consistent with their intended use and enterprise guidelines</td>
</tr>
<tr>
<td>5.4</td>
<td>Communicate results within the specified time and in accordance with enterprise confidentiality and security guidelines.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

Data may be recorded on worksheets or entered into spreadsheets or databases linked to information management systems. Data includes the results of:

- tests
- measurements
- analyses
- surveys.

Calculations may be performed with or without a calculator or computer software. Examples of calculations of scientific quantities could include:

- % and absolute uncertainties in measurements and test results
- dose (mg), dilution (1:10), concentration (molarity, g/mL, mg/L, ppm, ppb)
- pH, [H⁺], [OH⁻], buffer calculations, Kₐ, pKₐ, K₆, pK₆, K₇
- solubility constants Kₛ, pKₛ
- radioactivity: half life, dose, activity, exposure
- optical properties: absorbance/transmittance, path length, extinction coefficient, concentration (Beers law), detection limits
- electrical properties: conductivity, resistivity, dielectric constants
- mechanical properties: stress, strain, elastic moduli, yield strength, hardness
- thermal properties: heat capacity, thermal expansion, thermal conductivity, thermal resistance
- food content (%): of water, ash, dietary and crude fibre, carbohydrate, protein, fat and specific vitamin quantities associated with quality control monitoring, assessment and reporting.

Graphical analysis could include:

- determination of linear, logarithmic, exponential and power relationships
- regression lines and interpretation of correlation coefficients.
Statistical analysis could include the use of:
- histograms, frequency plots, stem and leaf plots, boxplots, scatter plots
- probability, normal probability plots
- Pareto diagrams, Stewhart control charts, CuSum control charts
- regression methods for calibration, linearity checks, comparing analytical methods
- analysis of variance (ANOVA)
- data acceptability tests such as Q, T and Youden.

Records could include information associated with:
- purchase of equipment and materials, service records
- safety procedures
- history of calibration and test results.

Reference materials could include:
- material data safety sheets
- equipment manuals and warranty, supplier catalogues, handbooks
- sampling and test procedures, standard operating procedures (SOPs)
- enterprise quality manual, customer quality plan
- OHS regulations, guidelines and procedures

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to analyse and report data in accordance with workplace procedures.

In particular, the assessor should look to see that the candidate is able to:

- store, retrieve and manipulate data following document traceability procedures
- calculate scientific quantities relevant to her/his laboratory work and present accurate results in the required format
- analyse data to determine relationships between variables
- prepare frequency distributions for given data, calculate and interpret measures of central tendency and dispersion
- prepare and interpret control charts and take appropriate actions
- maintain the confidentiality of data in accordance with workplace and regulatory requirements
- report results in the required formats and expected timeframe.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- procedures for data traceability
- procedures for verifying data and rectifying mistakes
- procedures for maintaining and filing records, security of data
- the characteristics of a valid measurement
- sources of uncertainty in measurements
relevant scientific and technical terminology such as:
- variables - dispersion
- central tendency - process control
- process stability - normal distribution
- confidence level - replication.

relevance/importance of the National Measurement Act to laboratory measurement.

Competency also includes the ability to perform laboratory computations such as:

calculations involving fractions, decimals, ratios, proportions and percent
evaluation of formulae containing powers, exponents, logarithms, trigonometric functions
use of scientific notation, correct units, correct number of significant figures
calculation of uncertainties
preparation and interpretation of linear, semi-log and log-log graphs
calculation and interpretation of statistical quantities such as mean, median, mode, range,
variance and standard deviation
determination of regression line equations, correlation coefficients
preparation and interpretation of more complex control charts and frequency distribution plots.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
technical units such as the PML TEST 400 and “500 series” units
PML DATA 501 A – Use laboratory application software.

This unit of competency should be assessed after:
PML DATA 300 A – Process and record data.

Assessment methods and resources

The following assessment methods are suggested:
review of data worksheets, calculations, computer files, graphs and/or tables prepared by the candidate
questions to assess understanding of relevant procedures, trends in data, sources of uncertainty
review of reports prepared by the candidate
feedback from supervisors and peers regarding the candidate’s ability to analyse and report data in accordance with enterprise procedures.
Resources may include:

- data sets and records
- computer and relevant software or laboratory information system
- relevant workplace procedures.

**This competency in practice**

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

Before pharmaceutical products can be approved for use in Australia, they must be tested for shelf life in their Australian sales pack(s). The shelf-life of a preparation is the time of storage which results in a preparation becoming unfit for use, either through chemical decomposition of the active substance(s) or physical deterioration of the preparation.

Stability profiles are determined by storing the preparation under a range of temperature conditions and evaluating it at predetermined time intervals. For example, a technical assistant may be required to evaluate the physical parameters of the new tablet #20496 to detect any changes in its appearance, hardness, friability, disintegration and dissolution profile. The assistant regularly assays the tablets using a stability indicating assay. The results are plotted and the information gained is used to predict the period of time for which the tablets will meet the appropriate standards for physical characteristics, purity and potency when stored under defined conditions.

**Biomedical and environmental services**

Supplementation of vitamins and minerals in the diet as a means to avert a clinical problem is a popular area of research, linking epidemiological and clinical investigation with food analyses. In the example of folate, such combined studies have led to the fortification of a number of foods and the requirement for folate supplementation for women of child bearing age.

A typical project team would involve medical staff, a dietitian and a scientific or technical officer to perform the assays. One possible line of study is to control the level of supplementation of the subjects and introduce the micronutrient in a dose form over and above that given in a controlled baseline diet. Blood samples would be collected and the serum micronutrient levels assayed. The technical officer would be responsible for keeping the statistical QC data and analysing for the assays. The technical officer would work with the research team to correlate the serum levels with the dose input. To contribute effectively, the technical officer must understand the significance of the relationships between collected test data and the controlled experimental variables.
Food and beverage processing industries

A State government analytical laboratory recently performed comparative assays of β-carotene using spectrometric (UV-VIS) and high performance liquid chromatography (HPLC) techniques. In any procedure where the assay is to be replaced, side by side analyses must be performed on multiple samples and the correlations between the data compared statistically. The two procedures are then developed or modified for local laboratories and a routine procedure developed. At this point, technical officers would assay the samples by the two methods. They would ensure that all procedures were followed with close attention to quality control. Precision would be assessed through frequent assays of the same samples. Sensitivity of the assay would be assessed by performing the assay over a range of sample concentrations. The technical officers would carefully document the procedures and record all data for later validation. They may also provide preliminary graphical representations of data for their supervisor.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
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<th>Using technology</th>
</tr>
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<tbody>
<tr>
<td>Level 2</td>
<td>Level 2</td>
<td>Level 1</td>
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<td>Level 2</td>
</tr>
</tbody>
</table>
# Use laboratory application software

## Unit Title:

Use laboratory application software

## Unit descriptor

This unit of competency covers the ability to use and apply computer application software in the laboratory, field and production plants.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Access application software</td>
<td>1.1 Identify software required for the task</td>
</tr>
<tr>
<td></td>
<td>1.2 Open software from a personal computer or network terminal</td>
</tr>
<tr>
<td>2 Use software for specified purposes</td>
<td>2.1 Input a range of scientific data into a computing system</td>
</tr>
<tr>
<td></td>
<td>2.2 Conduct searches for the retrieval of required data</td>
</tr>
<tr>
<td></td>
<td>2.3 Use application features for efficient computation</td>
</tr>
<tr>
<td></td>
<td>2.4 Construct data sets and databases for numerical and graphical analyses</td>
</tr>
<tr>
<td>3 Produce reports of retrieved data and/or processed data</td>
<td>3.1 Analyse data using features of the software package</td>
</tr>
<tr>
<td></td>
<td>3.2 Select options for constructing data reports</td>
</tr>
<tr>
<td></td>
<td>3.3 Print the results of data analyses using features of the software package</td>
</tr>
<tr>
<td></td>
<td>3.4 Integrate data from diverse application software units in a report</td>
</tr>
<tr>
<td></td>
<td>3.5 Prepare reports of the rationale and history of a computerised database search where appropriate</td>
</tr>
<tr>
<td></td>
<td>3.6 Reference computerised data sources according to the style requirements of the enterprise</td>
</tr>
<tr>
<td>4 Perform simple record housekeeping</td>
<td>4.1 Maintain backup of worked data</td>
</tr>
<tr>
<td></td>
<td>4.2 Maintain archive data according to enterprise standard procedures</td>
</tr>
<tr>
<td></td>
<td>4.3 Maintain hard copy data according to standard enterprise operating procedures</td>
</tr>
<tr>
<td></td>
<td>4.4 Use antivirus software and general standard quarantine procedures for important discs.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the application and use of software packages in the context of laboratory or field work. Typically this software would be for the storage, retrieval, analysis and display of information.

There is no expectation that technical officers would be able to customise the software to meet specific needs. However, they should be able to use software application features and instructions to input, save, analyse, sort, retrieve and display the records or data. They may also make use of in house software manuals to augment their skills and solve operational problems.

Information sources could include:
manuals of enterprise standard instructions
hardware manuals
software manuals
training materials to orient software to enterprise needs.

Software packages could include: wordprocessing, spreadsheets, databases, graphical and statistical analysis and laboratory information systems.

Updating information

Changes in computer hardware and the expansion of multimedia facilities should not affect the structure of this unit of competency, but will modify some specific skills and knowledge.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to use software for the analysis, reporting and management of laboratory and field data and information. In particular, the assessor should look to see that the candidate:

- selects the most appropriate software package for the task
- uses routine instruction sets of the software package to complete the task
- uses software to analyse data such as quality control and instrument performance characteristics
- backs up electronic storage
- uses scanning software to protect in house software and data.

Essential knowledge

Cross industry

*The following knowledge requirements apply to all industry sectors covered by this Training Package.*

Competency includes the ability to apply and explain:

- the applications of the software package
- the terminology associated with the software packages
- the relationship between the package instructions and the data manipulation performed
- types of database models that are available
- the relationship between the protocol for data input and file storage of the data
- general file and record maintenance.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 500 A – Analyse data and report results
Any unit in the PML TEST “500 series”.

This unit of competency should be assessed after:
PML DATA 300 A – Process and record data.

Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
analysis tasks linking test results to the generation of meaningful reports
simple statistical and/or graphical analysis of quality control data
oral and written exercises in preparation for keyboard activities.

Resources may include:
access to a computer network or a personal computer
software packages that include a database package, spreadsheet, statistical analysis, simple graphics output.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

A laboratory technician performing tests on starting materials may test appearance, identity, melting point, moisture content, trace elements, sulfated ash and assay. The results are entered in a computer database that allows trend analysis to be carried out on the test results for materials from each supplier. As a result, the technician may recognise when a supplier is experiencing problems with their production process. The technician would then notify the supervisor and/or supplier that there is a high probability that future supplies may be out of specification unless appropriate steps are taken during the production process.
Biomedical and environmental services

A routine task of the technical officer in a pathology laboratory is to perform statistical analysis for QC purposes. The software package provides for the input of data, analysis of mean value and variance as well as graphical reporting. The technical officer uses a dedicated software package or a package within the customised pathology data management system in order to assess the validity of the results produced from the analytical instrument.

Food and beverage processing industries

A technical officer may be required to perform a nutrient analysis of a food portion using a software package, or add data using the database function of the package. The technical officer must be able to input new or accessed data and manipulate that data to provide a full nutrient display or report.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
<th>Communicating ideas &amp; information</th>
<th>Collecting, analysing &amp; organising information</th>
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</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 1</td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 1</td>
<td>Level 2</td>
</tr>
</tbody>
</table>
Use laboratory application software
Unit Title:
Maintain and control stocks

Unit descriptor
This unit of competency covers the ability to order, maintain and control the use of laboratory materials and/or equipment in the work area.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Maintain and control stocks of materials or equipment</td>
<td>1.1 Label, document and store stocks in accordance with relevant standards and specific safety requirements</td>
</tr>
<tr>
<td></td>
<td>1.2 Follow stock rotation procedures to maximise use of stocks within permitted shelf life</td>
</tr>
<tr>
<td></td>
<td>1.3 Identify stock discrepancies and replace redundant or outdated stocks to maintain stocks at prescribed level</td>
</tr>
<tr>
<td></td>
<td>1.4 Identify and replace damaged/worn equipment or arrange for repairs or disposal as appropriate</td>
</tr>
<tr>
<td></td>
<td>1.5 Initiate QC sampling and testing procedures when appropriate</td>
</tr>
<tr>
<td></td>
<td>1.6 Report stock problems outside own knowledge and authority limitations to relevant personnel</td>
</tr>
<tr>
<td>2 Order and receive material and equipment</td>
<td>2.1 Determine requirements of customers and suppliers using appropriate communication and interpersonal skills</td>
</tr>
<tr>
<td></td>
<td>2.2 Determine demand for stock, taking into account peak and seasonal variations in stock usage and production conditions</td>
</tr>
<tr>
<td></td>
<td>2.3 Place and/or follow up approved orders using enterprise systems and procedures</td>
</tr>
<tr>
<td></td>
<td>2.4 Check condition of received goods and take appropriate action</td>
</tr>
<tr>
<td>3 Maintain stock records</td>
<td>3.1 Record all relevant details accurately using the specified forms/computer system</td>
</tr>
<tr>
<td></td>
<td>3.2 Ensure that written information is legible and indelible</td>
</tr>
<tr>
<td></td>
<td>3.3 File all records in the designated place</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency is relevant to experienced laboratory personnel who have responsibility for maintaining stock levels for their work area.

This unit of competency includes the ability to apply workplace procedures relating to:
ordering, purchase and receipt of stocks
verification of temperature control for delivered and stored stocks (e.g., reagents containing enzymes)
organisation of compatible batch or lot numbers
storage of stocks, stock control, rotation of stock
quality control testing, monitoring of use by dates of standards and shelf life of reagents (e.g., DNA, enzymes, antibodies, radioisotopes and vitamins)
reporting non-conformance.

Information sources and documentation may include:
AS 2508 - Safe storage and handling information cards
AS 1940 - Storage and handling of flammable and combustible liquids
AS 3780 - Storage and handling of corrosive substances
AS 4452 - Storage and handling of toxic substances
AS 4332 - Storage and handling of gases in cylinders
AS 2243 Safety in laboratories
Enterprise OHS manual and quality manual
Material Safety Data Sheets (MSDSs)
internal/external stock orders and overdue actions
workplace procedures for cleaning
customer database and supplier catalogues.

Records could include:
stock usage current inventories
orders, progress of orders QC sampling, testing and stock rotation
equipment servicing and repairs.

Communication could require the use of:
telephone email
fax equipment
mail
databases
inventories
online information systems
print records
filing systems.

Communication could involve suppliers, freight companies and customers.

**Updating information**

Changes in codes of practice and applicable standards should be noted.

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**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the candidate’s ability to maintain the required quantity and quality of stock items in their work area. In particular, the assessor should look to see that the candidate:

- confirms customer requirements with senior personnel where there is doubt
- accesses online databases and/or catalogues efficiently
- interprets labelling information (lot number, batch, date) and MSDSs correctly
- applies procedures for safe handling, storage and transport of stocks
- uses required safety and manual handling equipment
- performs QC sampling and testing and rotates stock in accordance with SOPs
- follows workplace procedures for predicting and/or determining demand for stock
- maintains stock at prescribed levels through regular inspections, timely ordering of replacement items and follow up of late orders
- copes with peak and seasonal variations in stock usage and production conditions
- follows workplace procedures for researching, ordering and receipt of stock
- completes and records all documentation accurately
- demonstrates effective communication and interpersonal skills when dealing with customers and suppliers.
Essential knowledge

Cross industry

*The following knowledge requirements apply to all industry sectors covered by this Training Package.*

Competency includes the ability to apply and explain:
- technical terminology relating to ordering and storage of stocks
- laboratory stock, product and service information
- common usage and International Union of Pure and Applied Chemistry (IUPAC) name for chemical reagents
- types of chemical reactions and rationale for recommended storage systems
- enterprise procedures and quality system requirements for stock control
- codes of practice and regulations concerning the handling, storage and transport of the stock involved.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency should be assessed after:
- PML OHS 300 A – Work safely in accordance with defined policies and procedures.

Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
- review of documentation for orders prepared by the candidate
- examination of stock records maintained by the candidate
- observation of the candidate handling stock and conducting QC sampling and testing
- feedback from the laboratory manager, quality manager, customer service manager, supervisor, customers and peers
- explanation by the candidate of the labelling and storage requirements of a selection of stock items.

Questioning to assess underpinning knowledge should also be used. Questioning techniques should be appropriate to the candidate’s language and literacy skills.

Resources may include:
Maintain and control stocks
stock order forms and documentation
sampling and testing equipment.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

Neglected chemicals may deteriorate on the shelf to a completely different entity. Not only can this change in identity damage a chemical manufacturing process, it can also present an immediate hazard.

For example, this occurred in a storeroom where stored ether built up high levels of peroxides. When it was used in an extraction process to make a starting material in a manufacturing process, the peroxides were concentrated and exploded. The company was fortunate that loss of life didn’t occur. The company revised workplace procedures to ensure that in the future, redundant or outdated stocks are identified and removed.

Biomedical and environmental services

The stock of immunoradiometric assay (IRMA) kits in a pathology laboratory was running low and the senior scientist has requested that isotope labelled kits for beta HCG assays are to be phased out in favour of ELISA technology. The technical officer was instructed to maintain sufficient IRMA kits to last a further 2 months. Usually 6 kits would be sufficient but it was suggested that an extra kit be ordered in case of extra demand or an accident. The technical officer endeavoured to order all kits from the same batch number to optimise reagent usage and to ensure the longest possible shelf life.

Food and beverage processing industries

The staff in a confectionary company laboratory use enzyme based methods to routinely analyse sugars (glucose, fructose, sucrose and lactose) in products. Although the enzymes are stored as directed by the manufacturer, typically at −20°C in the dark, they do not retain their activity indefinitely. To avoid using inactive enzyme in an analytical procedure and obtaining a reduced or false negative result, several features of each enzyme preparation are routinely noted. These include the date of purchase, the number of times the enzyme has been thawed and refrozen and its initial activity. Periodically, the enzyme activity is verified and stock is discarded where its activity has fallen to a less than acceptable value. These practices ensure that the analytical methods that use enzymes are performed with functional reagents and give accurate results.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the
The following areas:

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<tbody>
<tr>
<td>Level 2</td>
<td>Level 2</td>
<td>Level 2</td>
<td>Level 2</td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 2</td>
</tr>
</tbody>
</table>
Unit Title:

Assist in the maintenance of reference materials

Unit descriptor

This unit of competency covers the ability to assist in the maintenance of reference materials that can be used in the identification of new specimens and allow for the quality control of laboratory procedures. The unit does not cover the scientific identification of species or specimens.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Acquire reference material</td>
<td>1.1 Confirm that required transit conditions were maintained</td>
</tr>
<tr>
<td></td>
<td>1.2 Apply quarantine or isolation arrangements as necessary</td>
</tr>
<tr>
<td></td>
<td>1.3 Record data of accessioned reference material in the collection data base</td>
</tr>
<tr>
<td></td>
<td>1.4 Label material to ensure that its identity is maintained during storage and issue</td>
</tr>
<tr>
<td>2 Maintain the reference material</td>
<td>2.1 Monitor storage conditions to ensure that they comply with suppliers’ warranty specifications</td>
</tr>
<tr>
<td></td>
<td>2.2 Monitor storage conditions to ensure materials remain true to specification</td>
</tr>
<tr>
<td></td>
<td>2.3 Test material during storage, where relevant and appropriate, to report on reference characteristics and specificity</td>
</tr>
<tr>
<td></td>
<td>2.4 Report findings that suggest reference specimens may be deteriorating</td>
</tr>
<tr>
<td>3 Dispense reference material to clients</td>
<td>3.1 Verify requests with supervisor before requests for reference materials are processed</td>
</tr>
<tr>
<td></td>
<td>3.2 Supply reference material without contamination of stock material</td>
</tr>
<tr>
<td></td>
<td>3.3 Keep records of materials issued in accordance with enterprise procedures</td>
</tr>
<tr>
<td></td>
<td>3.4 Follow safely protocols in handling and processing of reference materials</td>
</tr>
<tr>
<td></td>
<td>3.5 Dispose of wastes in accordance with safety and environmental requirements.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This competency typically applies to technical officers who contribute to the maintenance of reference material as part of their job.

Reference materials used in research and manufacturing processes could include:
- specimens such as cells, tissues and samples of aqueous or proteinaceous standards
- aggregates, grains and powders
- materials used for checking equipment calibrations.

Information sources could include:
- workplace procedures, standard operating procedures (SOPs) and operating manuals
- test procedures (validated and authorised)
- sampling procedures (labelling, preparation, storage, transport and disposal)
- safety requirements for equipment, materials or products
- cleaning, hygiene and personal hygiene requirements
- quality system and continued improvement processes
- incident and accident/injury reports
- schematics, work flows and laboratory layouts
- instructions to comply with new legislation, standards, guidelines and codes
- training program contents
- waste minimisation and disposal procedures.

Equipment, materials and systems could include:
- centrifuges, waterbaths, incubators
- lyophilisers and humidifiers
- equipment and material for transport (such as dry ice or ice packs)
- equipment and material for storage (such as liquid nitrogen)
- storage boxes
- storage and display cabinets
- computer information systems, databases, record and filing systems
- laboratory glassware and measuring equipment
- materials suitable for the safe collection and disposal of biological and non-biological wastes.
This unit of competency may include communication with:
supervisors and managers (laboratory, quality and customer service)
other laboratory or clinical personnel.

Specific industry variables

*Additional variables may apply for each industry sector below.*

Process manufacturing and construction materials industries
drill (core) samples for mineral identification
concrete samples for analysis of composition and/or strength and suitability for application.

Biomedical and environmental services
bacterial cultures related to colony and microscopic morphology; specificity and reliability of staining reaction; biochemical characteristics; immunological characteristics
cell suspensions and cell and tissue preparations that can act as quantitative or qualitative controls in tests and procedures
plasma and other body fluids with known attributes or quanta that can act as standards and controls in quantitative and qualitative tests and procedures.

Food and beverage processing industries
quality assurance for viability of enzymes used in process
bacterial or yeast cultures relating to colony and microscopic morphology for culturing purpose
grain samples used in identification of cereal specimens (eg, barley varieties such as Proctor, Franklin and Stirling).

Updating information

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to maintain materials and specimens so that the reference characteristics and attributes are stable in storage and manifest in use after retrieval.

In particular, the assessor should look to see that the candidate:
- maintains material identity during storage
- performs all manipulations safely
- tests stored material for reference characteristics before release
- reconstitutes completely lyophilized materials
- prepares materials for freeze-drying.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- certified reference materials - what they are, when and why they should be used
- the storage requirements of biological and non-biological materials
- the labile nature of chemical and biological materials
- the rationale for testing reference characteristics before issuing reference materials
- reasons for testing before accession of reference materials.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.
Interdependent assessment of unit

This unit of competency may be assessed with:

a unit in the PML TEST 500 series that may involve using materials from a collection
  (eg, PML TEST 501 A)
PML ORG 601 A – Supervise laboratory operations in work or functional area
PML TEST 600 A – Select appropriate test methods and procedures.

This unit of competency should be assessed after:
PML QUAL 401 A – Apply quality systems and continuous improvement processes.

Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:

observation of the candidate performing tests of stored reference material prior to release and
  review of results
case study such as the:
  - accession and processing of a plasma sample that is intended for use as a control in a
    blood coagulation test
  - response to request for supply of a Staphylococcus culture with coagulase activity.
role plays on receipt, testing during storage and release of reference materials
oral and written tests of relevant knowledge.

Resources may include:

equipment and materials related to the occupational task for which the reference material is
  relevant.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of
each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

A technical officer in a pharmaceutical laboratory assays each batch of paracetamol tablets
before their release for sale using ultraviolet spectrometric analysis. Twenty tablets are
ground and a known weight of sample is dissolved in a specified solvent. The ultraviolet
absorption is measured and compared with the absorption of a reference standard, which has
been similarly treated. The potency of the tablets is calculated and compared to the release
limits before being released for sale. The concentration of the reference paracetamol must be
accurately known if the assay is to be correct. The standard is packed and stored under
conditions that will minimise its breakdown, and the storage conditions are monitored to
ensure that the potency remains with acceptable limits.
Biomedical and environmental services

A technical officer in a histology laboratory was asked to perform a batch of iron stains by the Prussian Blue technique. The officer went to the block repository and chose one of the liver blocks known to contain haemosiderin. The officer checked the block number against the data in the control materials log and then cut four sections to process in parallel for the day’s batch and those anticipated over the next few days. Noting that there was only one iron-positive block left, the officer wrote a short memo to the laboratory supervisor suggesting that the pathologist allow for a stock of tissue to be collected the next time he/she identified a suitable specimen.

Food and beverage processing industries

While many attributes of food can be quantified and specified using chemical reference standards, some attributes are best assessed by comparison with a physical reference sample. For example, the number of poppy seeds on a loaf of bread would be impractical to count. However, comparison with retention samples made with various levels of poppy seeds will give an approximation of the number of seeds on the bread. Suitable reference samples need to be prepared and preserved so that the handling of samples does not result in seeds falling from the sample.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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<thead>
<tr>
<th>Communicating ideas &amp; information</th>
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</tbody>
</table>
Unit Title:
Schedule laboratory work for a small team

Unit descriptor

This unit of competency covers the ability to schedule the laboratory work for a small team to meet operational requirements. It covers the ability to identify resource requirements and then document, monitor and adjust schedules in response to operational variations and in consultation with relevant personnel.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Determine work requirements and laboratory resources</td>
<td>1.1 Determine and prioritise demand for laboratory services in work area for the planning period</td>
</tr>
<tr>
<td></td>
<td>1.2 Access and verify information on orders/service requests, stocks and delivery</td>
</tr>
<tr>
<td></td>
<td>1.3 Determine the personnel, material and equipment required to deliver services</td>
</tr>
<tr>
<td>2 Develop schedules in consultation with relevant personnel</td>
<td>2.1 Prepare schedules which meet the demand for services and balance the best use of available resources with skill development opportunities</td>
</tr>
<tr>
<td></td>
<td>2.2 Distribute work schedules to team or appropriate personnel and confirm contents with them</td>
</tr>
<tr>
<td>3 Monitor schedules</td>
<td>3.1 Monitor workflow and outputs against schedules and recognise any variation(s) or potential disruptions</td>
</tr>
<tr>
<td></td>
<td>3.2 Identify possible causes for the variation(s) and discuss possible adjustments with senior personnel</td>
</tr>
<tr>
<td>4 Adjust schedules in consultation with senior personnel</td>
<td>4.1 Adjust schedules in response to operational variation</td>
</tr>
<tr>
<td></td>
<td>4.2 Maintain or renegotiate outputs in accordance with work requirements</td>
</tr>
<tr>
<td></td>
<td>4.3 Update documented schedules and distribute to appropriate personnel.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency is relevant to experienced technical officers who have responsibility for the work outputs of a small work team.

Laboratory work could include:
- setup, pre-use and calibration checks of equipment
- preparation and standardisation of solutions
- maintenance of laboratory facilities, equipment and stocks
- collection, preparation, storage/dispatch of samples
- testing and analysis of raw materials, products and specimens
- preparation of products (e.g., sterile media) and product batches
- trial and modification of methods.

Scheduling for a small team could include:
- identification of resources to maintain work flow including:
  - interpreting production data
  - analysing job tasks
  - prioritising tasks within a work schedule
  - determining appropriate human resources in terms of skills and numbers
  - determining material and equipment requirements
  - monitoring information regarding orders, stocks and deliveries
- monitoring of work outputs
- adjustment of work schedules as agreed with senior personnel to accommodate unexpected events such as:
  - processing abnormal and urgent results
  - delays in arrival of samples
  - seasonal variations, bad weather
  - analysing and solving operational problems resulting in unacceptable test results
  - unexpected events such as equipment failure and sudden personnel absences
- communication with senior personnel including:
  - determining and organising work priorities and schedules
  - analysing and solving problems affecting work schedules
  - adjusting work schedules as necessary
  - identifying possible problems for following shift
communication with team members in relation to:
- explaining work schedules, priorities and sequences
- distributing work schedules
- maintaining required output
documentation of outputs and resource usage
- quality and quantity of outputs
- supplies of stock materials
- maintenance and servicing of equipment.

**Updating information**

This unit of competency is not expected to need rapid updating because it is not limited by current versions of legislation, procedure and practices.

**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to consistently schedule the work activities of a small team to meet operational requirements. In particular, the assessor should look to see that the candidate:

determines required resources accurately
plans schedules that are efficient and satisfy operational requirements without compromising safety, quality, accuracy and ethics
adheres to timelines whenever possible
recognises non-standard behaviour in samples and equipment
recognises potential disruptions to planned timetable
compensates for a variety of work environments (eg, outdoors or night work)
 adjusts schedules and resource requirements efficiently in response to variations
 communicates and documents schedule variations in accordance with procedures
 recognises and uses capabilities of team members
 communicates effectively with team members.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

The candidate requires sufficient knowledge of the enterprise’s information systems, procedures and equipment to schedule the laboratory work for a small team to meet operational requirements. Competency includes the ability to apply and explain:

- basic planning strategies
- accurate scientific and technical terminology
- scientific and technical details underpinning the processes or techniques involved
- enterprise standard operating procedures (SOPs) for the processes or techniques involved
- production schedules, analysis times for product range
- operational factors that may affect the type of tasks scheduled
- resource requirements of the work to be scheduled
- hazards of operations, equipment and materials involved
- workplace procedures relating to OHS, access and equity, relevant sections of industrial awards and enterprise agreements
- quality requirements for the tasks scheduled.

An appreciation of the laboratory’s business goals is also required as a basis for decisionmaking and actions.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency should be assessed after:

- PML OHS 300 A – Work safely in accordance with defined policies and procedures
- PML ORG 300 A – Follow established work plan
- PML COM 300 A – Communicate with other people.

Individual enterprises may choose to add other relevant prerequisites.
Assessment methods and resources

Competency in this unit should be assessed by collecting evidence over sufficient time to demonstrate the candidate’s ability to handle a variety of schedules and contingencies.

The following assessment methods are suggested:

- review of documented work schedules prepared by the candidate which successfully met a variety of operational requirements
- feedback from managers, supervisors and customers serviced by the team involved
- feedback from team members regarding the effectiveness of team interactions
- questions to check underpinning knowledge of relevant policies, procedures and scheduling principles and handling of possible contingencies
- questions to check scientific and technical details underpinning the processes or techniques involved.

Resources may include:

- workplace procedures and workplace documentation (e.g., production data).

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

A consulting laboratory receives 10-15 samples to test daily. The technical officer schedules the work for three other laboratory team members depending on the type of tests and equipment required. One of the technical officer's main tasks is to determine daily and weekly work priorities and distribute the work among team members to maximise their output and use of laboratory equipment. The technical officer monitors work outputs against the schedule and takes corrective action, if required, to ensure that customers receive results within the agreed timeframe.

Biomedical and environmental services

At a regular team meeting a technical officer announced changes to the team's work schedules for the following week. The technical officer explained that the changes were part of a strategy to enable the team to become multiskilled. However, the technical officer neither documented nor distributed written confirmation of the changes, as required. On the set date, confusion and conflict arose as a number of team members insisted on using the old schedules. Valuable time was taken up resolving the problem and confirming the changes with personnel individually. Afterwards, the laboratory supervisor reviewed the relevant communication protocols with the technical officer to emphasise their importance.

Food and beverage processing industries

The annual waste water audit for a company required analysis of water samples collected at...
one-hourly intervals over a 24-hour period. The technical officer called his team together to find out what work priorities individual team members had and whether they had any personal commitments for the following Monday and Tuesday. Afterwards, the officer drew up a roster for the annual audit, taking into account the commitments of team members. Following the audit, the officer analysed the results and compared them with the previous year’s data. As there was a marked discrepancy between the figures, another audit was scheduled.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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<td>Level 3</td>
<td>Level 2</td>
<td>Level 2</td>
<td>Level 1</td>
<td>Level 2</td>
<td>Level 1</td>
</tr>
</tbody>
</table>
Unit Title:

Design and manufacture glass apparatus and glass systems

Unit descriptor

This unit of competence covers the ability to design and manufacture glass apparatus and glass systems. It may include consulting with clients regarding design specifications and cost, and designing equipment and systems to improve efficiency, increase production capabilities and improve safety of equipment and processes.

This competency typically applies to a skilled and experienced scientific glassblower. It requires the application of theoretical and technical knowledge and precision technical skills, as well as the exercise of planning and judgement in determining procedures and outcomes in a range of contexts.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Scope the design of glass apparatus/system</td>
<td>1.1 Clearly identify the function, operating procedures and requirements for apparatus and/or glass system</td>
</tr>
<tr>
<td></td>
<td>1.2 Confirm details of glass apparatus and glass systems required</td>
</tr>
<tr>
<td></td>
<td>1.3 Prepare specifications for new glass apparatus and glass system requirements</td>
</tr>
<tr>
<td></td>
<td>1.4 Prepare design proposal and timelines</td>
</tr>
<tr>
<td></td>
<td>1.5 Obtain client’s approval for design proposal</td>
</tr>
<tr>
<td>2 Design glass apparatus and systems</td>
<td>2.1 Identify or prepare appropriate blueprints, drawings or designs</td>
</tr>
<tr>
<td></td>
<td>2.2 Consult with clients regarding design specifications and cost</td>
</tr>
<tr>
<td></td>
<td>2.3 Design the equipment</td>
</tr>
<tr>
<td></td>
<td>2.4 Obtain client’s approval for manufacture</td>
</tr>
</tbody>
</table>
3 Manufacture glass apparatus and systems

3.1 Select and prepare glass stock and materials
3.2 Select and prepare tools and equipment in accordance with job requirements
3.3 Construct apparatus or system
3.4 Perform annealing operations
3.5 Perform glass finishing operations
3.6 Trial and commission apparatus or system

4 Maintain records

4.1 Record data into reporting system
4.2 Maintain glass apparatus and system equipment logs as per enterprise requirements
4.3 Ensure confidentiality of enterprise information

RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work conducted by skilled and experienced scientific glassblowers who design and manufacture glass apparatus and glass systems as part of their job.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- material safety data sheets
- standard operating procedures (SOPs)
- equipment manuals
- equipment start-up, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.
All operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

This competency includes tools, materials and equipment such as:

- bench burner, hand torch and ribbon burners, gas supplies and gas economisers
- glass working lathes
- annealing ovens
- measuring and recording equipment
- hand tools such as carbon paddles and mandrels, range of forceps, glass tubing gauges, angle setting jigs, calipers, glass support rollers, brass shapers, carbon rods, glass knife, stainless steel gauze, eye protection and heat resistant mittens, vernier calipers and other measuring tools, strain viewer
- mechanical glass cutters and saws
- mechanical glass grinding equipment
- special formula glasses
- glass to glass and glass to metal seals
- communication equipment
- safety clothing and equipment.

**Updating information**

This unit of competence does not contain detailed information that requires regular updating.

**EVIDENCE GUIDES**

*Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competence**

Competence must be demonstrated in the ability to design and manufacture glass apparatus systems.

In particular the assessor should look to see that the candidate can:

- interpret a brief to design requirements and cost
- prepare apparatus and system designs
- incorporate appropriate design factors relevant to use requirements of apparatus
- select appropriate grades of glass and components and prepare for use
- apply basic theoretical knowledge in chemistry and physics and make relevant conclusions
• identify atypical or out of normal problems
• communicate problems to either supervisor or outside service technician
• record and communicate work results
• follow correct OH&S and GLP practice.

**Essential knowledge**

Competence includes the ability to apply and explain:

• design principles for glass apparatus
• types of glass *(including special formula glass)*, their properties and applications
• incompatible glass types
• glass to glass and glass to metal seals
• theoretical and practical knowledge of glasswork methods and procedures, including electrode sealing techniques and electrode placement in glass
• basic theory of equipment operation and use for which design and manufacture is required
• characteristics, capabilities and limitations of glassblowing techniques.

**Assessment context**

This unit of competence is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit may be assessed with:

• Construct, modify and maintain high vacuum systems
• Perform glass coating, grinding and finishing operations.

This unit may be assessed after:

• Operate basic handblowing equipment
• Repair glass apparatus using simple glass blowing equipment.

**Assessment methods and resources**

It is strongly recommended that assessment is conducted through observation over time. The time frame must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

• use of suitable simulation and/or a range of case studies/scenarios
• feedback from peers and supervisors
• examples of glasswork and workplace documentation completed
• analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.
In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:

- access to an operating laboratory which will allow for appropriate and realistic simulation
- a bank of case studies is required where these form part of the assessment method
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:*

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</tbody>
</table>
**Unit Title:**

Perform glass coating, grinding and finishing operations

**PML SCIG 502A**

**Unit descriptor**

This unit of competence covers the ability to perform glass coating, grinding and finishing operations for scientific glassware.

This competency typically applies to a skilled and experienced scientific glassblower. It requires the application of theoretical and technical knowledge and precision technical skills, as well as the exercise of planning and judgement in determining procedures and outcomes in a range of contexts.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prepare for work 1.1 Identify appropriate specifications and procedures, and discuss any issues or problems with customer and work team</td>
<td></td>
</tr>
<tr>
<td>1.2 Identify safety requirements and use appropriate procedures</td>
<td></td>
</tr>
<tr>
<td>1.3 Record description of the job, compare with specification and plan work activities</td>
<td></td>
</tr>
<tr>
<td>1.4 Prepare equipment in accordance with job requirements</td>
<td></td>
</tr>
<tr>
<td>2 Perform glass coating operations 2.1 Identify, select and prepare appropriate grades of glass, coating materials, abrasives, solutions and finishing agents as appropriate for the job</td>
<td></td>
</tr>
<tr>
<td>2.2 Clean and prepare glass as required for coating operation</td>
<td></td>
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<tr>
<td>2.3 Perform glass coating operation as per standard procedure</td>
<td></td>
</tr>
<tr>
<td>2.4 Perform post-coating procedures to maintain coated surface</td>
<td></td>
</tr>
<tr>
<td>2.5 Perform coating removal processes</td>
<td></td>
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<tr>
<td>2.6 Ensure appropriate disposal of all waste</td>
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</tbody>
</table>
### Perform glass grinding operations

<table>
<thead>
<tr>
<th>Task</th>
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</thead>
<tbody>
<tr>
<td>3.1 Identify and prepare grinding tools as required for procedure</td>
</tr>
<tr>
<td>3.2 Select appropriate abrasives for grinding operations</td>
</tr>
<tr>
<td>3.3 Perform grinding and repairing/regrinding processes as appropriate</td>
</tr>
<tr>
<td>3.4 Test ground surfaces to ensure they meet compliance requirements</td>
</tr>
<tr>
<td>3.5 Identify problems and atypical situations that arise during operations</td>
</tr>
<tr>
<td>3.6 Rectify [delete word routine] problems by applying knowledge of operations, of chemical and physical science, and of problem control methods</td>
</tr>
</tbody>
</table>

### Perform glass finishing operations

<table>
<thead>
<tr>
<th>Task</th>
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</thead>
<tbody>
<tr>
<td>4.1 Establish finishing requirements for the job</td>
</tr>
<tr>
<td>4.2 Perform finishing procedures as required for job</td>
</tr>
<tr>
<td>4.3 Ensure the safe disposal of wastes</td>
</tr>
<tr>
<td>4.4 Clean, care for and maintain work area, equipment and tools</td>
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</table>

### Maintain records

<table>
<thead>
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<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Record data into reporting system</td>
</tr>
<tr>
<td>5.2 Maintain equipment logs as per enterprise requirements</td>
</tr>
<tr>
<td>5.3 Ensure confidentiality of enterprise information</td>
</tr>
</tbody>
</table>

### RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work conducted by skilled and experienced scientific glassblowers who perform glass coating, grinding and finishing operations as part of their job.

All operations are usually performed in accordance with laboratory and/or enterprise procedures. These procedures include or have been prepared from:

- industry codes of practice
- material safety data sheets
- standard operating procedures (SOPs)
- equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
Perform glass coating, grinding and finishing operations

- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

All operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

This competency includes tools and equipment such as:

- coating solutions and baths
- grinding tools and abrasives
- bench, handlamp and ribbon burners, gas supplies and gas economisers
- glass working lathes
- annealing ovens
- measuring and recording equipment
- hand tools such as carbon paddles and mandrels, range of forceps, glass tubing gauges, angle setting jigs, calipers, glass support rollers, brass shapers, carbon rods, glass knife, stainless steel gauze, eye protection and heat resistant mittens, vernier calipers and other measuring tools, strain viewer
- mechanical glass cutters and saws
- mechanical glass grinding equipment
- communication equipment
- safety clothing and equipment.

Glass coating may include operations such as:

- cleaning and preparation of glass
- preparing coating solutions
- coating/strip coating and dedicated coating
- protecting coated surfaces
- electroplating
- removal/partial removal of coating.

Grinding may include operations such as:

- selection of abrasives and metal grinding tools
- interpreting specifications for glass-ground joints
- using grinding procedures
- testing ground surfaces for leakage
- preparing glass stopcocks.

Finishing may include operations such as:

- cleaning, rinsing and drying
- evacuating and sealing
- metallising (if applicable)
- flame and/or mechanical polishing.

Updating information
This unit of competence does not contain detailed information that requires regular updating.

**EVIDENCE GUIDES**

*Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competence**

Competence must be demonstrated in the ability to perform glass coating, grinding and finishing operations when preparing scientific glassware.

In particular the assessor should look to see that the candidate can:

- apply appropriate techniques to clean and prepare glass surfaces
- apply knowledge of chemical and physical science to glassblowing situations and make appropriate conclusions
- metal coat glass surfaces or apply opaque treatments to industry standards
- grind and hand lap glass to be used in fabrication and for precision fit
- apply finishing techniques to complete job
- identify atypical situations and take appropriate action
- select appropriate grades of glass, coating materials, abrasives and finishing agents for job
- optimise and use materials and equipment
- communicate with customers/research team to meet timeline commitments
- record and communicate work results
- follow correct OH&S and GLP practice.

**Essential knowledge**

Competence includes the ability to apply and explain:

- use of glassblowing materials, equipment, tools and techniques
- chemistry of coating materials and coating process
- theoretical and practical principles of glass coating materials and processes
- theoretical and practical principles of glass grinding materials and processes
- theoretical and practical principles of glass finishing materials and processes
- theory of equipment operation and use
- common faults in coating, grinding and finishing operations and methods for control
- safety procedures relevant to coating, grinding and finishing operations
- waste disposal procedures.

**Assessment context**
This unit of competence is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit may be assessed with:

- Construct, modify and maintain vacuum systems
- Design and manufacture glass apparatus and glass systems.

This unit may be assessed after:

- Operate basic handblowing equipment
- Repair glass apparatus using simple glassblowing equipment.

**Assessment methods and resources**

It is strongly recommended that assessment is conducted through observation over time. The time frame must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of glasswork and workplace documentation completed
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:

- access to an operating laboratory which will allow for appropriate and realistic simulation
- a bank of case studies is required where these form part of the assessment method
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:

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</tbody>
</table>
Unit Title:

Construct, modify and maintain high vacuum systems

Unit descriptor

This unit of competence covers the ability to construct, monitor, modify and maintain high vacuum systems.

This competency typically applies to a skilled and experienced scientific glassblower. It requires the application of theoretical and technical knowledge and precision technical skills, as well as the exercise of planning and judgement in determining procedures and outcomes in a range of contexts.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Construct high vacuum systems</td>
<td>1.1 Consult with clients regarding design specifications and cost</td>
</tr>
<tr>
<td></td>
<td>1.2 Identify or prepare appropriate blueprints, drawings, sketches and designs</td>
</tr>
<tr>
<td></td>
<td>1.3 Identify safety requirements</td>
</tr>
<tr>
<td></td>
<td>1.4 Prepare equipment in accordance with job requirements</td>
</tr>
<tr>
<td></td>
<td>1.5 Construct and install vacuum apparatus</td>
</tr>
<tr>
<td></td>
<td>1.6 Trial and commission vacuum apparatus</td>
</tr>
<tr>
<td></td>
<td>1.7 Use leak detection equipment to vacuum check system</td>
</tr>
<tr>
<td></td>
<td>1.8 Complete records and file in the reporting system</td>
</tr>
</tbody>
</table>
2 Modify high vacuum systems

2.1 Identify opportunities to improve efficiency of vacuum system
2.2 Use leak detection equipment to vacuum check system
2.3 Identify gaps and deficiencies which limit system’s usefulness
2.4 Confirm modification requirements with appropriate personnel
2.5 Modify system to meet requirements
2.6 Complete records and file in the reporting system

3 Maintain high vacuum systems

3.1 Identify maintenance procedures and appropriate records
3.2 Plan and evaluate maintenance according to appropriate quality standards
3.3 Identify, document and report need for maintenance for faulty or damaged equipment
3.4 Maintain vacuum and associated systems as per standard procedures
3.5 Use leak detection equipment to vacuum check system
3.6 Complete records and file in the reporting system

4 Monitor and finetune vacuum operation

4.1 Monitor system to determine whether equipment is operating to specification
4.2 Evaluate equipment outputs to determine nature of problem
4.3 Define nature of substandard performance clearly
4.4 Fine-tune system to restore system to specification
4.5 Complete records and file in the reporting system
**RANGE OF VARIABLES**

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work conducted by skilled and experienced scientific glassblowers who construct, modify and maintain high vacuum systems as part of their job.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- material safety data sheets
- standard operating procedures (SOPs)
- equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

All operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

This competency includes tools and equipment such as:

- leak detection equipment
- pumps and lubricants
- pressure measuring equipment
- bench, handlamp and ribbon burners, gas supplies and gas economisers
- glass working lathes
- annealing ovens
- measuring and recording equipment
- hand tools such as carbon paddles and mandrels, range of forceps, glass tubing gauges, angle setting jigs, calipers, glass support rollers, brass shapers, carbon rods, glass knife, stainless steel gauze, eye protection and heat resistant mittens, vernier calipers and other measuring tools, strain viewer
- mechanical glass cutters and saws
- mechanical glass grinding equipment
- communication equipment
- safety clothing and equipment.
Vacuum apparatus includes items such as:

- manometers
- vacuum traps
- vacuum manifolds
- vacuum distillation apparatus
- gas handling systems.

Maintenance includes procedures such as:

- cleaning and maintaining work area, equipment and tools
- checking and maintaining gas manifolds, cylinders and pumps
- ensuring safety of vacuum and related equipment
- evaluating and troubleshoot high vacuum systems
- evaluating and restoring efficiency of systems.

**Updating information**

This unit of competence does not contain detailed information that requires regular updating.

**EVIDENCE GUIDES**

*Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competence**

Competence must be demonstrated in the ability to use advanced bench/hand glasswork techniques and equipment to fabricate glass apparatus.

In particular the assessor should look to see that the candidate can:

- prepare and interpret blueprints, drawings, sketches, designs and customer requirements
- apply theoretical concepts and practical principles to construct, modify and maintain vacuum systems
- evaluate and make recommendations for modifications to vacuum systems
- modify high vacuum systems to meet new requirements
- use appropriate procedures to monitor and maintain high vacuum systems
- follow enterprise procedures to document and communicate work details.

**Essential knowledge**

Competence includes the ability to apply and explain:
• principles of design of high vacuum apparatus
• principles of working with high vacuum systems
• theoretical and practical knowledge of glassworking methods and procedures
• practices to control stress and strain in glass systems
• theory of equipment operation and use
• characteristics, capabilities and limitations of glassblowing techniques
• properties of glass and specific ways to join glass for high vacuum applications
• ideal joint placement for high vacuum systems
• ultra cleaning procedures for glass in high vacuum systems
• preparation and use of glass to metal seals
• safety procedures relevant to constructing and working with high vacuum systems.

**Assessment context**

This unit of competence is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit may be assessed with:

- Perform glass coating, grinding and finishing operations
- Design and manufacture glass apparatus and glass systems.

This unit may be assessed after:

- Operate basic handblowing equipment
- Repair glass apparatus using simple glass blowing equipment.

**Assessment methods and resources**

It is strongly recommended that assessment is conducted through observation over time. The time frame must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of glasswork and workplace documentation completed
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:
access to an operating laboratory which will allow for appropriate and realistic simulation
a bank of case studies is required where these form part of the assessment method
access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:

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</tbody>
</table>
Unit Title:
Calibrate and maintain instruments

Unit descriptor
This unit of competency covers the ability to calibrate and maintain instruments.

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<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Perform setup and pre-use safety checks</td>
<td>1.1 Perform safety checks in accordance with appropriate enterprise procedure</td>
</tr>
<tr>
<td></td>
<td>1.2 Report hazardous, damaged or faulty equipment to appropriate personnel</td>
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<td></td>
<td>1.3 Label faulty equipment appropriately</td>
</tr>
<tr>
<td></td>
<td>1.4 Start up equipment according to procedures</td>
</tr>
<tr>
<td>2 Perform calibration checks</td>
<td>2.1 Perform equipment calibration as per calibration schedule and procedure using appropriate reference materials</td>
</tr>
<tr>
<td></td>
<td>2.2 Make adjustments to calibration and test equipment (if appropriate) to ensure that equipment operates within specified range</td>
</tr>
<tr>
<td></td>
<td>2.3 Document calibration status and report out-of-calibration equipment</td>
</tr>
<tr>
<td>3 Maintain equipment</td>
<td>3.1 Identify maintenance procedures and appropriate records</td>
</tr>
<tr>
<td></td>
<td>3.2 Maintain equipment, facilities, reference standards, related literature and stocks of consumables as per standard procedures</td>
</tr>
<tr>
<td></td>
<td>3.3 Plan and evaluate maintenance according to appropriate quality standards</td>
</tr>
<tr>
<td></td>
<td>3.4 Identify, document and report need for maintenance for faulty or damaged equipment</td>
</tr>
<tr>
<td></td>
<td>3.5 Update maintenance records in accordance with enterprise procedures</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by laboratory technicians who calibrate and maintain a range of laboratory equipment and instruments as part of their job.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

- Australian and international standards
- codes of practice (such as GLP and GMP)
- material safety data sheets (MSDSs)
- National Measurement Act
- standard operating procedures (SOPs)
- equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the Occupational Health and Safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

Laboratory equipment and instruments will depend on the enterprise and the range of testing carried out. Typical equipment may include:

- balances
- density bottles, pipettes, burettes and volumetric glassware
- optical microscopes, thermometers, melting point apparatus, refractometers, viscometers, hardness testing equipment
- conductivity meters, pH meters
- autoclaves
- centrifuges
- noise meters, pressure gauges, torque testers
disintegration apparatus
polarimeters, colorimeters, spectrometers
cromatographic equipment, electrochemical equipment
cell analysers and cell counters.

Updating information

Changes in codes of practice and applicable standards should be noted.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to calibrate and maintain instruments to enterprise requirements. In particular the assessor should look to see that the candidate can:

- start up equipment to enterprise standards
- develop and use necessary calibration charts
- adjust operating parameters as required
- calibrate and maintain equipment to enterprise standards
- evaluate results and respond as per enterprise requirements
- identify the need for and perform routine maintenance as required
- maintain and/or order spare parts necessary to ensure proper operation if required
- shut down equipment as per procedure.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- principles and methods of equipment calibration
- principles of operation of equipment
- procedures for evaluating equipment calibration
- procedures for recognition of maintenance requirements
- equipment maintenance schedules and procedures
- common errors associated with equipment use
- OHS hazards and controls.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
- PML TEST 400 A – Perform instrumental tests/procedures
- PML TEST 504 A – Perform chemical pathology tests
- PML TEST 506 A – Apply spectrometric techniques
- PML TEST 507 A – Apply chromatographic and electrophoretic techniques.

This unit of competency should be assessed after:
- PML TEST 300 A – Perform basic tests
- or
- PML TEST 301 A – Perform biological laboratory procedures.

Assessment methods and resources

The following assessment methods are suggested:
- observation of the candidate calibrating and maintaining instruments
- oral or written questioning
- feedback from peers and supervisors
- examples of records and workplace documentation completed by the candidate.
Resources may include:

standard laboratory equipped with appropriate equipment and calibration standards
standard operating procedures (SOPs), calibration and maintenance schedules and procedures.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

The ability to calibrate instruments and keep accurate calibration records is an important skill requirement for any laboratory technician. Laboratories applying for NATA registration must maintain records that show equipment calibrations have been properly carried out. These calibrations should also be traceable back to certified primary reference standards to ensure their validity. Starting materials used in manufacturing operations are often white powders. Infrared spectroscopy is used to positively identify many materials. Two compounds are one and the same if their spectra match in all respects (ie, in the position and relative intensity of the absorption bands).

For example, if the spectra of a white powder matches the spectra of caffeine, the technician can be sure that the white powder is caffeine provided that the spectrometer has been correctly maintained and calibrated. The infrared spectrometer must be calibrated against a standard, which is polystyrene film. Calibration of spectrometers and the identification of unknown compounds is an important task performed by laboratory technicians.

Biomedical and environmental services

The recording spectrophotometer is a primary instrument used in biochemical research. This instrument enables the identification and quantitation of material that has been isolated from cells or tissues.

An example is the identification and determination of DNA isolated from bacterial cells. A culture of cells is grown up and when the cell yield is sufficient, the cells are pelleted, ruptured and the DNA extracted. DNA can be precipitated by ethanol and then redissolved in a buffer. DNA absorbs at 280nm and the absorbance can be used to determine its concentration. Protein impurities are noted by absorbance at 260nm. It is critical that the instrument reads the true wavelength for this work. The technical officer will calibrate the instrument for wavelength using calibration filters. This procedure confirms that the wavelength selected is the true wavelength used in analysis.
Food and beverage processing industries

Technicians in a NATA certified laboratory must do regular checks to ensure that laboratory equipment such as balances, refractometers and spectrometers are calibrated and in working order.

For example, balances are calibrated to ensure that they are weighing within the correct tolerances. Using calibrated masses and appropriate documented methods, the technician checks that the balances are weighing within specification. If the balance is out of specification, the technician follows appropriate procedures to correct this and/or notifies the manufacturer to arrange for the balance to be serviced.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</tbody>
</table>
Unit Title:

Perform microbiological tests

Unit descriptor

This unit of competency describes the ability of technical personnel to contribute to the culture, isolation and identification of microorganisms for investigating the physiology and pathology of plants and animals; for monitoring the natural environment; and to assist in the production of foods, pharmaceutical goods and other manufactured materials. Using techniques of aseptic transfer, culture and identification, this unit of competency provides for the development of skill in procedures that can be applied in investigations of bacteria, viruses, protozoans, algae and parasites, as well as addressing the broader needs of biotechnology and tissue culture applications.

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<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
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<tbody>
<tr>
<td>1 Receive samples and process associated request forms</td>
<td>1.1 Check samples and request form details before they are accepted</td>
</tr>
<tr>
<td></td>
<td>1.2 Return samples and request forms that do not comply with requirements to source with reasons for non-acceptance</td>
</tr>
<tr>
<td></td>
<td>1.3 Log samples, recording details that allow accurate tracking and chain of custody</td>
</tr>
<tr>
<td></td>
<td>1.4 Distribute samples for local testing or dispatch samples to other testing facilities</td>
</tr>
<tr>
<td></td>
<td>1.5 Store samples appropriately where testing or transport is to be delayed</td>
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<tr>
<td></td>
<td>Prepare for safe microbiological work and aseptic applications</td>
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</tr>
<tr>
<td>2</td>
<td>2.1 Select work area and equipment required for the safe handling of materials that may contain microorganisms of specified risk groups</td>
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<tr>
<td></td>
<td>2.2 Wear protective apparel, replacing when contamination is suspected</td>
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<tr>
<td></td>
<td>2.3 Apply correct disinfection procedures to work areas before and after use</td>
</tr>
<tr>
<td></td>
<td>2.4 Locate relevant emergency equipment for timely response to microbiological accidents</td>
</tr>
<tr>
<td></td>
<td>2.5 Apply standard precautions when handling biological materials</td>
</tr>
<tr>
<td></td>
<td>2.6 Minimise the production and release of aerosols, using biological safety cabinets where necessary</td>
</tr>
<tr>
<td></td>
<td>2.7 Clean spills, reporting all spills and suspected accidents to supervisor</td>
</tr>
<tr>
<td></td>
<td>2.8 Wash hands before and after laboratory work and when contamination is suspected</td>
</tr>
<tr>
<td></td>
<td>2.9 Ensure the safe disposal of biohazardous materials and other laboratory wastes in accordance with enterprise procedures</td>
</tr>
<tr>
<td>3</td>
<td>Process samples for direct examination</td>
</tr>
<tr>
<td></td>
<td>3.1 Prepare thin smears of samples for subsequent staining to enable microscopic identification of cells</td>
</tr>
<tr>
<td></td>
<td>3.2 Prepare liquid films of specimens for direct observation for motility or cell structure</td>
</tr>
<tr>
<td></td>
<td>3.3 Prepare samples to concentrate material for subsequent staining or microscopy</td>
</tr>
<tr>
<td>4</td>
<td>Prepare pure cultures for microbiological work and aseptic applications</td>
</tr>
<tr>
<td></td>
<td>4.1 Select culture media to maximise growth of microorganisms and cells</td>
</tr>
<tr>
<td></td>
<td>4.2 Inoculate media aseptically, applying techniques suitable for purpose of culture</td>
</tr>
<tr>
<td></td>
<td>4.3 Incubate inoculated media in conditions to optimise growth of organisms and cells</td>
</tr>
<tr>
<td></td>
<td>4.4 Sub culture on suitable media to optimise production of pure cultures</td>
</tr>
</tbody>
</table>
|   | Perform microbiological tests | 5.1 | Select staining techniques to demonstrate required cellular characteristics  
|   |   | 5.2 | Stain prepared films to demonstrate diagnostically useful characteristics  
|   |   | 5.3 | Inoculate and incubate media with pure cultures to assist in the biochemical and immunological identification of micro-organisms  
|   |   | 5.4 | Perform tests on pure cultures to assist in the biochemical and immunological identification of micro-organisms  
|   | Estimate the number and/or size of micro-organisms in samples | 6.1 | Count cells in undiluted samples to indicate the dilution necessary to reliably count organisms in culture  
|   |   | 6.2 | Aseptically prepare serial dilutions of samples for culture and colony counting  
|   |   | 6.3 | Count colonies for calculating number of viable organisms per unit volume  
|   |   | 6.4 | Count micro-organisms in samples and cultures using spectrometric and electronic methodologies, where relevant  
|   | Contribute to antibiotic sensitivity testing where required | 7.1 | Prepare inoculum suitable for antibiotic sensitivity testing  
|   |   | 7.2 | Dispense or position antibiotic discs as indicated by enterprise protocol  
|   |   | 7.3 | Incubate inoculated media under conditions to maximise growth of cultured organism  
|   |   | 7.4 | Read and record sensitivity reactions, noting phenomena that can assist in the correct interpretation of results  
|   | Maintain records of laboratory work | 8.1 | Make entries on report forms or into computer systems, accurately recording or transcribing required data as required  
|   |   | 8.2 | Maintain instrument logs as required by accreditation checklists  
|   |   | 8.3 | Keep confidential all clinical information and laboratory data  
|   |   | 8.4 | Ensure security of all clinical information and laboratory data and records.  

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes aspects of work conducted by supervised technical personnel. Although a supervisor may not always be present, the technical worker will follow standard operating procedures that will clearly describe the scope of permitted practice in modifying testing procedures and for communicating test results to people outside the laboratory.

The results of work performed by technical personnel would normally be integrated, interpreted and reported on by scientists, medical, veterinary or plant pathologists or other responsible officers of an enterprise.

All work will assume the potential infectivity of samples and materials presented for laboratory processing. Facilities, equipment and processes will conform to the recommendations of AS/NZS 2243.3 - Safety in laboratories, Part 3: Microbiology. Information sources could include:

- workplace procedures, standard operating procedures (SOPs) and operating manuals
- test procedures (validated and authorised)
- sampling procedures (labelling, preparation, storage, transport and disposal)
- safety requirements for equipment, materials or products
- cleaning, hygiene, personal hygiene requirements
- quality system and continued improvement processes
- incident and accident/injury reports
- schematics, work flows, laboratory layouts
- instructions to comply with new legislation, standards, guidelines and codes
- training program contents
- waste minimisation, containment, processing and disposal procedures
- current guidelines for small scale genetic manipulation work, from the Genetic Manipulation Advisory Committee (GMAC).
Equipment, materials and systems could include:

- protective and physical containment facilities and equipment for safe handling of microorganisms (AS/NZS 2243.3: Safety in Laboratories, Part 3: Microbiology)
- personal protective equipment such as gloves, gown, mask and safety glasses, gloves for working with extremes of heat and cold
- carbon dioxide cabinets
- transfer equipment, such as inoculating loops, pipettes (quantitative and qualitative), flasks, tubes and spatulas
- liquid nitrogen containers for cell storage
- filtration membranes
- microscopes with bright field and other relevant illumination systems, stereomicroscopes
- counting chambers for micro-enumeration
- colony counting devices
- bunsen burners, bench incinerators
- incubators, water baths
- anaerobic jars, fermentation chambers, continuous culture systems and other devices for controlling growth environments of micro-organisms
- computer information systems, databases, record and filing systems
- stains, media, reagents and biological materials necessary for laboratory testing
- laboratory glassware and measuring equipment
- disinfecting and sterilising solutions and equipment such as ultra-violet (UV) lamps
- materials suitable for the safe containment, collection, processing and disposal of biological and non-biological wastes
- autoclaves.

This unit of competency may include communication with:

- supervisors and managers (laboratory, quality and customer service)
- personnel in other laboratories in the enterprise or in other enterprises to which work may be referred
- customers, patients and clients
- external auditors and accreditation agencies (eg, NATA).

**Specific industry variables**

*Additional variables may apply for each industry sector below.*

**Biomedical and environmental services**

- sampling for the microbiological testing of drinking water should conform to the guidelines published by the National Health and Medical Research Council and the Australian Water Resources Council
- testing procedures for the microbiological content of water should be guided by advice of relevant national and State environment protection agencies
- antibiotic susceptibility/sensitivity testing
- use of polymerase chain reaction (PCR) procedures in virology testing
handling of genetically altered cells
freezing and thawing of cultured cells.

**Food and beverage processing industries**
sampling and test batteries should conform to relevant food standards code.

**Updating information**
Changes in codes of practice and applicable standards should be noted.

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**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to safely perform tasks for the culture, isolation, identification and use of micro-organisms. In particular the assessor should look to see that the candidate:

does not contaminate him/herself, other people, the work area, equipment or the samples or materials under test

does not contaminate media or reagents during manipulations involving transfer of cultures identifies artefact or image aberration attributable to misalignment or obstruction of light paths or condensers used in bright field, dark ground, phase and fluorescent microscopy, or with other steps in microscopic examinations

is consistently accurate in the identification of Gram reactions

is consistently accurate in the description of bacterial colony forms on common media used in bacteriological investigations

reports all incidents or accidents

disinfects any spillage and safely disposes of all contaminated materials

decontaminates the work area upon completion of work.
Specific industry

Additional aspects of competency apply for each industry sector below.

Biomedical and environmental services

In tissue culture settings, maintain the proper growth or storage conditions for the preservation of pure cell culture lines

In biotechnology settings, maintain the proper containment and preservation of genetically altered cell lines.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

relevant microbiological terminology, including, where relevant that of bacteriology, parasitology, virology, mycology

use of protective clothing and biological safety cabinets

disinfection and sterilisation as applied to practical aspects of microbiology

microbial diversity

micro-organisms of importance in medicine, in production of foods and other manufactured goods, in assessment of the natural environment

cell biology and chemistry related to laboratory phenomena such as growth and isolation of organisms for identification

microbial genetics

rationale for sample dilution when preparing materials for enumerating organisms and other pure culture work (eg, Most Probable Number (MPN) technique)

need for accurate identification of sample source (eg, body, specimen, process line, field location, etc).

Specific industry

Additional knowledge requirements apply for each industry sector below.

Biomedical and environmental services

aspects of normal and abnormal anatomy, physiology, biochemistry and immunology as these pertain to the microbiological investigation of health and disease of animals and plants; or aspects of ecology and other biological disciplines as these pertain to the microbiological investigation of the natural environment

interactions of micro-organisms with hosts; issues of pathogenicity

anti-microbial agents and antibiotic susceptibility/sensitivity testing.
Food and beverage processing industries

aspects of food, pharmaceutical and other relevant processing as these relate to the involvement of micro-organisms in the production process and the microbiological monitoring of the production process.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML QUAL 401 A – Apply quality system and continuous improvement processes.

This unit of competency should be assessed after:
PML TEST 305 A – Perform aseptic techniques
PML TEST 301 A – Perform biological laboratory procedures
PML OHS 300 A – Work safely in accordance with defined policies and practices.

Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:

integrated assessment with a case study focus such as the isolation and identification of bacterial species in a specimen containing two or more species, by relating sample, cultural, morphological and biochemical data, and such from other relevant tests and procedures
oral and/or written questions associated with laboratory determinations and record keeping
feedback from peers and supervisors to confirm that workplace procedures are consistently followed and those results meet workplace requirements.

Resources may include:

workplace documents
workplace procedures
relevant equipment, samples and reagents.

Under duty of care requirements, off job training providers will only use samples and organisms of a risk category compatible with their laboratory as defined in AS 2243.3.
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Biomedical and environmental services**

A patient’s urine sample and request form have been brought to the laboratory for urgent testing. After preparation of the work area, the technical officer examines a coverslipped preparation of the sample and notes the presence of pus cells and non-motile rod organisms. In a Gram stain he confirms the presence of pus cells and Gram negative bacilli. He inoculates a MacConkey’s and a blood agar plate for growth and isolation of bacteria.

After consultation with the supervisor he is asked to set up a direct culture for antibiotic sensitivity testing. The supervisor informs the clinician of the initial findings. The next morning the technical officer assists the supervisor to read the plates. The predominance of lactose fermenting organisms is noted. The supervisor asks the technical officer to set up a biochemical panel to assist in identifying the organism. The supervisor confirms the technical officer’s reading of the direct sensitivities plate. Later in the day the team is able to confirm that the patient’s urine is infected with Escherichia coli and that the organism is sensitive to a number of antibiotics, including a sulphonamide and a cephalosporin.

**Food and beverage processing industries**

A swollen can of tuna was received at the company laboratory for microbiological investigation. The technical officer recorded the details supplied with the can and prepared for the investigation. A range of media including cooked meat media and nutrient broth were prepared and aseptic can opening equipment was sterilised. After the can was opened in the biohazard cabinet, the state of the contents was recorded, pH checked and Gram stains prepared and examined. The media was inoculated with the food samples and incubated at a range of temperatures under aerobic and anaerobic conditions. The can was then emptied for double seam tear down to determine the cause of the spoilage. The next day the technical officer examined the media and broth cultures. From all the data collected the technical officer and supervisor were able to determine that pre-processing spoilage had occurred, probably due to excessive delays in the process prior to can sterilisation. The results were reported to production personnel so that they could follow up the circumstances relating to the delays, and ensure that the standard operating procedure had been followed and sufficient product rejected.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
<th>Communicating ideas &amp; information</th>
<th>Collecting, analysing &amp; organising information</th>
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</table>
Unit Title:
Perform haematological tests

Unit descriptor

This unit of competency describes the ability to determine levels, function, activity and interactions of cellular and plasma components of blood, using tests and procedures identified with the discipline of laboratory haematology. This unit of competency does not cover the laboratory aspects of transfusion science; these are covered in the unit, PML TEST 509 A – Perform immunohaematological tests. While this unit focuses on the laboratory investigation of human physiology and pathology, it reasonably describes aspects of work performed in veterinary settings.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1 Process samples and associated request details</td>
<td>1.1 Sort specimens according to tests requested, urgent status and volume</td>
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<tr>
<td></td>
<td>1.2 Return samples and request forms that do not comply with requirements to their source with reasons for non-acceptance</td>
</tr>
<tr>
<td></td>
<td>1.3 Log acceptable samples and request forms, applying required document tracking mechanisms</td>
</tr>
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<td></td>
<td>1.4 Process samples as required by requested tests</td>
</tr>
<tr>
<td></td>
<td>1.5 Store samples and sample components appropriately until ready for testing</td>
</tr>
<tr>
<td>2 Perform tests</td>
<td>2.1 Select authorised tests that are indicated for the requested investigations</td>
</tr>
<tr>
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<td>2.2 Conduct individual tests according to documented methodologies, applying required quality control procedures</td>
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<td>2.3 Record all results, noting any phenomena that may be relevant to the interpretation of results</td>
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<td>2.4 Seek advice of section head or other responsible colleague when result interpretation is outside parameters of authorised approval</td>
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<td>2.5 Store unused sample or sample components, for possible future reference, under conditions suitable to maintain viability</td>
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<tr>
<td></td>
<td>Maintain a safe environment</td>
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<tr>
<td>4</td>
<td>Maintain laboratory records</td>
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**RANGE OF VARIABLES**

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

The unit of competency assumes that technical personnel would perform tests and procedures under close supervision. The results of their work would also normally be integrated, interpreted and reported on by supervising scientists and medical pathologists. Because technical personnel may work alone in some circumstances, the unit describes attributes that need to be addressed in the education and training of technical personnel. In such circumstances the worker's scope of permitted work and interpretation would be defined by relevant workplace operating procedures and protocols.

It is understood that the management of any laboratory would establish for itself, in terms of its own responsibility and purposes, the ability of any worker to work in a haematology laboratory, regardless of the education and training record or presumed ability of any worker.

It is expected that all work would conform to statutory and enterprise occupational health and safety codes of practice.
In the laboratory the worker and supervisor would generally have access to the following:

- workplace procedures, standard operating procedures (SOPs) and operating manuals
- test procedures (validated and authorised)
- sampling procedures (labelling, preparation, storage, transport and disposal)
- safety requirements for equipment, materials or products
- cleaning, hygiene and personal hygiene requirements
- quality system and continued improvement processes
- incident and accident/injury reports
- schematics, work flows, laboratory layouts
- instructions to comply with new legislation, standards, guidelines and codes
- stock records and inventory
- training program contents
- waste minimisation and disposal.

This unit of competency includes the use of items of equipment and systems such as:

- blood mixers
- reference material for automated and manual quality control and quality assurance systems
- instruments for the semi-automated or automated electronic counting and partial characterisation of blood cells, the measurement of haemoglobin and the computation of red cell indices
- staining machines
- safe working cabinets
- centrifuges, waterbaths, incubators
- volumetric glassware and measuring devices
- cell counting chambers
- microscopes for bright field and phase contrast examinations
- spectrometers
- coagulometers
- counters for single or multiple cell types
- computer information systems, databases, record and filing systems
- general laboratory glassware and equipment identified with a serology laboratory.

This unit of competency may include communication with:

- supervisors and managers (laboratory, quality and customer service)
- other laboratory or clinical personnel
- patients and clients
- personnel of accreditation agencies (eg, NATA).

**Updating information**

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Competency must be demonstrated in the ability to perform manual and automated haematological tests and procedures. Tests should focus on the:

- counting and measurement of cells
- derivation of cell data that can assist in classification of cell populations
- staining and morphological identification and classification of cells
- determination of the amount and function of blood components such as haemoglobin and other substances quantified by spectrophotometry
- measurement of clinically useful phenomena such as erythrocyte sedimentation
- assessment of haemostasis, coagulation, fibrinolysis and thrombosis
- detection of markers of immune response (where appropriate)
- amplification and detection of gene products (where appropriate).

Competency also includes contribution to the general maintenance of equipment and processes to ensure ongoing compliance with enterprise and laboratory accreditation.

In particular, the assessor should look to see that the candidate:

- recognises problems in systems and documentation
- uses enterprise information system efficiently
- critically analyses information in enterprise documents
- prepares documentation that is accurate, easily understood by the intended audience and in accordance with requirements
- manages tasks and organises work to ensure the timely completion of tasks
- uses samples, reagents and materials economically and disposes of wastes safely
- uses equipment safely
- maintains equipment, recording and reporting malfunctions appropriately.
Essential Knowledge

Competency includes the ability to apply and explain workplace procedures relating to:

the necessity for a patient or client focus when performing laboratory procedures and tests, including issues of confidentiality and security of clinical and laboratory information and data

the relationships that exists between the sample and the test result, including:

- sample collection
- the preservation and timely testing of samples
- sample storage requirements and issues of artefact
- sub-sampling routines including the nature of unstable particulate suspensions
- validated tests
- quality control
- quality assurance

the use and maintenance of laboratory equipment and resources that contribute to accurate, precise, timely and economical generation of data for use by clinicians

accurate use of terms applied to:

- relevant underpinning aspects of normal and abnormal anatomy, physiology, genetics, biochemistry and immunology
- the investigation of blood cell disorders, including: anaemia, leucocytoses and leucocytopaenias, leukaemia and thrombocytopenia
- heritable and acquired coagulopathies and therapeutic drug related alterations in haemostatic and coagulation mechanisms
- haematological responses to infection, immunisation and malignancy.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:

PML DATA 500 A – Analyse data and report results
PML QUAL 401 A – Apply quality system and continuous improvement processes.

This unit of competency should be assessed after:

PML OHS 300 A – Work safely in accordance with defined policies and procedures
PML TEST 301 A – Perform biological laboratory procedures.

Individual enterprises may choose to add other relevant prerequisites.
Assessment methods and resources

The following assessment methods are suggested:

- integrated assessment by use of case studies to demonstrate performance of the range of tests and procedures implied in the critical aspects of competency and essential knowledge sections of this standard. Suitable case studies could involve:
  - performance of the routine full blood count, including the examination of the stained blood film
  - a coagulation screen, including tests to measure anti-vitamin K and anti-heparin therapeutic agents, and the counting of platelets
  - studies that can assist in identifying relationships between quantitative data from blood counts and morphological findings from stained blood films

oral and/or written tests and paper problems associated with test methods and laboratory processes such as equipment calibration and maintenance

feedback from peers and supervisors that workplace procedures were followed and that work is consistently performed in line with workplace requirements.

Resources may include:

workplace documents
workplace procedures
relevant equipment, samples and reagents, etc.

Under duty of care requirements, off job training providers should ensure that blood samples are known to be antibody free for hepatitis B and C, syphilis and human immunodeficiency viruses.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

Biomedical and environmental services

A patient’s blood sample and request form have been brought to the laboratory. The patient has complained of rectal bleeding for some months. The technical officer has been asked by the supervisor to perform a full blood count on the analyser, to set up an erythrocyte sedimentation rate, and to prepare, stain and examine a film of the patient’s blood. The technical officer checks the records for information on the patient. Finding none, the technical officer records the required data in the laboratory computer and then performs the required tests. Satisfied that the results of the standards are within range, the technical officer prints an interim report for the supervisor. The report incorporates the results of the differential white cell count, calculations of the leucocyte numbers and comments on the morphology of the blood cells. The report and film is taken to the pathologist for supplementary comments, verification and signature. Following these checks, the technical officer telephones the ward to advise that the patient’s results can be retrieved from the ward’s computer terminal.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</tbody>
</table>
Perform haematological tests
**Unit Title:**

**Perform histological tests**

**Unit descriptor**

This unit of competency covers the ability to perform tests and procedures associated with processing and staining tissues for examination by pathologists and scientists for the detection of the presence of tissue abnormalities that can assist in disease diagnosis. The unit covers tests and procedures that are associated with anatomical pathology, and may involve the use of automated processors and staining machines. The unit principally refers to techniques performed on human tissues, but many aspects may be relevant to animal and plant tissues. Attainment of this competency will contribute to the preparation of a technical officer for work in an electron microscopy facility.

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<tr>
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<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1 Check and match specimens and request forms before they are accepted</td>
</tr>
<tr>
<td></td>
<td>1.2 Return specimens and request forms that do not comply with requirements to their source with reasons for non-acceptance</td>
</tr>
<tr>
<td></td>
<td>1.3 Process routine and non-routine specimens according to enterprise protocols</td>
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<td>1.4 Log acceptable specimens, applying required document tracking mechanisms</td>
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<td></td>
<td>1.5 Dispatch specimens to referral laboratories as required</td>
</tr>
<tr>
<td></td>
<td>1.6 Store specimens appropriately until required for testing</td>
</tr>
<tr>
<td>2</td>
<td>2.1 Arrange tissues and request forms in cut-up area</td>
</tr>
<tr>
<td></td>
<td>2.2 Label tissue cassettes as required to maintain identity during subsequent procedures</td>
</tr>
<tr>
<td></td>
<td>2.3 Prepare containers for transport of tissues to processor</td>
</tr>
<tr>
<td></td>
<td>2.4 Select tissue fixative to prepare tissue for subsequent procedures</td>
</tr>
<tr>
<td></td>
<td>2.5 Weigh organs and count tissue chips and shavings</td>
</tr>
<tr>
<td></td>
<td>2.6 Take notes of gross features of specimens during cut-up if required</td>
</tr>
</tbody>
</table>
### Process tissue

<table>
<thead>
<tr>
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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Select program and reagents for processing</td>
</tr>
<tr>
<td>3.2</td>
<td>Inspect processor reagents for deterioration and adequate volume</td>
</tr>
<tr>
<td>3.3</td>
<td>Follow processing requirements for non-routine techniques including histochemistry</td>
</tr>
<tr>
<td>3.4</td>
<td>Monitor processor regularly during processing sequence where appropriate</td>
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</table>

### Embed tissue

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<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>4.1</td>
<td>Select embedding medium that is compatible with infiltrating agent</td>
</tr>
<tr>
<td>4.2</td>
<td>Check that temperature of embedding medium is suitable for embedding process</td>
</tr>
<tr>
<td>4.3</td>
<td>Check that volume of embedding medium is sufficient for uninterrupted embedding of processor load</td>
</tr>
<tr>
<td>4.4</td>
<td>Embed tissue in correct orientation</td>
</tr>
<tr>
<td>4.5</td>
<td>Apply procedures to prevent cross contamination between patient tissues</td>
</tr>
<tr>
<td>4.6</td>
<td>Allow block to solidify according to requirements of embedding medium</td>
</tr>
</tbody>
</table>

### Cut tissue sections

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>5.1</td>
<td>Check that flotation bath is ready and satisfactory for use</td>
</tr>
<tr>
<td>5.2</td>
<td>Prepare microtome and associated equipment to accommodate requirements of tissue batch</td>
</tr>
<tr>
<td>5.3</td>
<td>Secure block in microtome following specified safety procedures</td>
</tr>
<tr>
<td>5.4</td>
<td>Label required number of microscope slides with patient identification as prescribed by enterprise</td>
</tr>
<tr>
<td>5.5</td>
<td>Cut tissue sections according to needs of subsequent procedures</td>
</tr>
<tr>
<td>5.6</td>
<td>Float sections onto water bath to flatten tissues</td>
</tr>
<tr>
<td>5.7</td>
<td>Pick up sections onto microscope slides ensuring patient identification on slides matches that on block</td>
</tr>
<tr>
<td>5.8</td>
<td>Apply procedures to prevent cross contamination between patient tissues</td>
</tr>
<tr>
<td>5.9</td>
<td>Maintain tissue sections in conditions compatible with intended subsequent procedures</td>
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</tbody>
</table>
| 6 | Stain tissue sections | 6.1 Apply staining procedures to demonstrate required morphological features  
6.2 Prepare labile reagents for immediate use  
6.3 Select reagents for specified technique, ensuring reagent sequence matches standard procedure  
6.4 Stain sections according to method accommodating any authorised variations and applying required quality control  
6.5 Examine sections microscopically to ensure expected staining outcomes are achieved and procedural artefacts are detected  
6.6 Mount slides using medium compatible with staining technique  
6.7 Confirm macroscopically or microscopically that tissue type conforms with labelling and pathologist specifications  
6.8 Participate in final check to establish that the number of slides tallies with the worksheet  
6.9 Attach permanent label giving specimen details as required by enterprise |
| 7 | Contribute to efficient provision of histological services | 7.1 Monitor and maintain resources for pathologists in cut-up area  
7.2 Liaise with clinical and nursing staff if required by enterprise regarding tissue fixative requirements in areas such as wards, theatres, mortuary  
7.3 Monitor and maintain volumes of fixatives in areas such as wards, theatres, mortuary  
7.4 Store slides and blocks according to legal and enterprise requirements under conditions that prevent degeneration |
Maintain a safe environment

8.1 Apply practices to ensure occupational health and safety of self and other laboratory workers

8.2 Handle non-fixed tissues safely to minimise cross infection and contamination of personnel and environment

8.3 Store fixed tissues as specified to minimise exposure of personnel to dangerous fumes and vapours

8.4 Clean up spills using appropriate techniques to protect personnel, work area and environment from contamination

8.5 Minimise the generation of wastes

8.6 Ensure the safe disposal of biohazardous materials and other laboratory wastes in accordance with enterprise procedures

Maintain laboratory records

9.1 Make entries on report forms or into computer systems, accurately recording or transcribing data as required

9.2 File and store tissue sections to facilitate efficient retrieval as required

9.3 Maintain instrument logs as required by accreditation checks

9.4 Ensure confidentiality and security of all clinical information and laboratory data and records.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competency assumes that the technical officer would perform tests and procedures under the close supervision of scientific and/or medical staff. Because technical personnel may work alone in some circumstances, the unit describes attributes that need to be addressed in the education and training of technical personnel. In such circumstances, the worker’s scope of permitted work and interpretation would be defined by relevant workplace operating procedures and protocols.

The involvement of the technical officer in mortuary work will be determined by the enterprise. Work of this nature will always be closely supervised by scientific/medical staff.
Technical workers may need to interrupt their routine work in order to assist with or perform frozen sections or special staining procedures to facilitate rapid diagnosis of specimens from patients in the operating theatre.

It is expected that all work would conform to statutory and enterprise occupational health and safety codes of practice.

In the laboratory, the worker and supervisor would generally have access to the following:
workplace procedures, standard operating procedures (SOPs) and operating manuals
test procedures (validated and authorised)
medico-legal and laboratory accreditation requirements for traceability of specimens and records
sampling procedures (labelling, preparation, storage, transport and disposal)
safety requirements for equipment, materials or products
quality system and continued improvement processes
incident and accident/injury reports
schematics, work flows and laboratory layouts
instructions to comply with new legislation, standards, guidelines and codes
stock records and inventory
training program contents
waste minimisation and disposal protocols.

This unit of competency includes the use of items of equipment, reagents, specimens and systems such as:

microtomes and microtome knives (non-disposable or disposable)
cryostats
microtome knife sharpeners
embedding centres
flotation baths, drying ovens, microwave ovens
tissue processors
staining and cover slipping machines
microscopes for bright field, phase contrast and fluorescence examinations
volumetric glassware and measuring devices
general laboratory glassware and equipment identified with an anatomical pathology laboratory
reagents such as formaldehyde, ethanol, xylene, paraffin, picric acid, mercuric chloride
reference material for automated and manual quality control and quality assurance systems
fresh and fixed specimens
computer information systems, databases, record and filing systems including specimen accessioning.
This unit of competency may include communication with:

supervisors and managers (laboratory, quality and customer service)
other laboratory or clinical personnel (pathologists, nursing staff, pathology registrars, other medical staff and clerical staff)
clients
external auditors and accreditation agencies (eg, NATA).

Updating information

Changes in codes of practice and applicable standards should be noted.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Competency must be demonstrated in the ability to perform manual and automated histological tests and procedures for the:

cutting of sections, free of wrinkles, scores and folds, at the specified thickness to demonstrate tissue and cellular structures, granules, inclusions and organelles if required
cutting of frozen sections at the specified thickness to demonstrate tissue and cellular structures and inclusions as required
staining of sections to achieve optimum differentiation of nuclear and cytoplasmic detail and differentiation between tissue components
cover slipping of slides, ensuring that no air bubbles are formed and material is preserved for the life of the slide
clear labelling of slides with case, specimen and stain details.

In particular, the assessor should look to see that the candidate:

recognises problems in systems and documentation, and troubleshoots under direction and/or where appropriate
uses enterprise information system efficiently
critically analyses information in enterprise documents
prepares documentation accurately, concisely and in accordance with requirements
prepares documentation that is easily understood by the intended audience
manages tasks and organises work to ensure the timely completion of tasks
uses samples, reagents and materials economically and disposes of wastes safely
uses equipment safely
maintains equipment, recording and reporting malfunctions appropriately.

**Essential knowledge**

Competency includes the ability to apply and explain the:

- relationship of the anatomy and morphology of tissue types and the macroscopic and microscopic appearance of stained sections
- terminology used to communicate issues that relate to underpinning normal and abnormal anatomy, physiology, biochemistry and immunology
- effects of the presence of artefacts in sections on microscopic examination of tissues
- relationship between the tissue components to be demonstrated and the choice of fixatives and fixation procedures such as microwave fixation, processing and staining techniques
- chemistry of fixatives and their role in retaining size and spatial relationships in tissues and in preventing autolysis and putrefaction
- theory of staining procedures including immunohistochemistry
- labile nature and chemistry of stains and the importance of correct preparation and storage to ensure required staining outcome
- correlation between poorly maintained processing reagents and resultant tissue blocks being difficult to cut or unsuitable for cutting
- chemistry of dehydration and rehydration of tissues during processing and staining
- relationship between correct orientation of the tissue during embedding and ability to cut sections from surface required for subsequent microscopic examination
- properties of the embedding medium and the choice of mountant
- importance of recognising the uniqueness of patient histological tissues (a non-renewable resource)
- relationship between strict adherence to enterprise procedures during each step and the maintenance of specimen integrity
- occupational health and safety procedures related to handling irritating, volatile, flammable and potentially carcinogenic substances such as formaldehyde, xylene, histoclear, ethanol and chloroform.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated workplace environment.
Interdependent assessment of unit

This unit of competency may be assessed with:

PML QUAL 401 A – Apply quality systems and continuous improvement processes.

This unit of competency should be assessed after:

PML TEST 301 A – Perform biological laboratory procedures
PML OHS 300 A – Work safely in accordance with defined policies and procedures.

Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:

observation of candidate performing tests and procedures such as:
- preparation of microtome for cutting, cutting blemish free sections, successful flotation and pickup of section
- staining tissues to demonstrate tissue structures and cell components as required
- morphological identification of tissues such as epithelial, muscle, central nervous and glandular.

oral and/or written tests and paper problems associated with test methods and laboratory processes such as equipment calibration and maintenance

feedback from peers and supervisors.

Resources may include:

workplace documents
workplace procedures
relevant equipment, samples and reagents, etc.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

Biomedical and environmental services

In preparation for cutting some sections, a technical officer followed standard procedures. This involved checking the flotation bath temperature, checking the surface of the bath for cleanliness, inserting the microtome knife and checking the angle of the knife. (S)he referred to the work sheet to confirm the number of slides required per patient and then labelled slides accordingly. (S)he then proceeded with section cutting, carefully observing the safety protocols. (S)he ensured that as the sections were picked up from the flotation bath, the patient identification on the slides and the block matched. (S)he then cleaned the surface of the bath to prevent cross contamination of samples between patients. The technical officer’s care and diligence in performing these procedures ensured that specimen integrity was
maintained.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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<tr>
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</tbody>
</table>
Perform histological tests
Unit Title:
Perform chemical pathology tests

Unit descriptor

This unit of competency covers the ability to perform tests and procedures associated with the detection and monitoring of tissue and bodily fluid responses to normal physiological processes and to disease. The unit covers tests and procedures that are usually associated with the laboratory discipline of clinical biochemistry, and are performed in a full or partial computerised and automated environment. The unit principally refers to human pathology but many aspects are relevant to veterinary pathology.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1 Ensure sample labels and request forms are correctly completed in accordance with enterprise requirements</td>
</tr>
<tr>
<td></td>
<td>1.2 Return samples and request forms that do not comply with requirements to their source with reasons for non-acceptance</td>
</tr>
<tr>
<td></td>
<td>1.3 Log acceptable samples, applying required document tracking mechanisms</td>
</tr>
<tr>
<td></td>
<td>1.4 Process samples as required by test procedure and request status</td>
</tr>
<tr>
<td></td>
<td>1.5 Store sample components under optimal conditions until required for testing</td>
</tr>
<tr>
<td></td>
<td>Perform tests</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Maintain a safe work area and environment</th>
<th>3.1</th>
<th>Apply practices to ensure occupational health and safety of self and other laboratory workers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3.2</td>
<td>Clean up spills using appropriate techniques to protect personnel, work area and environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3</td>
<td>Identify instrument malfunction that may impact on safe operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4</td>
<td>Ensure the safe disposal of biohazardous materials and other laboratory wastes in accordance with enterprise procedures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Maintain laboratory records</th>
<th>4.1</th>
<th>Make entries on report forms or into computer systems, accurately recording or transcribing required data as required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4.2</td>
<td>Maintain instrument logs as required by accreditation checklists</td>
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<tr>
<td></td>
<td></td>
<td>4.3</td>
<td>Keep confidential all clinical information and laboratory data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.4</td>
<td>Ensure security of all clinical information and laboratory data and records.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competency describes the testing of tissues, blood, bodily fluids (cerebrospinal fluid, peritoneal and wound aspirates, sweat, sputum), calculi, and excreta (urine and faeces) in laboratories. Tests examine and measure compounds that can give information about alterations in individual physiology and pathology, or compounds such as therapeutic drugs or drugs of abuse that will alter normal physiology.

The unit of competency describes aspects of work conducted by supervised technical staff. Although a supervisor may not always be present, the technical worker will follow standard operating procedures (SOPs) that clearly describe his or her scope of permitted practice in modifying testing procedures and for communicating test results to people outside the laboratory.

Information sources could include:

- workplace procedures, SOPs and operating manuals
- test procedures (validated and authorised)
- sampling procedures (eg, labelling, preparation, storage, transport and disposal)
- safety requirements for equipment, materials or products
- cleaning, hygiene, personal hygiene requirements
- quality system and continued improvement processes
- incident and accident/injury reports
- schematics, work flows and laboratory layouts
- instructions to comply with new legislation, standards, guidelines and codes
- training program contents
- waste minimisation and disposal procedures.

Equipment, materials and systems could include:

- centrifuges, waterbaths and incubators
- manual and automated spectrometers and other related measurement devices
- various discrete and multi-channel analysers for chemical analytes
- computer information systems, databases, record and filing systems
- chemicals, reagents and biological materials including immunological reagents and DNA probes necessary for laboratory testing
- laboratory glassware and measuring equipment
- materials suitable for the safe collection and disposal of biological and non-biological wastes.
This unit of competency may include communication with:
supervisors and managers (laboratory, quality and customer service)
other laboratory or clinical personnel
patients and clients
external auditors and accreditation agencies (eg, NATA).

**Updating information**

Changes in codes of practice and applicable standards should be noted.

**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

Competency must be demonstrated in the ability to test blood and body fluids, including excreta. Tests should focus on:

- the amount of chemical substances that are associated with organ dysfunction or indications of success or failure of treatment
- biological activity (eg, assessment of enzyme activity indicative or organ/tissue damage)
- monitoring humoral immune system components
- the application of DNA techniques
- evidence of prior exposure to infective agents, as in the case of identifying plasma changes that are consequent to or associated with immune responses.

In particular, the assessor should look to see that the candidate can:

- recognise problems in systems and documentation
- discriminate between significant data and artefact
- use enterprise information system efficiently (eg, networks or ordering for consumable materials)
- critically analyse information or documents and respond appropriately to an abnormal result
- prepare work list documentation accurately and in accordance with requirements
- prepare documentation that is easily understood by the intended audience
- use samples, reagents and materials correctly and economically
- dispose of wastes safely
- report equipment malfunction or liaise with contracted service technician to ensure equipment downtime is minimised.
Essential knowledge

Competency includes the ability to apply and explain workplace procedures relating to the:
- selection and use of testing procedures, in terms of the supposed or defined clinical problem.
- Sufficient knowledge of the relevant terminology and normal and abnormal anatomy, physiology, biochemistry and immunology is required to enable efficient communication with laboratory and clinical staff.
- range of tests results that have meaningful clinical significance
- selection and use of quality control and quality assurance processes, as they pertain to the issuance of meaningful results
- ability to identify, and if necessary correct, sources of error in pre- and post-analyses of samples
- need for confidentiality of work results
- protection of worker health and safety and the protection of the environment
- management of work flow for effective and efficient use of resources
- central place the patient, client or customer occupies in the business of the enterprise
- application of enterprise occupational health and safety and environmental policies.

Competency includes the ability to use scientific, medical, clinical, technical and workplace terminology accurately.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
- PML QUAL 401 A – Apply quality system and continuous improvement processes
- PML TEST 500 A – Calibrate and maintain instruments
- PML TEST 400 A – Perform instrumental tests/procedures.

This unit of competency should be assessed after:
- PML OHS 300 A – Work safely in accordance with defined policies and procedures
- PML TEST 301 A – Perform biological laboratory procedures.
Assessment methods and resources

The following assessment methods are suggested:

integrated assessment with a case focus such as the measurement of single or multiple chemical substances and metabolites in serum
oral and/or written questions associated with laboratory determinations and record keeping feedback from peers and supervisors to confirm that workplace procedures are consistently followed and that results meet workplace requirements.

Resources may include:

workplace documents
workplace procedures
relevant equipment, samples and reagents.

Under duty of care requirements, off job training providers should ensure that blood samples are known to be antibody free for hepatitis B and C, syphilis and human immunodeficiency viruses.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

Biomedical and environmental services

A patient’s blood sample and request form have been brought to the laboratory. The sample has been recorded in the laboratory’s log as “urgent cardiac enzymes”. The specimen has been processed ahead of the other routine samples. The technical officer selects the panel of tests in the cluster designated cardiac enzymes on the automated analyser. The technical officer also ensures that the instrument has adequate reagents, quality control sera and reference sera loaded before placing the sample for analysis. At the end of the analysis cycle, the quality control is validated and the result report generated. An elevated creatine phosphokinase is noted. The technical officer alerts the supervisor and confirms that this result can be phoned through to the requesting physician. The rest of the sample is refrigerated awaiting immediate follow up tests. Within 24 hours, it will be frozen for a week in case more tests are requested. At the end of the day, the technical officer sets the analyser on standby, stows sensitive reagents in the refrigerator, cleans his/her work area, and safely disposes of biological and non-biological wastes.
Key competencies

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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</tbody>
</table>
Perform chemical pathology tests
### Unit Title:

**Conduct sensory analysis**

### Unit descriptor

This unit of competency covers the ability to set up and co-ordinate test panels and assess the results obtained from a sensory analysis.

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<th>ELEMENT OF COMPETENCY</th>
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</thead>
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<tr>
<td>1</td>
<td>Select panellists for sensory analysis</td>
</tr>
<tr>
<td>1.1</td>
<td>Develop and use a questionnaire for initial screening of potential panellists based on testing brief</td>
</tr>
<tr>
<td>1.2</td>
<td>Determine the ability of panellists to distinguish the desired sensory characteristics</td>
</tr>
<tr>
<td>1.3</td>
<td>Analyse and report results used to establish panel</td>
</tr>
<tr>
<td>2</td>
<td>Prepare panellists for sensory analysis</td>
</tr>
<tr>
<td>2.1</td>
<td>Explain procedures of test to panellists</td>
</tr>
<tr>
<td>2.2</td>
<td>Conduct any training required to detect test characteristics</td>
</tr>
<tr>
<td>2.3</td>
<td>Instruct panellists on recording and reporting requirements of test data</td>
</tr>
<tr>
<td>3</td>
<td>Prepare samples for sensory analysis</td>
</tr>
<tr>
<td>3.1</td>
<td>Prepare reference samples to be used for the sensory analysis specification</td>
</tr>
<tr>
<td>3.2</td>
<td>Prepare evaluation samples to sensory analysis specification</td>
</tr>
<tr>
<td>3.3</td>
<td>Apply food safety procedures in the preparation and presentation of samples</td>
</tr>
<tr>
<td>4</td>
<td>Conduct routine sensory analysis</td>
</tr>
<tr>
<td>4.1</td>
<td>Select appropriate test materials for the information required</td>
</tr>
<tr>
<td>4.2</td>
<td>Ensure tests are conducted according to enterprise procedures</td>
</tr>
<tr>
<td>4.3</td>
<td>Analyse data to obtain statistically reliable results</td>
</tr>
<tr>
<td>4.4</td>
<td>Report on process and results in accordance with enterprise procedures</td>
</tr>
</tbody>
</table>
5 Evaluate and report findings

5.1 Assess the possible effects of group attributes
5.2 Review reliability of results for group bias
5.3 Complete all relevant documentation and present findings.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Tests may be performed to determine the following aspects of a sample:
- flavour
- aroma
- appearance
- texture.

Testing methods may include:
- triangular test
- duo-trio test
- ranking test
- paired comparison test
- blending test
- flavour profile
- threshold analysis
- discriminative testing
- descriptive testing
- affective testing.

Group attributes could relate to:
- age
- qualifications
- gender
- trained/untrained
- ethnicity
- random panel
- smoking
- cultural background, as related to food preferences/food styles.

The primary flavour characteristics include:
- sweet/sour
- bitter/salty
- umarmic.

The results obtained from the sensory analysis may be applied in the following fields:
- marketing studies
- purchasing requirements
- quality assurance
- quality control and troubleshooting
- research and development.
Updating information

Changes in codes of practice and applicable standards should be noted.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Competency must be demonstrated in the ability to screen panellists and prepare samples for sensory testing. Appropriate methods of sensory testing must be applied, along with a thorough analysis of data and completion of the necessary documentation.

In particular, the assessor should look to see that the candidate is able to:
- perform initial screening of panellists and determine their suitability
- select appropriate test procedures
- accurately prepare evaluation samples by dosing or processing
- communicate the significance of results, including the discussion of any errors and/or unexpected variation.

Essential knowledge

Competency includes the ability to apply and explain the:
- anatomy, physiology and functions of taste and smell
- interaction of sensory activity
- associated characteristics of mouth feel and appearance
- principles of effective control of the sensory testing environment
- principles of descriptive, discriminative and affective sensory analysis methods
- development and use of questionnaires
- use of consumer research methods
- features of sensory quality control.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.
Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 500 A – Analyse data and report results.

This unit of competency should be assessed after:
PML DATA 300 A – Process and record data
PML COM 300 A – Communicate with other people.

Assessment methods and resources

The following assessment methods are suggested:
observation of candidate conducting panel tests
written reports which include an analysis of findings from sensory tests conducted by the candidate
written/oral questions to assess underpinning knowledge
responses to market scenarios and/or case studies.

Resources may include:
statistical data sheets and charts
logbook
relevant ISO standards and AS standards
scientific calculator
sensory evaluation panel room
access to a range of chemicals
group of panellists.

This competency in practice

Food and beverage processing industries

The quality manager in a dairy food company has identified a product which does not meet enterprise standards. An alternative ingredient has been supplied and used. The sensory analyst has the task of determining whether consumers will be able to detect any differences in this quarantined product compared to the standard product. The sensory analyst chooses an appropriate difference test and considers a suitable panellist group from log book records. Samples of the relevant products are stored and prepared under standard test conditions. A full sensory panel is conducted with score sheets, coding, booth preparation and product presentation. After testing, the results are analysed and the test conditions are reviewed. The overall results are presented as a written report to management.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the
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Conduct sensory analysis
Unit Title:
Apply spectrometric techniques

Unit descriptor
This unit of competency covers the ability to apply spectrometric techniques to analysis of materials.

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<th>PERFORMANCE CRITERIA</th>
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<td>1 Prepare samples</td>
<td>1.1 Identify materials to be tested, appropriate standard method and safety requirements</td>
</tr>
<tr>
<td></td>
<td>1.2 Use personal protective equipment and safety procedures as specified for test method and materials to be tested</td>
</tr>
<tr>
<td></td>
<td>1.3 Record sample description, compare with specification and record and report discrepancies</td>
</tr>
<tr>
<td></td>
<td>1.4 Prepare sample in accordance with testing requirements</td>
</tr>
<tr>
<td>2 Perform analytical procedures</td>
<td>2.1 Weigh or measure sample and standards (if appropriate) to be tested</td>
</tr>
<tr>
<td></td>
<td>2.2 Check calibration status of equipment and calibrate if applicable</td>
</tr>
<tr>
<td></td>
<td>2.3 Set up and operate equipment/instrumentation as per test method requirements</td>
</tr>
<tr>
<td></td>
<td>2.4 Perform tests in accordance with enterprise procedures</td>
</tr>
<tr>
<td></td>
<td>2.5 Interpret data and/or calculate test results from data</td>
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<td>2.6 Identify and report “out of specification” or atypical results promptly to appropriate personnel</td>
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<td></td>
<td>2.7 Troubleshoot “out of specification” or atypical results and suggest probable causes</td>
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<td></td>
<td>2.8 Shut down equipment according to operating procedures</td>
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<tr>
<td></td>
<td>2.9 Clean, care for and store reagents and test equipment as required</td>
</tr>
</tbody>
</table>
3 Report and communicate test results

3.1 Enter approved results into laboratory reporting system

3.2 Maintain equipment logs as per enterprise procedures

3.3 Communicate results to appropriate personnel.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by laboratory technicians who apply spectrometric techniques to analyse materials, interpret data and/or calculate results.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

- Australian and international standards
- codes of practice (such as GLP and GMP)
- material safety data sheets (MSDSs)
- National Measurement Act
- standard operating procedures (SOPs)
- quality and equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include:

- sections of the occupational health and safety legislation
- enterprise safety rules and procedures
- relevant State and Federal legislation
- national standards or codes of practice.
Preparation of sample includes processes such as:
grinding, mulling, preparation of discs
ashing
dissolving, refluxing, extracting
filtration, evaporation, precipitation and centrifugation.

Quantitative/qualitative spectrometric methods may include:
ultraviolet visible, infrared including Fourier transform infrared and near infrared atomic
absorption, x-ray, nuclear magnetic resonance
fluorescence and flame emission
mass spectrometry.

Tests may include methods for:
control of starting materials, in-process materials and finished products
environmental monitoring
therapeutic drug analysis
diagnostic pathology tests
kinetic or rate determinations of enzyme activity
determination of chemical analytes, for example:
  - starch
  - glucose
  - DNA
  - therapeutic degradation products
troubleshooting enterprise processes.

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to apply spectrometric methods to analyse materials and interpret and use test data appropriately.

In particular, the assessor should look to see that the candidate can:
  - start up, set up and shut down equipment
  - check calibration status of equipment and calibrate if required
  - prepare and test samples using procedures appropriate to the nature of sample
  - optimise and use equipment and spectrometers to enterprise standards
  - choose appropriate wavelength maxima and test blanks for analysis
  - prepare calibration graphs and calculate results in appropriate units
  - apply theoretical knowledge to interpret data and draw relevant conclusions
  - record and communicate results as per enterprise procedures
  - maintain security, integrity, traceability and identity of samples, subsamples and documentation
  - follow OHS procedures and GLP.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
spectrometric principles and concepts related to instrumentation operation and testing
relationship of chemical structure to electromagnetic radiation absorption
function of key components of the equipment
effects on spectra of modifying instrumental variables
procedure for optimising equipment through changing operation parameters
sample preparation procedures
equipment and testing method troubleshooting procedures
use of spectroscopy for qualitative and quantitative analysis
preparation and use of calibration charts
calculation steps to give results in appropriate units
OHS procedures and GLP.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 500 A – Analyse data and report results
PML TEST 500 A – Calibrate and maintain instruments.

This unit of competency should be assessed after:
PML TEST 400 A – Perform instrumental tests/procedures
PML TEST 402 A – Prepare, standardise and use solutions.
Assessment methods and resources

The following assessment methods are suggested:
observation of the candidate conducting a range of spectrometric analyses
oral or written questioning
feedback from peers and supervisors
examples of testing records and workplace documentation completed by candidate
review of results obtained by candidate over a period of time to ensure accuracy, consistency
and that work can be completed within required timeline.

Resources may include:
standard laboratory equipped with appropriate spectrometers
laboratory reagents and equipment
standard operating procedures (SOPs) and testing methods.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of
each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

Ultraviolet spectroscopy is a sensitive technique for measuring polycyclic hydrocarbons. Because polycyclic hydrocarbons are considered carcinogenic, they are strictly regulated, and technicians making these measurements must follow procedures when handling samples. A technician conducting such an analysis noted variable results. After some discussion with the laboratory scientist, it was determined that the standard materials were light sensitive and were being degraded. The technician suggested that they change the light in the work space to yellow. When the lighting was changed, the standard remained stable and the measurements for polycyclic hydrocarbons were carried out successfully.

Biomedical and environmental services

DNA can be extracted from human blood for subsequent identification of inherited genetic disorders, paternity disputes or forensic investigations. It is not a difficult procedure and is performed by technical officers in diagnostic molecular biology laboratories and those working in university research laboratories.

In such a procedure, the DNA is separated from the haemoglobin and blood cells, the protein in the plasma and the fat by a series of enzymic digests and phenol/chloroform extractions. The last purification step involves precipitation by clod ethanol and dissolving the DNA in TRIS buffer. The yield from 10mL of human blood is about 12-20mg of DNA if all is well. The yield is determined by spectrometric absorption at 260 and 280nm. The two wavelengths are used to determine the DNA extract and the degree of protein contamination. The technical officer will carry out this step before proceeding. Too small a yield will make further testing impractical and PCR will need to be used to amplify the DNA in the sample.
Food and beverage processing industries

A technician was determining the amount (by mass) of β-carotene in imported tomato paste. The technician extracted a known mass of the paste into acidified ether, evaporated off the solvent, and measured the absorbance of the remaining material by spectrometry. After reference to the Australian Food Additive Guide, the technician was able to report the tomato paste met the requirements of the Australian standard.

Key competencies

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</table>
Unit Title:
Apply chromatographic and electrophoretic techniques

Unit descriptor
This unit of competency covers the ability to apply chromatographic and electrophoretic techniques to analyse and purify materials.

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<tr>
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<td>1.3 Record sample description, compare with specification and record and report discrepancies</td>
</tr>
<tr>
<td></td>
<td>1.4 Prepare sample in accordance with testing requirements</td>
</tr>
<tr>
<td>2 Perform analytical and/or preparative procedures</td>
<td>2.1 Weigh or measure sample and standards (if appropriate) to be tested</td>
</tr>
<tr>
<td></td>
<td>2.2 Set up equipment/instrumentation as per test method requirements</td>
</tr>
<tr>
<td></td>
<td>2.3 Run chromatograms of samples and standards (if applicable) in accordance with enterprise procedures</td>
</tr>
<tr>
<td></td>
<td>2.4 Interpret and/or calculate results where appropriate</td>
</tr>
<tr>
<td></td>
<td>2.5 Identify and report “out of specification” or atypical results promptly to appropriate personnel</td>
</tr>
<tr>
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<td>2.6 Troubleshoot “out of specification” or atypical results and suggest probable causes</td>
</tr>
<tr>
<td></td>
<td>2.7 Shutdown equipment according to operating procedures</td>
</tr>
<tr>
<td></td>
<td>2.8 Clean, care for and store reagents and equipment as required</td>
</tr>
</tbody>
</table>
3 Report and communicate results

3.1 Enter approved results into laboratory reporting system

3.2 Maintain equipment logs in accordance with enterprise procedures

3.3 Communicate results to appropriate personnel.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by laboratory technicians who apply chromatographic and electrophoretic techniques to analyse and purify materials.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. These procedures include or have been prepared from:

- Australian and international standards
- Codes of practice (such as GLP and GMP)
- Material safety data sheets (MSDSs)
- National Measurement Act
- Standard operating procedures (SOPs)
- Equipment manuals
- Equipment startup, operation and shutdown procedures
- Calibration and maintenance schedules
- Quality manuals
- Enterprise recording and reporting procedures
- Production and laboratory schedules
- Material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.
Chromatographic methods include both analytical and preparative procedures using:
- thin layer, paper
- gas liquid and gas solid chromatography
- high performance liquid chromatography (LLC, LSC, IC, SEC)
- electrophoretic techniques include agarose, polyacrylamide
denaturing electrophoresis (such as SDS-PAGE).

Preparation of sample includes processes such as grinding, dissolving, extraction and filtration.

Tests may include methods for:
- control of starting materials, in-process materials and finished products
- environmental monitoring
- troubleshooting enterprise processes.
- affinity chromatography and gel filtration chromatography for purification and preparation of high grade proteins
- blot transfer procedures in conjunction with electrophoresis (eg, Western and Southern Blot transfers, agarose and polyacrylamide DNA gels).

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to apply chromatographic and electrophoretic methods to analyse and purify materials. In particular the assessor should look to see that the candidate:

can start up, set up and shut down equipment
checks calibration status of equipment and calibrates if required
prepares standards and test samples using procedures appropriate to the nature of sample
optimises and uses equipment to enterprise standards
installs and maintains a variety of chromatographic columns
prepares calibration graphs and calculates results in appropriate units
applies theoretical knowledge to interpret data and makes relevant conclusions
troubleshoots analytical procedures and equipment problems
records and communicates results as per enterprise procedures
maintains security, integrity, traceability and identity of samples, subsamples and documentation
follows OHS procedures and GLP.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
chromatographic and electrophoretic principles and concepts related to instrumentation operation, material preparation and testing
handling of unstable chemicals and/or the fragile/labile nature of biological material
function of key components of the equipment
use of chromatographic methods for analysis and preparation
use of electrophoresis for analysis
effects on chromatogram of modifying instrumental variables
procedure for optimising separation through changing operation parameters
sample preparation procedures
equipment and testing method troubleshooting procedures
use of chromatographic methods for qualitative and quantitative analysis
use of calibration charts
calculation procedures to give results in appropriate units
basic equipment maintenance procedures
OHS procedures and GLP.

Specific industry

Additional knowledge requirements apply for each industry sector below.

Biomedical and environmental services

Techniques that capitalise on biological properties to assist in chromatographic separations.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.
Interdependent assessment of unit

This unit of competency may be assessed with:
PML DATA 500 A – Analyse data and report results
PML TEST 500 A – Calibrate and maintain instruments.

This unit of competency should be assessed after:
PML TEST 400 A – Perform instrumental tests/procedures
PML TEST 402 A – Prepare, standardise and use solutions.

Assessment methods and resources

The following assessment methods are suggested:
observation, together with oral or written questioning
feedback from peers and supervisors
eamples of records and workplace documentation completed by candidate
review of candidate’s results over time to ensure accuracy, consistency and that work can be completed within the required timeframe.

Resources may include:
standard laboratory equipped with appropriate chromatographic and electrophoresis equipment
laboratory reagents and equipment
standard operating procedures (SOPs) and testing methods.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

Technicians who conduct chemical synthesis use chromatographic methods such as thin-layer chromatography (TLC), gas chromatography (GC), high performance liquid chromatography (HPLC) and other instrumental techniques to check the identity and purity of the material they have produced.

For example, a technician reacted an amine with acetic anhydride to form the acylated amine to prepare a pilot batch of material for a new application. After completing the reaction, the technician collected the product in a Buchner funnel using vacuum assisted filtration, and used chromatographic techniques to purify the material. The product was then analysed by HPLC using a number of stationary phases and solvent systems. In each case, a reference standard was run. These tests confirmed the identity and purity of the material.
Biomedical and environmental services

Technicians in research facilities often prepare a protein by extracting it from tissue. This extraction process introduces impurities that must be removed before the purified protein is ready for use or the characterisation of its purity and molecular weight. Impurities such as salt, detergents and other proteins are sequentially removed by passing the protein extract through gel filtration columns of differing grades of chromatographic gel. For antibodies, the final column used is an affinity chromatography column. Demonstration of the purity of the protein is by the presence of one single band on an SDS-PAGE gel. The molecular weight of the protein can also be determined from the SDS gel.

Food and beverage processing industries

Technicians who work in the food and beverage processing industries regularly monitor the purity of food additives such as dyes and colouring agents. For example, technicians may sample a batch of soft drink by low temperature evaporation of a known percentage of the water and then subject the remains to chromatographic analysis. In this way, both the identification and concentration of a dye (or other additive) present in the soft drink can be determined.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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<td>Level 3</td>
</tr>
</tbody>
</table>
Apply chromatographic and electrophoretic techniques
Unit Title:
Perform ecological techniques

Unit descriptor
This unit of competency covers the ability to participate in laboratory investigations involving animals and plants. The animals or plants might be single specimens or be in culture or under propagation. The investigations might also be part of experimental models that examine interactions of animals and/or plants and environments. Investigations would generally relate to taxonomy, physiology and pathology, and would be oriented to scientific research, food production and manufacture, and to investigation of biological environments and ecosystems.

Field activities that may complement aspects of this competency are described in PML TEST 510 A – Perform fieldwork.

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<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1 Process specimens and documentation</td>
<td>1.1 Check specimens and request forms for labelling and documentation before acceptance</td>
</tr>
<tr>
<td></td>
<td>1.2 Log specimens, applying required document tracking mechanisms</td>
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<td></td>
<td>1.3 Dispatch specimens to referral laboratories as required</td>
</tr>
<tr>
<td></td>
<td>1.4 Store specimens appropriately until required for testing and preservation</td>
</tr>
<tr>
<td>2 Participate in the identification and classification of species</td>
<td>2.1 Record macroscopic and/or microscopic details of specimens to assist in their identification and classification</td>
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<td></td>
<td>2.2 Use taxonomic keys to assist in the identification and classification of species</td>
</tr>
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<td></td>
<td>2.3 Perform laboratory analyses that can assist in identification and classification of species</td>
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<td></td>
<td>2.4 Preserve specimens for future reference</td>
</tr>
<tr>
<td></td>
<td>2.5 Label preserved specimens for storage and reliable retrieval from collections</td>
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<tr>
<td></td>
<td>Maintain viability and integrity of specimens during experimentation</td>
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<tr>
<th></th>
<th>Integrate laboratory and field data</th>
<th>4.1</th>
<th>Locate field data relevant to the study or experiment</th>
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<td>4.2</td>
<td>Ensure that field and laboratory data codes are matched for tracking, reporting and chain of custody requirements</td>
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<td></td>
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<td>4.3</td>
<td>Log field and laboratory data into information systems</td>
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<td>4.4</td>
<td>Assist with writing reports of experiments and related field studies.</td>
</tr>
</tbody>
</table>

### RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competency assumes that the technical officer would perform tests and procedures under the close supervision of scientific staff. It is expected that all work would conform to statutory and enterprise occupational health and safety codes of practice.

The unit does not cover procedures related to the handling of vertebrates that are subject to national and State animal care and ethics regulations. The enterprise will need to equip its workers with relevant animal handling skills should such be required.

The unit does not cover field activities that may complement aspects of this competency. Fieldwork activities are described in *PML TEST 510 A - Perform fieldwork.*
In the laboratory, the worker and supervisor would generally have access to the following:
workplace procedures, standard operating procedures (SOPs) and operating manuals
test procedures (validated and authorised)
sampling procedures (labelling, preparation, storage, transport and disposal)
safety requirements to minimise contraction of zoonoses
safety requirements for equipment, materials or products
cleaning, hygiene, personal hygiene requirements
quality system and continued improvement processes
incident and accident/injury reports
schematics, work flows, laboratory layouts
instructions to comply with new legislation, standards, guidelines and codes
stock records and inventory
training program contents
waste minimisation and disposal protocols.

This unit of competency includes the use of items of equipment, reagents, specimens and systems for botanical and zoological techniques. Included would be:
dissecting, stereo and other microscopes, hand lenses
dissecting equipment
balances and scales
calipers, rules and measuring tapes
pH meters, dissolved oxygen probes and other potentiometric equipment
spectrometers
physiological monitors for temperature, respiration,
monitors for experimental variables such as temperature, humidity
microtomes and microtome knives (non-disposable or disposable)
tissue processors
incubators, water baths, controlled environment chambers
greenhouse
volumetric glassware and measuring devices
general laboratory glassware and equipment identified with an anatomical pathology laboratory
chemicals for preparation of nutrient and culture requirements
chemicals for tests of plant and animal physiology and pathology
reference material for quality control and quality assurance systems
computer or other classification keys
computer information systems, databases, record and filing systems including specimen accessioning.
This unit of competency may include communication with:

- supervisors, scientists
- field workers
- local government professionals or representatives of State authorities such as environmental protection agencies
- enterprise managers (laboratory, quality and customer service)
- clients.

**Updating information**

Changes in codes of practice and applicable standards should be noted.

**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

Competency must be demonstrated in the ability to contribute to the identification and classification of animals and plants for scientific and experimental purposes, and to participate in the monitoring of the physiology and interactions of plants and animals and their environments.

In particular, the assessor should look to see that the candidate:

- relates field and laboratory data for the generation of meaningful results
- takes representative samples for analysis
- works safely for the protection of him/herself and coworkers
- does not contaminate sterile environments or specimens when performing aseptic manipulations in microbiological procedures and tissue culture
- disposes of wastes carefully for the protection of those who may handle and process wastes, and to minimise contamination of the environment.
Essential knowledge

Competency includes the ability to apply and explain the:

growth requirements of organisms that are subjects of laboratory or greenhouse culture or propagation

general anatomy of plants and animals that is useful as classification data

processes that are essential for preservation of plant and animal material for use as reference material

relationships between field and laboratory data that are useful in giving commentary on the integrity or distress in biological environments

rationale for selection of techniques used to monitor the experimental environment and the effects of variables on organisms in the experimental environment

uses of environmental impact statements that incorporate the results of field and laboratory analyses.

Competency includes the ability to communicate relevant scientific and technical concepts and terminology accurately to supervisors, peers and clients.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML TEST 510 A – Perform fieldwork
PML DATA 500 A – Analyse data and report results.

This unit of competency should be assessed after:
PML OHS 300 A – Work safely in accordance with defined policies and procedures
PML TEST 301A – Perform biological procedures
PML TEST 305 A – Perform aseptic techniques
PML TEST 400 A – Perform instrumental test/procedures.

Individual enterprises may choose to add other relevant prerequisites.
Assessment methods and resources

The following assessment methods are suggested:

- case studies such as:
  - relating field and laboratory data in an environmental impact statement
  - preservation of plant species and placement in a herbarium
  - plant propagation in a variety of controlled environments
  - maintenance of cultures of protozoans or invertebrates

- supervisor reports that validate journals of work

- computer and literature research of data to support an experiment

- questioning about procedures that form part of experiments in progress.

Resources may include:

- equipment and resources for investigating the physiology of plants and animals in the laboratory

- scenarios for paper based assessments

- computers and programs for simulated experiments or data analysis.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

Biomedical and environmental services

A technical officer has been asked to preserve plant specimens and compile a report of classified species using material and data collected during a recent visit to a decommissioned open cut mine site and its adjacent areas. The supervising ecologist has been asked to advise the mine owner on replacement planting to restore the mine site in sympathy with its locality.

The technical officer records descriptions of features of each specimen. (S)he uses this data to classify the species by referring to the field report, atlases and specimens in the reference herbarium. (S)he then prepares each specimen for drying and preservation in readiness for labelling and cataloguing.

To compile the report, the technical officer prepares a map of the area to be regenerated. The map details the topographic features and illustrates the species to be planted in different areas of the land through the use of numbers and codes. To assist the landscape contractors, the technical officer advises where the required species can be purchased and the type of soils required for growth.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
Unit Title:
Perform immunohaematological tests

Unit descriptor
This unit of competency describes the ability of technical personnel to perform routine tests and procedures that are part of the requirements of pre- and post-blood transfusion practice. The unit also covers tests and procedures that are indicated in laboratory investigations in obstetric and perinatal medicine, in suspected haemolysis and haemolytic episodes and in other clinical circumstances.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1 Process samples and associated request forms</td>
<td>1.1 Check and match samples and request forms before they are accepted</td>
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<td></td>
<td>1.2 Return samples and request forms that do not comply with requirements to their source with reasons for non-acceptance</td>
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<tr>
<td></td>
<td>1.3 Log acceptable samples, applying required document tracking mechanisms</td>
</tr>
<tr>
<td></td>
<td>1.4 Process samples as required by requested tests</td>
</tr>
<tr>
<td></td>
<td>1.5 Store sample components appropriately until required for testing</td>
</tr>
<tr>
<td>2 Perform tests</td>
<td>2.1 Select authorised tests that are indicated for the requested investigations</td>
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<tr>
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<td>2.2 Conduct individual tests according to documented methodologies, applying required quality control procedures</td>
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<td>2.3 Record all results, noting any phenomena that may be relevant to the interpretation of results</td>
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<tr>
<td></td>
<td>2.4 Seek advice of section head or other responsible colleague when result interpretation is outside parameters of authorised approval</td>
</tr>
<tr>
<td></td>
<td>2.5 Store unused samples, for possible future reference, under conditions suitable to maintain viability</td>
</tr>
</tbody>
</table>
3  Maintain a safe environment  3.1  Apply practices to ensure occupational, health and safety of self and other laboratory workers

3.2  Clean up spills using appropriate techniques to protect personnel, work area and environment from contamination

3.3  Minimise the generation of wastes

3.4  Ensure the safe disposal of biohazardous materials and other laboratory wastes in accordance with enterprise procedures

4  Maintain laboratory records  4.1  Make entries on report forms or into computer systems, accurately recording or transcribing required data as required

4.2  Maintain instrument logs as required by accreditation checklists

4.3  Maintain records of blood and blood products received, used and returned to supplier

4.4  Keep all clinical information and laboratory data confidential

4.5  Ensure security of all clinical information and laboratory data and records

5  Issue blood and blood products  5.1  Complete documentation required to permit the issuing of blood or blood components that have been cleared for use by clinical staff

5.2  Advise courier of transport requirements to ensure blood or blood products are delivered in a timely and safe manner.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competency describes the work of the technical officer in the transfusion or immunohaematology laboratory.

The unit of competency is based on the assumption that technical personnel would perform tests and procedures under the close supervision of scientific and/or medical staff. But since technical personnel may work alone in some circumstances, the unit describes attributes that need to be addressed in the education and training of technical personnel.
In such circumstances, the worker’s scope of permitted work and interpretation would be defined by relevant workplace operating procedures and protocols.

It is understood that the management of any transfusion laboratory would establish for itself, in terms of its own responsibility and purposes, the ability of any worker to work in a transfusion science laboratory, regardless of the education and training record or presumed ability of any worker.

In the laboratory the worker and supervisor would generally have access to the following:

- Human Tissue Acts and regulations operable in Australian jurisdictions
- guidelines, policies and business rules of the Australian Red Cross Blood Service that are operable from time to time
- workplace procedures, standard operating procedures (SOPs) and operating manuals
- test procedures (validated and authorised)
- sampling procedures (labelling, preparation, storage, transport and disposal)
- safety requirements for equipment, materials or products
- cleaning, hygiene, personal hygiene requirements
- quality system and continued improvement processes
- incident and accident/injury reports
- schematics, work flows, laboratory layouts
- instructions to comply with new legislation, standards, guidelines and codes
- stock records and inventory
- training program contents
- waste minimisation and disposal.

This unit of competency includes the use of items of equipment and systems such as:

- centrifuges, light boxes, calibrated pipettes, waterbaths, incubators, microscopes
- computer information systems, databases, record and filing systems
- general laboratory glassware and equipment identified with a serology laboratory
- antisera and phenotyped red cells and other relevant reagents
- gel systems.

This unit of competency may include communication with:

- supervisors and managers (laboratory, quality and customer service)
- other laboratory or relevant medical or nursing personnel
- patients and clients
- external auditors, or accreditation agency (eg, NATA)
- couriers.
Updating information

Changes in codes of practice and applicable standards should be noted.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Competency must be demonstrated in the ability to accurately detect and record evidence of blood group antigen and antibody reactions.

Such reactions will be related to the determination of blood groups and the detection of antibodies of significance in transfusion (as laboratory evidence that in vivo cell destruction or immunisation may occur); in pregnancy and the perinatal period (as evidence of sensitisation of foetal red cells by transplacental maternal antibody); and in the investigation of haemolysis or haemolytic episodes, etc.

The tests that the worker will use will be validated and authorised procedures, clearly described in the laboratories manual of procedures. The parameters of interpretation will be clearly described, indicating for the worker what he or she is permitted to sign off without reference to supervisors or managers.

In particular, the assessor should look to see that the candidate:

- recognises problems in systems and documentation
- uses enterprise information system efficiently
- critically analyses information/documents
- prepares documentation that is accurate, easily understood by the intended audience and in accordance with requirements
- manages tasks and organises work to ensure the timely release of blood and blood products, as he or she completes routine tasks
- uses samples, reagents and materials economically and disposes of wastes safely
- uses equipment safely
- maintains equipment, recording and reporting malfunctions appropriately.
Essential Knowledge

Competency includes the ability to apply and explain workplace procedures relating to:
correct use of terminology relevant to underpinning normal and abnormal anatomy, physiology, biochemistry and immunology; and of relevant clinical and scientific terminology that relate to immunohaematology
selection and application of appropriate testing procedures in terms of the suspected or known nature of the antibody and its documented possible range of laboratory behaviours
selection, testing and issuance of blood cleared for transfusion
discussion of antigen/antibody reactions with colleagues to elucidate likely causes and to select and apply confirmatory tests as required
selection and issuance of blood products for therapeutic or prophylactic use.

Competency includes the ability to use scientific, medical, clinical, technical and workplace terminology accurately.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML QUAL 401 A – Apply quality system and continuous improvement processes.

This unit of competency should be assessed after:
PML TEST 301 A – Perform biological laboratory procedures
PML OHS 300 A – Work safely in accordance with defined policies and procedures.

Individual enterprises may choose to add other relevant prerequisites.

Assessment methods and resources

The following assessment methods are suggested:
integrated assessment with a case focus, such as the routine pre-transfusion crossmatch; an antenatal antibody detection and preliminary identification; batch of routine ABO and Rh(D) groups to be completed at the same time as completion of a pre-transfusion battery of tests; etc
oral and/or written tests and paper problems associated with ABO group determination; antibody identification; record keeping, etc
feedback from peers and supervisors that workplace procedures were followed and that work is consistently performed in line with workplace requirements.

Assessment should establish the candidate’s ability to perform tests accurately and to organise
work so that the needs of all relevant patients and clients are met in a timely fashion.

Resources may include:
- workplace documents and procedures
- relevant equipment, samples and reagents.

Under duty of care requirements, off job training providers should ensure that blood samples are known to be antibody free for hepatitis B and C, syphilis and human immunodeficiency viruses.

**This competency in practice**

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Biomedical and environmental services**

A patient’s blood sample and request form have been brought to the laboratory. The patient is to undergo an elective operation the next afternoon. The technical officer has been asked by the supervisor to determine the patient’s ABO and Rh(D) blood groups, to screen the sample for irregular blood group antibodies and to cross match two units of packed red cells in readiness for possible use during or after surgery. The technical officer checks the records for information on the patient. Finding none, (s)he prepares the required data in the laboratory databases and then performs the required tests. (S)he does not detect any irregular antibody and has had no difficulty in choosing suitable units for crossmatching. (S)he completes the required documentation and labels, and stores the compatible blood units for possible later use.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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</table>
Unit Title:
Perform fieldwork

Unit descriptor

This unit of competency describes the ability to perform tasks associated with the planning and organisation of fieldwork, including sample and data collection, field analysis of samples and data, and field camp maintenance. It also covers basic field safety and survival skills.

This unit of competency does cover gaining clearance for animal trapping, tagging, keeping or experimentation, but does not cover specific techniques related to handling animals. These tasks would only be performed under the guidance and supervision of a scientific officer.

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<th>PERFORMANCE CRITERIA</th>
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<tbody>
<tr>
<td>1 Plan fieldwork in consultation with senior staff</td>
<td>1.1 Select an appropriate field camp site to satisfy enterprise requirements</td>
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<tr>
<td></td>
<td>1.2 Determine local concerns, restrictions and customs associated with field site</td>
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<tr>
<td></td>
<td>1.3 Determine requirements such as food, water, fuel and communications</td>
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<tr>
<td></td>
<td>1.4 Determine transport requirements for equipment, supplies and personnel</td>
</tr>
<tr>
<td>2 Identify requirements for safe operation of field site and fieldwork</td>
<td>2.1 Determine the physical safety aspects of the camp and field sites</td>
</tr>
<tr>
<td></td>
<td>2.2 Obtain information regarding location and contact numbers of nearest medical services for emergency use</td>
</tr>
<tr>
<td></td>
<td>2.3 Obtain information regarding communication procedures and difficulties to allow planning of effective communication</td>
</tr>
</tbody>
</table>
3 Organise fieldwork

3.1 List the equipment and supplies required for the field camp and confirm with supervisor

3.2 Test equipment for working order prior to packing and transport to field camp

3.3 Monitor correct packing of equipment to minimise damage during transportation

3.4 Arrange mechanical checks on vehicles for off-road readiness

4 Maintain field camp

4.1 Monitor catering, hygiene and security practices for conformance with enterprise requirements

4.2 Prepare duty rosters to ensure equitable distribution of camp and field duties in consultation with other staff

5 Conduct field surveys

5.1 Confirm transport, fuel and equipment arrangements with senior staff prior to undertaking field survey

5.2 Collect samples in accordance with enterprise procedures, animal care and ethics and other legislative requirements

5.3 Store samples in accordance with special requirements for continued wellbeing, viability and integrity of samples

5.4 Perform designated tests and procedures for the collection of environmental data

5.5 Perform all survey work to minimise impact on the environment

6 Organise closedown of field camp in consultation with senior staff

6.1 Monitor the checking and packing of equipment, supplies and samples for transport, to minimise damage and maintain viability and integrity of samples

6.2 Check that field camp site is left in accordance with enterprise and environmental requirements

6.3 Test equipment for working order prior to return to storage at enterprise location

6.4 Monitor dispatch of collected samples for laboratory analysis
Perform fieldwork

7 Demonstrate basic field survival skills

7.1 Follow specified safety procedures to ensure safety of self and others

7.2 Follow specified survival procedures in the event of emergencies and accidents

7.3 Wear suitable clothing as protection against solar radiation, extreme temperatures and impact injury

7.4 Follow enterprise emergency first aid procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competency describes the ability to:

- collect samples such as animals, plants, soil and water in the field
- measure biological systems by observation and documentation
- identify samples
- maintain and store samples correctly; perform subsequent procedures and tests as directed
- analyse data.

A scientific officer or senior technical officer would supervise all aspects of field and laboratory work. Though a supervisor may not always be present, the worker will follow standard operating procedures (SOPs) that clearly describe the permitted scope of practice.

In the field, the worker and supervisor would generally have access to the following:

- fieldwork procedures, SOPs and operating manuals
- test procedures (validated and authorised)
- sampling procedures (labelling, preparation, storage, transport and disposal)
- safety requirements for equipment, materials or products
- animal welfare and ethics codes of practice
- cleaning, hygiene and personal hygiene supplies
- environmental requirements related to disposal of waste
- incident and accident/injury reports
- instructions to comply with new legislation, standards, guidelines and codes
- first aid kit and survival manual
- navigation and communication equipment such as compass, maps and global positioning system
- surveying instruments (eg, Abney level).
This unit of competency may include the use of items of equipment such as:

- pH meters, dissolved oxygen probes, portable colourimeters, field microscopes, hand centrifuges, sieves and filters
- rapid chemical field test kits
- environmental monitoring systems
- equipment required for the collection of samples and animals
- equipment required for ensuring the wellbeing of animals
- equipment suitable for the safe collection and disposal of biological and non-biological wastes
- basic first aid equipment
- data loggers
- communication systems such as two-way radios, conventional codes and symbols for signalling.

**Updating information**

Changes in codes of practice and applicable standards should be noted.

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**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to:

- collect samples in accordance with enterprise procedures and legislative requirements
- maintain and store samples in accordance with special requirements for continued wellbeing, viability and integrity of samples
- perform field analysis of samples
- collect environmental data
- record data according to enterprise procedures and legislative requirements
- prepare documentation accurately and in accordance with requirements
- perform all fieldwork and dispose of wastes in accordance with safety and environmental requirements.

The tests and procedures that the worker uses would be clearly described in enterprise
manuals of procedures, legislative documents and relevant codes of practice and ethics. The worker only operates within the permitted scope of practice.

**Essential knowledge**

Competency includes the ability to apply and explain:

- enterprise procedures relating to sample collection, maintenance and storage
- importance of collection of samples (type, location, sampling times) according to sampling plan
- importance of maintaining integrity of samples and source
- enterprise procedures relating to testing of samples
- principles of collection and preservation of plants and animals to enable subsequent identification
- specific legislation and codes of practice related to sample and animal collection
- documentation in accordance with enterprise procedures and legislative requirements
- principles of safety relating to fieldwork such as use of LPG, operation of generators, use of protective clothing
- communication procedures using two-way radio
- basic field survival strategies such as map reading, use of compass, “stay with vehicle” in the event of accident or emergency
- principles of mapping of survey area
- principles of basic map interpretation and surveying.

Competency also includes the accurate use of terminology to explain scientific and technical ideas relevant to field studies and aspects of biology, botany, ecology and zoology that are the focus of fieldwork.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit of competency may be assessed with:

- PML TEST 508 A – Perform ecological techniques.

This unit of competency should be assessed after:

- PML OHS 300 A – Work safely in accordance with defined policies and procedures
- PML TEST 301 A – Perform biological laboratory procedures
- PML TEST 305 A – Perform aseptic techniques.
Assessment methods and resources

The following assessment methods are suggested:
observation of work carried out on field trips with a focus on:
- sample collection and storage
- accurate documentation
- field testing of samples
- collection of environmental data
- safety aspects of fieldwork and basic field survival skills

paper exercises associated with planning and organisation of fieldwork, fieldwork operations, and basic field survival strategies

role plays with a focus on accident and emergency situations requiring use of communication procedures and basic field survival strategies

oral or written questioning to assess underpinning knowledge or likely actions in a contingency/emergency.

Resources may include:
enterprise and legislative documents and codes of practice
enterprise procedures
relevant field equipment, samples, test kits and reagents.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

Biomedical and environmental services

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 were assembled. All supplies and field equipment were purchased or assembled, checked against an inventory and securely stowed in the vehicles.

Key competencies

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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<thead>
<tr>
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</tbody>
</table>
Unit Title:
Supervise earthworks inspection, sampling and testing operations

Unit descriptor
This unit of competence covers the ability to supervise and direct earthworks operations based on observation and testing. This competency is typically performed by experienced technicians or para-professionals, often supervising or directing less experienced laboratory operators.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prepare for on-site operations</td>
<td>1.1 Identify the job, consult with the client and obtain relevant information including the level of supervision required, drawings, specifications, etc</td>
</tr>
<tr>
<td></td>
<td>1.2 Select equipment and materials required for the job</td>
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<td></td>
<td>1.3 Identify personal protective equipment and safety procedures as specified for job, and organise site induction as required</td>
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<td></td>
<td>1.4 Record description of the job to be undertaken, compare with specification and resolve any variations</td>
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<td></td>
<td>1.5 Select suitable transport for site access.</td>
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<td></td>
<td>1.6 Brief support personnel on job-specific requirements</td>
</tr>
<tr>
<td>2 Establish on-site operations</td>
<td>2.1 Consult with the site superintendent to determine methods of communication, roles, responsibilities and expectations of each party, including identification of potential problems and conflicts</td>
</tr>
<tr>
<td></td>
<td>2.2 Set up facilities for supervision, testing and sample storage</td>
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<td></td>
<td>2.3 Inspect the site to determine the characteristics of the project, including survey control points</td>
</tr>
<tr>
<td></td>
<td>2.4 Design inspection, sampling and testing program in accordance with specifications</td>
</tr>
<tr>
<td></td>
<td>Supervise earthworks operations</td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>3</td>
<td>3.1 Conduct inspection, sampling and testing in accordance with project requirements</td>
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<tr>
<td></td>
<td>3.2 Direct and advise the site superintendent based on test results and observations</td>
</tr>
<tr>
<td></td>
<td>3.3 Record test data and observations in accordance with enterprise practices</td>
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<td>3.4 Remit samples to the base laboratory for testing as required</td>
</tr>
</tbody>
</table>

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<tr>
<th></th>
<th>Analyse project data and report to client</th>
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<tbody>
<tr>
<td>4</td>
<td>4.1 Analyse test results, checking for accuracy and validity</td>
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<td>4.2 Report test results to site superintendent at specified frequency</td>
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<tr>
<th></th>
<th>Maintain records</th>
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<tbody>
<tr>
<td>5</td>
<td>5.1 Record observations, data and results in accordance with enterprise practices</td>
<td></td>
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<td></td>
<td>5.2 Maintain confidentiality of enterprise information</td>
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</table>

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<thead>
<tr>
<th></th>
<th>Complete the project</th>
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<tbody>
<tr>
<td>6</td>
<td>6.1 Clean and maintain sampling equipment, avoiding environmental damage including stormwater contamination</td>
<td></td>
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<tr>
<td></td>
<td>6.2 Remove equipment and materials from site</td>
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<td></td>
<td>6.3 Prepare and issue a final report on the project detailing supervision and testing carried out, statement of compliance and relevant tables and plans as required</td>
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</tr>
</tbody>
</table>
RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work conducted by experienced technicians and engineering para-professionals.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- standard operating procedures (SOPs)
- equipment manuals
- equipment start-up, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

Operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

Tools and equipment used include:

- hand and power augers
- hand tools including shovels, crowbars, scoops, spanners, wrenches, tape measure
- consumables including sample bags, labels
- documentation including maps, plans, contract documents, worksheets
- field test equipment including sand replacement apparatus, nuclear soil moisture/density gauge, dynamic cone penetrometer
- still/video camera
- safety clothing and equipment including helmet, boots, earmuffs, glasses, high-visibility clothing
- two-way radio, mobile telephone
- levelling equipment (dumpy, automatic levels).

Typical skills may include:

- working safely with equipment and around earthmoving plant
- driving safely on- and off-road
- working safely in field conditions
- setting up and maintaining tools and equipment
• using tools and equipment to perform sampling techniques
• using tools and equipment to perform in-situ testing techniques
• cleaning equipment before leaving site in compliance with environmental authority requirements
• reading site plans, specifications and codes to determine sampling locations and frequencies
• measuring and estimating elevations, lengths, areas and volumes
• identification of soil and rock materials
• observing and recording project information
• handling and storing samples appropriately
• comparing test results with specifications
• resolving problems without creating confrontational environments
• using computer software to create/maintain databases and produce detailed reports.

Typical problems include:
• uncooperative site personnel
• non-conformances leading to confrontational environments
• delays in obtaining test results
• damage to services, materials and site conditions
• displaced, missing and inaccurate survey markers
• misidentification of samples and sampling locations
• equipment breakdown and breakage
• environmental problems and issues including site access, inclement weather, traffic, wildlife, vegetation, construction activities.

**Updating information**

This unit of competence does not contain detailed information that requires regular updating.
EVIDENCE GUIDES

Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competence

Competence must be demonstrated in the ability to supervise and direct earthworks operations, as well as sampling and testing of materials.

In particular the assessor should look to see that the candidate can:

- read and interpret maps, drawings, specifications and codes of practice
- identify and locate sampling and testing sites
- measure and estimate elevations, lengths, areas and volumes
- determine sampling and testing frequencies
- take representative samples
- identify and describe materials
- record project details in writing, by sketching and photography
- handle and transport samples correctly
- record sampling and testing information
- compare test results with specifications and draw valid conclusions on compliance
- use tools and equipment effectively and efficiently
- observe, interpret and report atypical situations
- communicate problems to appropriate personnel
- record and communicate work results
- work safely
- resolve problems without creating confrontational environments.

Essential knowledge

Competence includes the ability to apply and/or explain:

- engineering properties of soil and rock materials
- techniques used in civil construction
- plant and equipment used in earthworks
- in-situ and laboratory test methods and their application to various materials
- roles and responsibilities for different levels of supervision.
Interdependent assessment of unit

This unit may be assessed with:

- PML ORG 500 A – Schedule laboratory work for a small team
- PML COM 500 A – Provide information to customers
- PML DATA 500 A – Analyse data and report results.

Assessment methods and resources

It is strongly recommended that assessment is conducted through observation over time. The timeframe must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of completed workplace documentation
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:

- access to tools, equipment and materials which will allow for appropriate and realistic simulation
- a bank of case studies is required where these form part of the assessment method
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.

This competency in practice

A geotechnical consultancy has been contracted to provide level one supervision for a commercial development in accordance with AS3798 – *Guidelines on earthworks for commercial and residential developments*. This will involve the construction of roadways, building pads, and parking areas for heavy vehicles.

A technician has been placed in charge of the project, with an experienced tester to assist with routine testing and supervision. The principal contractor has provided copies of specifications, drawings and local authority requirements for this type of project.

The project will involve clearing and stripping, setting-out (by contract surveyors), cut-to-fill, drainage, sewer lines and other services, and construction of roadways and building pads.

The supervision will be carried out in accordance with local authority requirements. Testing
will involve measuring in-situ densities of fill (including trench backfill) and roadbase materials. CBR (California Bearing Ratio) tests will be used as an aid in determining pavement thicknesses, and quality tests used to monitor pavement materials supplied from a local quarry. This will involve both on-site and off-site testing, requiring liaison with off-site personnel to ensure testing is timely and as specified.

Based on test results and direct observations, the technician is able to direct and advise the contractor’s operators so that the materials are correctly placed and compacted. Test locations are marked on drawings and sketches, and photographs used to record details of the project. Detailed daily records are used to prepare monthly reports for the contractor, accompanied by test certificates. Office staff use this information to invoice the client. The technician monitors the project to avoid exceeding the project specific budgetary requirements.

When the project is finished, the technician prepares a completion report including all test results, site observations and a scale drawing showing all filled areas, and reviews the information as a guide to planning and costing future projects.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:*

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<td>Level 3</td>
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</tbody>
</table>
Supervise earthworks inspection, sampling and testing operations.
Unit Title:
Develop and maintain laboratory documentation

Unit descriptor

This unit of competency covers the ability to develop and maintain relevant documentation and systems in response to identified information requirements or changes in laboratory policy or external accreditation requirements. It includes the analysis of specialised technical requirements, and the development and/or amendment of workplace documents, procedures and record keeping systems using established workplace procedures. Final responsibility for documentation and systems generally rests with professional scientific/medical/engineering staff who have the appropriate signatory status or legal delegation.

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<thead>
<tr>
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<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1 Recognise documentation need/deficiency</td>
<td>1.1 Evaluate current documentation to identify instances where documentation is needed or deficient</td>
</tr>
<tr>
<td></td>
<td>1.2 Analyse development opportunities and discuss with appropriate personnel to assess and confirm requirements</td>
</tr>
<tr>
<td>2 Develop/revise documentation</td>
<td>2.1 Specify documentation need and set/prioritise objectives</td>
</tr>
<tr>
<td></td>
<td>2.2 Analyse existing documentation/records in accordance with specified requirements</td>
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<td></td>
<td>2.3 Develop/amend documentation as a draft in accordance with review requirements</td>
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<td>2.4 Issue documentation to appropriate personnel for review</td>
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<tr>
<td></td>
<td>2.5 Edit documentation to ensure that the initial identified need/deficiency and review requirements are satisfied</td>
</tr>
<tr>
<td></td>
<td>2.6 Recall superseded documentation and issue new documentation in accordance with document control procedures</td>
</tr>
<tr>
<td>3 Communicate and evaluate changes to laboratory documentation</td>
<td>3.1 Brief personnel on new/revised documentation to ensure successful implementation of new procedures</td>
</tr>
<tr>
<td></td>
<td>3.2 Monitor and evaluate implementation of new/revised documentation and amend documents or provide training if required.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency includes the following types of reference documentation:

- Australian and international standards (eg, AS 2243 - Safety in Laboratories, ISO 9001 - 3 Quality and Food Standards)
- guidelines (eg, ANZFA, infection control, GMAC for working with genetically altered organisms)
- codes of practice (eg, Australian Dangerous Goods Code)
- testing procedures and specific method collections for industry sectors (eg, AOAC Methods of Analysis).

This unit of competency includes the following types of workplace documentation:

- workplace procedures, SOPs and operating manuals
- test procedures
- sampling procedures (sampling, preparation, labelling, storage, transport and disposal)
- evaluation of materials or products
- instructions for equipment installation, commissioning, calibration and maintenance
- safety requirements for equipment, materials or products
- cleaning, hygiene, personal hygiene requirements
- methods for extraction or manufacture of a product
- risk evaluation, monitoring or control procedures
- compliance/non-compliance reports
- quality system and continued improvement processes
- incident and accident/injury reports
- permits
- schematics/work flows/laboratory layouts
- instructions to comply with new legislation, standards, guidelines and codes
- stock records/inventory
- training program contents
- waste minimisation and disposal.

This unit of competency includes the use of items of equipment and systems such as:

- online information systems, databases, record and filing systems
- computer equipment.
This unit of competency may include communication with:

- supervisors and managers (laboratory, quality and customer service)
- other laboratory or production personnel
- members of the public, customers and suppliers
- external auditors, regulation and licensing/accreditation authorities (e.g., NATA).

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.

**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to analyse draft and amend enterprise documentation in accordance with specifications. Documentation must be completed in a clear and concise manner that is easily understood by others and in accordance with workplace requirements/specifications. In particular the assessor should look to see that the candidate can:

- recognise problems in systems and documentation
- use internal and external information sources efficiently
- critically analyse information
- prepare documentation that is accurate, free from editorial errors and omissions, and in accordance with requirements
- prepare documentation that is easily understood by the intended audience
- obtain and include relevant feedback on draft documentation
- communicate information and developments in the appropriate manner
- complete the preparation and distribution of documents in the given time.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain workplace procedures relating to:
- documentation development and tracking
- records management and maintenance
- quality systems and continuous improvement
- organisational structure, delegations and responsibilities
- communication protocols and reporting.

Competency includes the ability to apply the following knowledge when drafting documentation:
- accurate scientific, technical and workplace terminology
- OHS, environmental and other relevant legislative requirements, regulations, codes
- enterprise standard operating procedures (SOPs)
- technical developments in the sector (current methodologies, ranges and interpretations).

An awareness of the laboratory’s business goals and key performance indicators is also required as a basis for developing documentation.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
- PML OHS 600 A – Implement and monitor risk management processes associated with OHS and environmental policies and procedures
- PML ORG 601 A – Maintain registration and statutory or legal compliance in work/functional area
- PML QUAL 600 A – Maintain quality system and continuous improvement processes within work/functional area.

This unit of competency should be assessed after:
- PML COM 500 A – Provide information to customers
- PML QUAL 401 A – Apply quality system and continuous improvement processes.
Assessment methods and resources

The following assessment methods are suggested:

examination of a range of workplace relevant documentation developed by the candidate
feedback from peers and supervisors that workplace procedures were followed and that the
documentation is accurate and user friendly.

Resources may include:

information directories and databases
workplace documents and procedures.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of
each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

A water sample thought to contain cadmium had been logged for analysis. Later that day, the
technician designated to perform the analysis advised the laboratory supervisor that the
procedures had not yet been revised to suit the newly installed equipment. The supervisor
created a draft procedure document for the revised procedure and passed it, with an
explanation of the reasons for the change, to the appropriate personnel for authorisation. The
draft document was approved and the supervisor issued the revised procedures as a control
document. The supervisor notified all relevant personnel of the change, removed the old
procedures, replaced it with the new document and entered the change in the document
control register.

Biomedical and environmental services

New legislation regarding hazardous chemicals has required revisions to many workplace
documents. Apart from reviewing all storage and labelling of chemicals, each chemical must
have a material safety data sheet (MSDSs) and a risk assessment of its usage. To comply with
legislative requirements, this information must be clearly documented and communicated to
staff. In a large analytical laboratory, this task was undertaken by a senior technical officer.

Food and beverage processing industries

The senior technicians in the laboratory of a food processing company joined the company’s
HACCP team and suggested extensive changes to the way the laboratory functioned so that it
better supported the HACCP system. The technicians reviewed the HACCP documentation and
legislation, and revised the laboratory documentation that was relevant to the HACCP system.
They also organised inhouse training to provide each member of the laboratory team with the
knowledge and skills essential for successful implementation of this system. Overall, the
adoption of a HACCP plan by the company proceeded with relatively few problems, in part
because of the involvement of the laboratory staff and the training provided by the company.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
# Unit Title:

**Implement and monitor risk management processes associated with OHS and environmental policies and procedures**

## PML OHS 600 A

## Unit descriptor

This unit of competency covers the ability to implement and monitor risk management processes associated with OHS and environmental policies and procedures for a work group or laboratory, within the scope of a “head officer’s” responsibilities as defined in the Australian Standards AS 2243.1 *Safety in Laboratories*. The senior technician/supervisor is expected to analyse the work environment and judge the need for OHS/environmental intervention. He/she generally operates in an environment containing a wide range of potential hazards where quick and specific responses, based on detailed technical knowledge, may be required.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Provide information to the work group and handle issues that arise</td>
<td>1.1 Explain to the work group relevant provisions of occupational health and safety/environmental legislation and related codes of practice</td>
</tr>
<tr>
<td></td>
<td>1.2 Analyse enterprise occupational health and safety/environmental policies, procedures and programs and provide information to the work group</td>
</tr>
<tr>
<td></td>
<td>1.3 Provide regular information about identified hazards and risk control procedures</td>
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<td></td>
<td>1.4 Ensure that the work group understands all relevant procedures and individual obligations</td>
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<td>1.5 Promptly resolve issues raised by the group or refer these to appropriate personnel for resolution in accordance with workplace procedures</td>
</tr>
<tr>
<td>2 Implement and monitor workplace procedures for identifying hazards and assessing risks</td>
<td>2.1 Use strategies provided by management to identify workplace hazards</td>
</tr>
<tr>
<td></td>
<td>2.2 Use strategies provided by management to assess risks including frequency, severity and duration of exposure</td>
</tr>
<tr>
<td></td>
<td>Implement and monitor workplace procedures for controlling risk</td>
</tr>
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<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>3.1 Implement work procedures to control risk based on the hierarchy of control and monitor their adherence</td>
</tr>
<tr>
<td></td>
<td>3.3 Diagnose inadequacies in existing risk control measures in accordance with the hierarchy of control and report to designated personnel</td>
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<thead>
<tr>
<th></th>
<th>Implement workplace procedures for dealing with hazardous events</th>
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<tbody>
<tr>
<td>4</td>
<td>4.1 Implement workplace procedures for dealing with hazardous events whenever necessary to ensure that prompt control action is taken</td>
<td>4.2 Implement control measures to prevent recurrence and to minimise risk of hazardous events, based on the hierarchy of control</td>
</tr>
<tr>
<td></td>
<td>4.3 Assess events and refer matters beyond scope of responsibilities and competency to designated personnel for implementation</td>
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<thead>
<tr>
<th></th>
<th>Arrive for training</th>
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<tbody>
<tr>
<td>5</td>
<td>5.1 Monitor performance, establish training needs and specify gaps between competencies required and those held by work group members</td>
<td>5.2 Arrange for required training in consultation with relevant parties</td>
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<tr>
<td></td>
<td>5.3 Evaluate the effectiveness of training to improve laboratory safety</td>
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<th>Keep accurate records</th>
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<tbody>
<tr>
<td>6</td>
<td>6.1 Complete all records for work area in accordance with workplace requirements and legal requirements for the maintenance of records of occupational injury and disease</td>
<td>6.2 Recognise and report trends of occupational injury and disease.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency is consistent with the statements in AS 2243.1 Safety in Laboratories regarding a “head officer” and with the National Occupational Health and Safety Commission’s Generic Competency B for employees with supervisory responsibilities, for example:

- a laboratory supervisor
- other personnel with OHS risk management responsibilities.

At this level, personnel should be able to interpret and explain those sections of OHS legislation, codes, regulations and Australian standards that apply to the tasks undertaken in the workgroup.

Competency is to be demonstrated in the context of implementing and monitoring established enterprise OHS and environmental management systems.

Enterprise policies and procedures may include those which directly or indirectly cover:
- hazard policies and procedures
- standard operating procedures (SOPs)
- safety procedures
- work instructions
- maintenance schedules
- emergency, fire and accident procedures
- environmental incident procedures
- personal protective clothing and equipment procedures
- monitoring and appropriate tasking of personnel with possible infections
- waste minimisation, recycling and waste disposal.

Examples of regulations, codes and guidelines include:
- AS 2243 - Safety in laboratories
- AS 2503 - Safety storage and handling information cards
- AS 1940 - Storage and handling of flammable and combustible liquids
- AS 3780 - Storage and handling of corrosive liquids
- AS 4452 - Storage and handling of toxic substances
- AS 1678 - Emergency procedures guide for hazardous substances
State/Federal Acts - clean air and waterways
Australian Dangerous Goods Code
SAA HB9 - Occupational personal protection, and other relevant standards for protective,
clothing (eg, AS 2161, AS 2210, AS 1337 and AS 1338)
relevant standards for biological safety cabinet (AS 2252), fume hoods (AS 2243.8) and hand
washing facilities (AS 2982)
guidelines for the operation of classes of laboratories
standards for the segregation of wastes (eg, AS 2243.3 and AS 2243.4)
AQIS guidelines for the importation of biological products.

Consultation with employees in the work area should occur on:
identification of hazards
assessment of level of risk
implementation of risk control measures and review of effectiveness
participation in injury and incident investigation
participation in the development of policies and procedures.

Strategies provided by management to identify workplace hazards could include:
review of OHS records and statistics
review of registers of hazardous substances and dangerous goods
audits and workplace inspections
job safety analysis
consultation with workers.

Communication could involve managers, the enterprise OHS committee, elected OHS
representatives/health and safety representatives, laboratory and production personnel and
external OHS agencies.

**Specific industry variables**

*Additional variables may apply for each industry sector below.*

**Biomedical and environmental services**

GMAC guidelines for working with genetically altered organisms
maintain immunisation registers for employees at risk
establishment and maintenance of hazardous goods manifest and substance register.

**Food and beverage processing industries**

supervision of handling and disposal of microorganisms and heavy metals
supervision of analysis for mycotoxins and pesticide residues.
Updating information

Changes in codes of practice and applicable standards should be noted.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to implement and monitor the enterprise’s OHS and environmental policies, procedures and programs in the relevant work area. In particular, the assessor should look to see that the candidate can:

access and interpret relevant sections of OHS and environmental legislation, regulations and codes of practice and updates
analyse the work environment and judge OHS and/or environmental interventions
consult employees on safety and environmental issues, hazard identification, risk assessment, selection and implementation of control measures and their review
raise issues related to concerns with safety of work systems and work environment through consultation with management and employees
assist management to develop and implement improvements in work practices and procedures to reduce the risk of illness and injury and meet OHS legislative requirements
provide appropriate supervision, support and information in accordance with workplace procedures
keep OHS and environmental records complete, current and secure.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- consultation processes, either general or specific to occupational health and safety and environmental systems
- specific hazard policies and procedures (including housekeeping and inspections)
- occupational health and safety/environmental legislation, procedures and auditing
- occupational health and safety/environmental waste status record keeping
- maintenance of equipment in work area
- enterprise purchasing policy and procedures for safety related supplies and equipment
- counselling/disciplinary/issue resolution processes
- the hierarchy of control in any particular situation (elimination, substitution, engineering controls, administrative controls, personal protective equipment).
- waste minimisation, recycling of chemicals and water, by-product collection, equipment maintenance and microbiological waste disposal.

Specific industry

Additional knowledge requirements apply for each industry sector below.

Biomedical and environmental services

- specific OHS policies and State/Territory health department guidelines regarding infection control in the health care setting and the types of infections likely to occur
- regulations pertaining to laboratories involved in gene manipulation (Genetic Manipulation Advisory Committee)
- procedures and control measures for spillage of infected material in the public or non-laboratory domain.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.
Interdependent assessment of unit

This unit of competency may be assessed with units dealing with communication, supervision and training, for example:

PML COM 500 A – Provide information to customers
PML ORG 600 A – Supervise laboratory operations in work/functional area
PML ORG 601 A – Maintain registration and statutory or legal compliance in work/functional area.

This unit of competency should be assessed after:

PML OHS 300 A – Work safely in accordance with defined policies and procedures.

Assessment methods and resources

The following assessment methods are suggested:

review of information developed by the candidate and provided to the work group
review of records and reports generated by the candidate
feedback from team members and managers regarding provision of information and the candidate’s ability to implement and monitor established management systems
written and/or oral questioning to assess underpinning knowledge and likely reactions to simulated incidents (questions will be appropriate to candidate’s language and literacy levels).

Resources may include:

relevant OHS and environmental legislation, regulations, codes of practice and workplace procedures.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

Process manufacturing and construction materials industries

The smoke alarms have sounded and a general evacuation of the building has commenced. The fire brigade has been summoned in accordance with workplace procedures. All personnel, except the designated floor wardens, have moved to the assembly area. The supervising staff report to the brigade officers that there was smoke and fumes on the first floor. The brigade officers don respirators and enter the building. A search establishes that a clear plastic beaker has been placed in the drying oven along with glassware. The incident is the result of a careless mistake. With the cause of the smoke fumes identified, the brigade officers organise for the air conditioning system to exhaust the fumes. Once the building can be accessed, the laboratory supervisor prepares an incident report and organises follow-up counselling for the wash up staff.
Biomedical and environmental services

A senior technical officer supervises the work of laboratory cleaning staff and some technical assistants in a work area. The supervisor holds a current first aid certificate and is often the first person to be called to laboratory accidents and spill incidents. The supervisor also ensures that personnel who handle blood have current immunisation status for hepatitis B.

Food and beverage processing industries

A supervisor in the laboratory of a food processing company was concerned that an audit of the risks associated with the company’s activities had never been performed. When individual risk situations were identified they were usually addressed on a case by case basis. The supervisor realised that this approach did not have the rigour to identify less obvious hazards.

A risk audit was conducted in cooperation with the laboratory team to overcome this deficiency. The audit progressed well and was performed without unduly disrupting the primary functions of the laboratory. Several previously unrecognised hazards were identified. One of the more esoteric hazards concerned the use of proteases and lipases to selectively digest specific food components. Before the audit, these enzymes were thought harmless. However, it was discovered that these bacterial proteins could provoke a potentially fatal allergic reaction in sensitised individuals especially after inhalation. Furthermore, repeated exposure could induce sensitivity. After this hazard was identified, an SOP was developed for handling these enzymes. Individuals likely to come into close contact with the enzymes were required to regularly undergo an allergen sensitivity test.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
<th>Communicating ideas &amp; information</th>
<th>Collecting, analysing &amp; organising information</th>
<th>Planning &amp; organising activities</th>
<th>Working with others and in teams</th>
<th>Using mathematical ideas and techniques</th>
<th>Solving problems</th>
<th>Using technology</th>
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<tr>
<td>Level 3</td>
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</table>
Unit Title:
Supervise laboratory operations in work/functional area

Unit descriptor
This unit of competency covers the senior technician/supervisor’s role in planning, allocation of tasks, coordination, quality assurance, recording and reporting of laboratory outputs. This requires significant judgement about work sequences, choice of appropriate technology and procedures to ensure that products and services meet customer expectations and are provided safely and efficiently in keeping with enterprise business plan. Under broad direction from scientists/medical staff/engineers the senior technician/supervisor accepts responsibility for the day to day operation of his/her functional area.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
</table>
| 1 Program and direct work practices within functional area | 1.1 Ensure that personnel follow all relevant procedures, regulations and standards  
1.2 Confirm that all technical work is performed in accordance with relevant standards, SOPs and schedules  
1.3 Ensure that analytical results/data are checked, collated and distributed in accordance with enterprise requirements  
1.4 Monitor testing and sampling procedures for quality control in accordance with enterprise requirements  
1.5 Identify and resolve complex problems by using agreed problem solving strategies and acting to prevent their recurrence |
| 2 Manage personnel within work area | 2.1 Develop and coordinate rosters to balance job requirements, laboratory efficiency and skill development opportunities  
2.2 Empower work groups/teams in dealing with technical and work flow problems and suggesting improvements  
2.3 Provide coaching and mentoring to support personnel who have difficulties with meeting targets for performance and/or resource usage  
2.4 Establish and maintain effective communication with all personnel and clients to ensure smooth and efficient operations |
<table>
<thead>
<tr>
<th></th>
<th>Establish resource requirements and operating budgets</th>
<th>3.1 Collect and analyse available resource information in consultation with appropriate personnel</th>
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<tbody>
<tr>
<td></td>
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<td>3.2 Prepare operational plans which make the best use of available resources, taking into account client needs and enterprise plans</td>
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<td>3.3 Identify and analyse possible variances due to external/internal factors and prepare contingency plans</td>
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<td>3.4 Compile operating budgets as required</td>
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<tr>
<td></td>
<td>Procure resources to achieve operational plans</td>
<td>4.1 Analyse resource requirements and sources of supply in terms of suitability, cost, quality and availability</td>
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<td></td>
<td></td>
<td>4.2 Select and purchase new materials and equipment in accordance with enterprise procedures</td>
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<td>4.3 Coordinate stocktaking of materials and equipment to ensure maintenance of stock at prescribed levels</td>
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<td></td>
<td></td>
<td>4.3 Ensure that personnel are competent to perform required tasks and organise training if required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.4 Arrange for the recruitment and induction of personnel as appropriate</td>
</tr>
<tr>
<td></td>
<td>Monitor and optimise operational performance and resource usage</td>
<td>5.1 Monitor the relationship between budget and actual performance to foresee problems</td>
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<td>5.2 Analyse variations in budget performance and either report or rectify abnormal/sub-optimal performance</td>
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<td></td>
<td>5.3 Negotiate with designated personnel and seek approval for variations to operational plans as required</td>
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<td>5.4 Assess utilisation of plant, equipment and consumables and compare with planned usage</td>
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<td></td>
<td>5.5 Rectify sub-optimal utilisation of plant, equipment and consumables</td>
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<td></td>
<td></td>
<td>5.6 Program and arrange for maintenance of plant and equipment in accordance with enterprise maintenance schedules</td>
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<tr>
<td></td>
<td></td>
<td>5.7 Maintain systems, procedures and records associated with resource usage in accordance with enterprise requirements.</td>
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</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

Supervisors who prepare operational plans and monitor resource usage generally have reference to:

staff performance measures such as:
- internal auditing against standard operating procedures (SOPs)
- three stage proficiency testing (external, interpersonal, replicate)
customer needs, specific testing requirements, standards
waste auditing minimisation processes
strategic plans, productivity/profit targets, business plans
quality and continuous improvement processes and standards
cost/benefit analysis principles
workplace industrial agreements, hygiene/dress/behaviour regulations, grievance and dispute resolution procedures
relevant legislation, standards, codes and practices (eg, ethical and legal responsibilities of enterprise personnel relating to animal welfare, poisons, environmental protection)
access/equity/ethics principles, processes and procedures
technical standards such as:
- registration/licensing requirements
- NATA accreditation
- quality standards (eg, ISO 9001, 9002, 9003, ISO guide 25)
- AS 2243 Safety in laboratories
- RTA test methods
- Standard Australian test methods (eg, Food Standards Code, AS sampling and test methods)
batch cards, work schedules and rosters
maintenance and housekeeping schedules.

Resources may include but are not limited to:

people
consumables, equipment, buildings/facilities
time
services - power/energy, water
information - technical manuals, SOPs, quality manuals.
This unit of competency may include the use of equipment and systems such as:
computer equipment
information management systems
financial accounting systems.

Problem solving could include:
troubleshooting, fault finding
risk analysis, root cause analysis, aspect/impact analysis
non-routine operational/technical problems
non-routine administrative and personnel related problems.

Communication could involve:
supervisors and managers
laboratory and production personnel and workteams
members of the public, customers and suppliers.

This unit of competency includes supervision of:
work practices within functional area such as:
- determining quality assurance sequences to minimise errors and inconsistencies
- participating in external quality control programs
- ensuring documentation of results and that data is processed and records maintained
personnel within functional area such as:
- developing rosters to fulfil both work requirements and skill development opportunities
- identifying roles and responsibilities for individuals and team members
- providing effective communication pathways to ensure smooth and efficient operations
- encouraging teams to solve problems relating to work flow and to suggest possible
  improvements to work organisation to maximise efficiency
operational plans such as:
- determining work schedules that use resources efficiently and meet customer and
  enterprise needs
- identifying possible variances of operational plans in order to prepare contingency plans
operational performance such as:
- recognising problems and initiating corrective actions
- continuously improving the skills of personnel in the workplace.

Updating information

This unit of competency is not expected to need rapid updating because it is not limited by
current versions of legislation, procedure and practices.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance
criteria and the range of variables. Its purpose is to guide assessment of the unit in the
workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to supervise laboratory operations and personnel so that planned outcomes are achieved within agreed resource and budget parameters without compromising safety, quality and ethics. In particular, the assessor should look to see that the candidate can:

- collect, analyse and report information for enterprise operational plans, budgets and performance management
- organise and optimise the use of resources within agreed parameters to achieve planned outcomes
- revise plans to take account of the unexpected
- make decisions within limits of responsibility and authority
- ensure that legislation, statutory and enterprise requirements are met in work operations
- monitor outputs, analyse processes and introduce ways to improve operations
- use effective consultative processes
- promote a learning environment for personnel in immediate work area
- motivate and counsel personnel to improve performance.

Specific industry

Additional aspects of competency apply for each industry sector below.

Biomedical and environmental services

Access information from sources such as relevant Federal and State Acts, Environmental Protection Agency, National Pathology Accreditation Advisory Council (NPAAC) and National Health and Medical Research Council (NHMRC).

Food and beverage processing industries

Food Chemicals Codex, AOAC Methods of Analysis.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

The candidate requires sufficient knowledge of the enterprise’s business, strategic and operational plans and key performance indicators; laboratory services; and enterprise
products, services and customers to be able to supervise laboratory operations within a work or functional area.

Competency includes the ability to apply and explain:
- legislation, codes, standards and registration criteria relevant to the work area or function
- principles of budgeting, operational planning and efficient resource use
- workplace industrial agreements and regulations dealing with hygiene, dress and behaviour of employees
- SOPs and the technical details of sampling, testing, equipment and instrumentation within the work area
- problem solving techniques and contingency planning
- broad trends in production data (e.g., seasonal, annual)
- auditing procedures
- team leadership and development techniques
- mentoring and coaching techniques.

An appreciation of the laboratory’s business goals is also required as a basis for decisionmaking and actions.

**Assessment context**

This unit of competency should be assessed in a laboratory environment that either meets Australian Standards for working laboratories or the registration requirements of NATA or the Royal College of Pathology as appropriate.

**Interdependent assessment of unit**

This unit of competency may be assessed with:
- PML OHS 600 A – Implement and monitor risk management processes associated with OHS and environmental policies and procedures
- PML TEAM 600 A – Manage and develop teams
- PML ORG 601 A – Maintain registration and statutory or legal compliance in work/functional area.

This unit of competency should be assessed after:
- PML ORG 500 A – Schedule laboratory work for a small team
- PML QUAL 401 A – Apply quality system and continuous improvement processes
- PML COM 500 A – Provide information to customers.

**Assessment methods and resources**

Because of the comprehensive nature of this unit and the need to integrate a wide range of knowledge and skills, the assessment timeframe must allow for adequate assessment over a planning cycle and address a range of non-routine problems.
The following assessment methods are suggested:

direct observation of the candidate’s interactions with personnel
review of reports from subordinates, peers, managers and customers
review of reports, operational budgets and plans generated by the candidate
review of performance reports for the candidate’s work area
review of documented examples of quality performance improvements achieved and
elements of significant problems solved
simulations/role plays to assess situations which are critical but did not arise during the
negotiated assessment period
questioning/interview to assess underpinning knowledge.

Resources may include:
relevant workplace policies, procedures, operational reports, financial reports and stock
records.

**This competency in practice**

*Industry representatives have provided storylines to illustrate the practical application of
each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

The laboratory supervisor carried out a cost analysis for the regular testing of waste water for
heavy metals before its release. The supervisor found that it was more cost effective to out-
source these tests. As well as being more cost effective, this measure took pressure off
facilities and staff.
Biomedical and environmental services

A laboratory supervisor in a pathology laboratory noted that specimens regularly arrived later than expected during the last shift of the day. This meant that technical personnel could not be tasked productively during the delay. The laboratory supervisor, in consultation with the laboratory manager, established contingency plans that required only a minimum number of personnel to remain whenever these circumstances occurred. Then, only essential procedures were performed. Other procedures were left for the first shift of the following day. These arrangements did not compromise customer needs or enterprise plans and reduced operational costs.

Food and beverage processing industries

A technical officer had to complete a wide range of chemical analyses that required samples to be ignited for many hours in a muffler furnace, digested with acid, prepared for analysis by atomic absorption spectroscopy and gas chromatography (GC), and titrated against standard solutions. The laboratory supervisor noticed that the number of analyses performed each day by the technician tended to fluctuate widely without an obvious cause. Closer observation showed that the technician’s efficiency was dependent on the order in which the analyses were begun and the use of the auto sampler for overnight operation of the GC.

The supervisor suggested several ways to improve the technician’s time management. The supervisor installed a timer on the muffler furnace so that it could be operated overnight and organised the technician to perform labour intensive tasks after automated analyses had been initiated. The supervisor then showed the technician the optimum order to perform individual tasks and verified that his instructions were followed over succeeding weeks. The supervisor's actions significantly improved the productivity of the laboratory. Later it became obvious that the technician’s time management system was not working as effectively as it had. Again, the supervisor monitored the technician’s work and realised that since the daily analytical load was seasonal, a second management system had to be developed that was dedicated to the new season. Both systems were sufficiently flexible to take account of short term fluctuations in workload.

In summary, the organisational skills of the supervisor and technician’s ability to follow detailed instructions resulted in a more efficient use of company time, labour and resources.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
### Unit Title:

**Maintain registration and statutory or legal compliance in work/functional area**

**PML ORG 601 A**

### Unit descriptor

This unit of competency covers the senior technician/supervisor’s responsibility to ensure that her/his work or functional area complies with legislation and licensing, registration, or accreditation requirements (e.g., NATA) and enterprise policies and procedures. Under broad direction from scientists/medical staff/engineers the senior technician/supervisor accepts responsibility for the day to day operation of his/her functional area.

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<td>1</td>
<td>Interpret and communicate current legislation, codes and standards</td>
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<td>1.1</td>
<td>Maintain knowledge of current and new requirements impacting on work/functional area</td>
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<td>1.2</td>
<td>Distribute clear information regarding the roles and responsibilities of teams and individuals to maintain the laboratory’s statutory or legal compliance</td>
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<td>1.2</td>
<td>Explain the implications of non-conformance to all personnel within the work area</td>
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<td>2</td>
<td>Ensure that work practices meet compliance requirements</td>
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<tr>
<td>2.1</td>
<td>Plan work practices to ensure compliance with relevant legislation and licensing, registration, or accreditation requirements</td>
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<tr>
<td>2.2</td>
<td>Ensure that the calibration system is implemented to meet traceability requirements</td>
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<tr>
<td>2.3</td>
<td>Ensure that testing procedures are implemented so that methods and equipment are fit for purpose</td>
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<td>2.4</td>
<td>Implement systems to ensure the accuracy of measuring equipment</td>
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<td>2.5</td>
<td>Empower team members through coaching and mentoring to manage their responsibilities</td>
</tr>
</tbody>
</table>
3 Monitor, analyse, adjust and report performance

3.1 Ensure that actual and potential problems are identified, rectified and reported promptly to ensure workplace compliance
3.2 Analyse and supervise activities so that potential non-compliance is minimised
3.3 Recommend to designated personnel strategies to improve compliance
3.4 Ensure that individuals/teams are informed of new and improved procedures
3.5 Maintain systems, records and reporting procedures according to legislative and licensing, registration, or accreditation requirements and workplace procedures

4 Investigate, rectify and report non-conformance

4.1 Investigate and deal with non-conformance according to legislative and licensing, registration or accreditation requirements and workplace procedures
4.2 Provide on/off job training for personnel to acquire and apply competencies to meet legislative and licensing, registration or accreditation requirements
4.3 Re-design or adjust workplace practices to ensure that non-conformance is not repeated.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

While statutory or legal compliance is the responsibility of all personnel, supervisors have an important leadership role in promoting and monitoring workplace practices which enhance compliance. Statutory and legal requirements could include:

- general duty of care
- maintenance and confidentiality of records
- maintenance of records of breaches
- maintenance of certified reference materials and regulation 80 certificates
provision of information and training
regulations and codes of practice relating to hazards present in the work area
representative work groups/committees
dispute resolution.

Statutory or legal compliance may include but is not limited to:
OHS and environmental legislation
NATA accreditation
Australia standards of AS 2243 on Laboratory safety and AS 2500 on Storage of goods, AS 1514 on Measurement terminology, AS 2415 and AS 2000 on Calibration systems requirements
Therapeutic Goods Administration, Code of GMP
trade practices, weights and measures
waterways, Environmental Protection Agency
workers' compensation, Workcover, industrial relations

Communication could involve:
managers and supervisors
laboratory and production staff
regulating authorities
explanation of legislation, codes, standards and work practices such as:
- handling and use of animals (Animal Welfare Code 64)
- obtaining permits as required for collection of botanical and animal specimens
- minimising potential infection and contamination hazards and disposal of biological materials (eg, blood, urine, body tissues) which may be infected with hepatitis B and C, HIV/AIDS
- Food Standards Code, export regulations governing enterprise products.

**Updating information**

This competency is not expected to need rapid updating because it is not limited by current versions of legislation, procedure and practices.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to supervise laboratory operations to ensure that the work or functional area complies with legislation and laboratory licensing, registration, or accreditation requirements (eg, NATA) and the enterprise’s policies and procedures. In particular, the assessor should look to see that the candidate:

- monitors and analyses work practices to ensure compliance and takes appropriate actions to rectify potential problems or instances of non-conformance
- provides information and training on roles and responsibilities and enterprise procedures dealing with legal/statutory requirements
- negotiates changes to work processes and procedures to meet statutory or legal requirements
- develops and introduces practices to improve the work environment
- communicates effectively with others
- provides coaching and mentoring support to personnel to change work practices
- keeps required records complete, current and secure.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- workplace procedures governing document control, record management, communication and reporting, internal and external audits
- scientific technical terminology used to describe legislative, licensing, or registration requirements (eg, traceability)
statutory or legal compliance requirements such as:
- legislation governing laboratory operations
- National Measurement Act
- NATA accreditation.

Assessment context

This unit of competency should be assessed in a laboratory environment that either meets Australian Standards for working laboratories or the registration requirements of NATA or the Royal College of Pathology as appropriate.

Interdependent assessment of unit

This unit of competency may be assessed with:

- PML COM 500 A – Provide information to customers
- BSZ 404 A – Train small groups
- PML ORG 600 A – Supervise laboratory operations in work/functional area
- PML COM 601 A – Develop laboratory documentation.

This unit of competency should be assessed after:

- PML ORG 500 A – Schedule laboratory work for a small team
- PML QUAL 401 A – Apply quality systems and continuous improvement processes.

Assessment methods and resources

The following assessment methods are suggested:

- observation of the candidate's interactions with personnel
- review of verified records and reports generated by the candidate
- feedback from managers regarding the candidate’s ability to implement relevant enterprise procedures
- review of information developed by the candidate and provided to the workgroup
- questioning to assess underpinning knowledge.
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

A laboratory supervisor was asked to do an internal audit of a work area as part of an analytical laboratory’s preparation for a NATA assessment. The supervisor checked items such as the currency of the quality manual and laboratory documentation and the storage of reference standards, and compared the documentation of test results with NATA requirements. As a result of this internal audit, the supervisor was confident that the forthcoming NATA assessment would show that the work area complied with all requirements.

**Biomedical and environmental services**

A pathology laboratory was preparing for NATA assessment. The role of one laboratory supervisor was to organise information sessions to inform personnel of the standards and codes to be followed for accreditation. These covered issues such as working with biological, chemical and radiation hazards; the use of safety equipment; the disposal of waste; and patient confidentiality. Training was provided to ensure all personnel were equipped with sufficient knowledge and skills to fulfil their responsibilities in line with the relevant codes and standards. The thorough preparation of the laboratory personnel by the laboratory supervisor assisted the laboratory to gain NATA accreditation.

**Food and beverage processing industries**

A team of technical assistants performed a common set of food analyses that were essential to the operations of a food processing company. After a period of rapid staff turnover, their supervisor noticed that the degree of variance in the analytical results had increased. An internal proficiency study confirmed that this rise was not due to compositional differences between samples. The supervisor sought to overcome this problem by first discussing it with the team. The supervisor realised that some of the recently employed technical assistants did not fully understand some analytical procedures. Furthermore, each member of the team, for various reasons, had a distinct preference for performing some procedures over others and this appeared to influence their competency to conduct each analysis.

In consultation with the team, the supervisor made several changes to the way they worked. A more structured induction of new staff was introduced and where possible each technician was allocated the analyses that they preferred and were most competent to perform. The supervisor also instigated a review of the analytical methods involved and identified the critical steps in each assay as defined by the laboratory’s accreditation authority. Particular attention was paid to steps regularly misunderstood by one or more technicians in the past and a series of “critical operating procedures” were developed. These procedures, together with the standard operating procedures, were clearly displayed in the area where the relevant assay was conducted. Overall, these actions by the laboratory supervisor improved the work performance and satisfaction of the staff, maintained the laboratory’s standards of compliance and enhanced the level of communication and cooperation with the team.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</tbody>
</table>
Maintain registration and statutory or legal compliance in work/functional area
## Unit Title:
Manage complex projects

### Unit descriptor

This unit of competency covers the ability to interpret a complex technical brief, determine project methodology and resource requirements, establish a project plan, manage the project to a successful conclusion and evaluate the outcomes.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Interpret brief and design feasible project plan</td>
<td>1.1 Interpret and confirm project objectives, deliverables, constraints and principal work activities</td>
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<td></td>
<td>1.2 Determine resource requirements including personnel, equipment and materials</td>
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<td></td>
<td>1.3 Develop a detailed implementation plan for the project outlining methodology, milestones and budget</td>
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<td>1.4 Identify roles and responsibilities of project team members</td>
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<td>1.5 Analyse quality requirements to ensure compliance with quality standards</td>
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<td></td>
<td>1.6 Develop risk management strategies and risk management plans to ensure successful and timely outcomes</td>
</tr>
<tr>
<td>2 Establish and implement project plan</td>
<td>2.1 Brief team members about project and allocate roles and responsibilities, balancing job roles and skills development opportunities</td>
</tr>
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<td></td>
<td>2.2 Establish communication and reporting mechanisms</td>
</tr>
<tr>
<td></td>
<td>2.3 Implement agreed time management strategies to ensure milestones are met</td>
</tr>
<tr>
<td></td>
<td>2.4 Apply agreed quality requirements to measure performance and outcomes</td>
</tr>
</tbody>
</table>
3 Manage project

3.1 Monitor and report progress of activities in relation to the project plan

3.2 Ensure income and expenditure is in line with the agreed project plan and budget

3.3 Work with team to analyse and diagnose problems and to determine corrective actions

3.4 Implement agreed variations to the plan to accommodate changing situations

3.5 Maintain accurate records and communication with stakeholders and project team members

4 Finalise project

4.1 Ensure project objectives are met and deliverables are provided on time and within budget

4.2 Complete all reporting requirements

5 Evaluate project methodology

5.1 Assess the effectiveness of resource management in delivering project outcomes

5.2 Evaluate the effectiveness of communication processes used throughout the project

5.3 Recommend improvements for future projects.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

The focus of projects could involve:

development or modification of products and services
acquisition and commissioning of new equipment
commissioning of laboratory facilities
appraisal of supplies
development of applications for customers
validation of analytical methods and/or equipment
quality improvement or corrective action teams.
Records may take the form of:
lists of potential costs, invoice and payments records
project and/or enterprise files and records
reports to clients, personnel and higher management
risk management plans and log books
diaries, scheduling charts and other charts.

Communication may be computer generated, and may involve:
customers, stakeholders, external authorities and project team
reports, briefs, minutes, letters, oral briefings, advice and conversations, telephone calls.

Resources may include:
personnel
budget
equipment, materials, facilities
computer project planning programs.

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to establish a project team and implement a project in response to a given brief. The project will contribute to the business needs of the enterprise. In particular, the assessor should look to see that the candidate can:

- Analyse a complex technical brief and prepare a feasible project implementation plan
- Reach milestones within budget
- Consult and communicate effectively to ensure the project outcomes are achieved
- Maintain accurate records and documentation in accordance with the enterprise procedures
- Select and establish operational systems for the project
- Plan work activities, resources and finances to ensure the project outcomes are achieved within the timeframe and budget constraints
- Monitor and evaluate the progress of the project.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- Purpose and methods of planning
- Techniques for monitoring timelines, expenditure, team performance
- Techniques for achieving effective communication and cooperation
- Techniques for troubleshooting, problem solving and conflict resolution
- Reporting requirements
- Techniques for evaluation and continuous improvements.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:

PML TEAM 600 A – Manage and develop teams
PML QUAL 600 A – Implement and monitor quality systems and continuous improvement processes.

This unit of competency should be assessed after:

PML QUAL 401 A – Apply quality systems and continuous improvement systems.

Assessment methods and resources

The following assessment methods are suggested:

- review of reports, operational budgets and project plans generated by the candidate
- review of project outcomes and customer satisfaction
- questioning/interview to assess underpinning knowledge
- feedback from project team and management
- review of documented examples of quality performance improvements achieved and examples of significant problems solved
- observation of the candidate’s interaction with project team.

Resources may include:

- procedures and documentation typically used by the enterprise
- scheduling charts
- operational reports
- financial plans
- sample budgets.
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

A cosmetics manufacturing company decided to upgrade the image of a product range which included lipsticks, nail lacquers, hair shampoos and conditioners. A technical specialist coordinated the project and organised input from marketing, development, quality assurance and production personnel. The production boundaries were defined through consultation with marketing, and it was decided to update shades of shaded products and introduce natural ingredients wherever possible. The project had to be completed within a reasonably short timeframe and within a tight budget which placed overall constraints on the way the project could be handled.

After developing and getting approval for an implementation plan, team members were briefed and development samples produced for approval. Product characteristics were checked and recommendations made for adjustments until each product met requirements. When pilot batch manufacture had been successfully completed, project development processes were fully documented and then passed to production to allow for efficient development of production batches.

**Biomedical and environmental services**

The quality team in a laboratory has set a goal of getting reports out more quickly and assigned the coordination of the project to one of the senior technical officers. The officer prepared an outline of the project, a timeframe, a resource list and budget. Specific tasks were allocated to members of the quality team according to their abilities and existing work commitments. The officer monitored the project’s progress by tracking and adjusting elements as necessary. After the development of a final draft for the revised procedures, a draft project report was prepared for consideration by the quality team.

**Food and beverage processing industries**

A dairy company currently uses an imported cocoa-based product for the chocolate flavouring of their milk. Following a feasibility study of a range of ingredients, it was decided to further investigate an alternative source on the basis of cost.

A technical specialist prepared a project plan that included required personnel, materials, equipment and a detailed GANTT chart. Key personnel from quality assurance, production, engineering, product development and marketing were chosen for the project team. The project was monitored to confirm progress, control expenditure and review the suitability of the alternative product source. At the end of the project the technical specialist assessed the outcomes and prepared a detailed report that recommended the use of a local ingredient.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
## Unit Title:

**Maintain quality system and continuous improvement processes within work/functional area**

### PML QUAL 600 A

## Unit descriptor

This unit of competency covers the senior technician/supervisor’s responsibility to ensure that quality system requirements are met and to initiate continuous improvements within the work/function area. Under broad direction from scientists/medical staff/engineers the senior technician/supervisor accepts responsibility for the day to day quality of outputs for his/her work/functional area.

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<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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<tbody>
<tr>
<td>1 Develop and maintain quality framework within work area</td>
<td>1.1 Distribute and explain information about the enterprise’s quality system to personnel</td>
</tr>
<tr>
<td></td>
<td>1.2 Encourage personnel to participate in improvement processes and to assume responsibility and authority</td>
</tr>
<tr>
<td></td>
<td>1.3 Allocate responsibilities for quality within work area in accordance with quality system</td>
</tr>
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<td>1.4 Provide coaching and mentoring to ensure that personnel are able to meet their responsibilities and quality requirements</td>
</tr>
<tr>
<td>2 Maintain quality documentation</td>
<td>2.1 Identify required quality documentation, including records of improvement plans and initiatives</td>
</tr>
<tr>
<td></td>
<td>2.2 Prepare and maintain quality documentation and keep accurate data records</td>
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<tr>
<td></td>
<td>2.3 Maintain document control system for work area</td>
</tr>
<tr>
<td></td>
<td>2.4 Contribute to the development and revision of quality manuals and work instructions for the work area</td>
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<td></td>
<td>2.5 Develop and implement inspection and test plans for quality controlled products</td>
</tr>
</tbody>
</table>
3 Provide training in quality systems and improvement processes

3.1 Analyse roles, duties and current competency of relevant personnel

3.2 Identify training needs in relation to quality system and continuous improvement processes

3.3 Identify opportunities for skills development and/or training programs to meet needs

3.4 Initiate and monitor training and skills development programs

3.5 Maintain accurate training records

4 Optimise and report performance

4.1 Review performance outcomes to identify ways in which planning and operations could be improved

4.2 Enhance customer service through the use of quality improvement techniques and processes

4.3 Adjust plans and communicate these to personnel involved in their development and implementation

5 Evaluate relevant components of quality system

5.1 Undertake regular audits of components of the quality system that relate to the work area

5.2 Implement improvements in the quality system in accordance with own level of responsibility and workplace procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency is relevant to experienced technical officers and supervisors who initiate continuous improvements.
Quality audits and evaluations for the work area may be undertaken as an individual or as part of a team. Quality manuals and procedures may be based on standards such as:

- ISO 9001, 9002 and 9003, ISO GUIDE 25
- National Association of Testing Authorities (NATA) requirements,
- Good laboratory practice (GLP), good manufacturing practice (GMP), the British Standard BS 5750 and the OECD Principles of good laboratory practice, Therapeutic Goods Administration - Code of GMP
- AS1199 – Sampling procedures and tables for inspection by attributes
- AS1399 – Guide to AS1199
- HACCP principles
- international testing method (eg, AOAC, CODEX).

Quality audits could include:

- regular checks of laboratory procedures
- daily and weekly checks of specimen reception, instrumentation and results for control and standard samples to identify non-conformance and problem areas
- maintenance of appropriate certified reference materials (CRMs)
- participation in external quality assurance programs.

Communication may involve:

- supervisors, managers and quality managers
- laboratory and production personnel
- customers and suppliers
- auditors.

Reporting may involve:

- verbal responses
- data entry into laboratory or enterprise databases
- written reports.

Documentation could include:

- sampling plans
- enterprise quality manual
- quality (certification or registration) requirements
- audit documents
- performance plans and reports
- training records and/or plans
- workplace procedures relating to OHS, EO, environmental legislative requirements
- industrial awards, enterprise agreements.
Updating information

Changes in quality standards should be noted. It is anticipated that from the year 2000 onwards ISO Guide 25 will be superseded by ISO IIEC 17025.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to implement and monitor defined quality system requirements and initiate continuous improvements within the work area. In particular, assessors should look to see that the candidate:

- applies effective problem identification and problem solving techniques
- strengthens customer service through a focus on continuous improvement
- implements, monitors and evaluates quality systems in the work area
- initiates quality processes to enhance the quality of performance of individuals and teams in the work area
- gains commitment of individuals/teams to quality principles and practices
- implements effective communication strategies
- encourages ideas and feedback from team members when developing and refining techniques and processes
- analyses training needs and implements training programs
- prepares and maintains quality and audit documentation.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
relevant national and international quality standards and protocols
the enterprise quality system
continuous improvement principles
enterprise organisational structure, delegations and responsibilities
SOPs for the technical work performed in work area
communication/reporting protocols
policy and procedure development processes
enterprise information systems management.

The candidate also requires sufficient knowledge of enterprise business goals and key performance indicators to implement continuous improvement processes effectively.

Assessment context

This unit of competency should be assessed in a laboratory environment that either meets Australian Standards for working laboratories or the registration requirements of NATA or the Royal College of Pathology as appropriate.

Interdependent assessment of unit

This unit of competency should be assessed after:
PML QUAL 401 A – Apply quality system and continuous improvement processes
PML COM 500 A – Provide information to customers.

Relevant technical competencies may also be required and should be decided by the enterprise.
Assessment methods and resources

Competency in this unit should be assessed over a sufficient period of time to enable the candidate to initiate and implement improvements.

The following assessment methods are suggested:

observation of the candidate leading a quality improvement team
review of verified reports of improvement initiatives and/or projects conducted by the candidate
feedback from peers, team members, supervisors, quality manager and customers
review of quality documentation prepared and maintained by the candidate
review of training places prepared by the candidate for personnel in the work area
review of audit processes and outcomes generated by the candidate
questions to assess underpinning knowledge of procedures and contingency management.

Resources may include:

quality manuals and documentation.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

The laboratory supervisor with a pharmaceutical company had participated in the production of a company wide quality manual. This manual was distributed amongst the various work teams and an induction program for all workers was undertaken to familiarise them with the demands of the quality system. A transient, sharp improvement in laboratory operations was observed after which the quality metrics fell (although not to pre-quality system levels). The supervisor investigated this phenomenon and found that many of the analytical specifications determined by the company were detailed in the quality manual and nowhere else. Put simply, after an initial period during which laboratory personnel consulted the manual for guidance, there was a tendency for the personnel to rely more on their memories and less on the manual. The supervisor made it clear to personnel that “guessing” procedures and methodologies was unacceptable. If they were uncertain of something they must consult the manual.

Awareness of this problem allowed the supervisor to be more vigilant in monitoring laboratory operations, and personnel eventually developed the habit of referring to the manual as required. A subsequent review of the manual went smoothly and efficiently. The staff were familiar with the manual, its strengths and shortcomings, and had made annotations for improvements that were readily incorporated during the review.
Biomedical and environmental services

Collection of botanical specimens for research purposes required personnel to record data at the time of collection in a prescribed format. A quality audit conducted by the laboratory supervisor indicated that some documentation was incomplete. The supervisor also found that sometimes documentation was completed later, from memory, rather than in the field. The supervisor met with the collectors involved, reinforced the enterprise protocols, explained the importance of diligent record keeping in achieving valid research outcomes and gained a renewed commitment to quality from the personnel. Subsequent quality audits indicated that the personnel had met their commitment and the research work was no longer jeopardised.

Food and beverage processing industries

The laboratory supervisor of a food processing company had noted over recent years that the requests of some customers were virtually impossible to fulfil. For example, one customer wanted a bleached flour which had not undergone any chemical treatment or adulteration for a particular market niche. Another customer wanted analytical results within an unrealistic timeframe. While none of these requests had caused serious friction between the company and its customers, the supervisor decided to take a proactive stance to address the not altogether unreasonable ignorance of some customers. After consulting with the laboratory manager, the supervisor invited all customers to tour the laboratory, during which the aims and limitations of the analytical procedures were explained. The tour gave customers the opportunity to assess their demands of the company and generate more realistic ideas for modifying the company’s products to suit their needs.

The outcomes of this exercise were that company-customer relations were improved, the future expectations of some customers were more practical, and the company’s ongoing program of product improvement was facilitated by customer input.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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Laboratory Operations Training Package

Maintain quality system and continuous improvement processes within work/functional area
## Unit Title

**Conduct an internal audit of the quality system**

**PML QUAL 601A**

### Unit descriptor

This unit of competency covers the senior technician/supervisor’s responsibility to prepare for, carry out and document an internal audit of aspects of the laboratory’s quality system. It also covers the implementation of the identified corrective action and opportunities for improvement and the monitoring of its effectiveness.

Senior technician/supervisors often play a key role in audit teams because of their analytical and diagnostic skills and extensive knowledge of both quality systems and complex technical procedures.

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<td>1 Prepare for internal audit</td>
<td>1.1 Analyse brief to determine the scope and detailed requirements of the planned audit</td>
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<tr>
<td></td>
<td>1.2 Identify procedures and/or the work area to be audited, and collect relevant documentation</td>
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<td>1.3 Brief relevant personnel and allocate roles and responsibilities</td>
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<td>1.4 Develop a detailed audit plan in consultation with relevant personnel</td>
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<td></td>
<td>1.5 Develop a checklist to identify conformance and non-conformance</td>
</tr>
<tr>
<td>2 Conduct audit</td>
<td>2.1 Explain the components of the quality system and work area to be audited</td>
</tr>
<tr>
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<td>2.2 Collaborate with relevant personnel to maximise continuous improvement and ownership of the audit process</td>
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<tr>
<td></td>
<td>2.3 Collect sufficient evidence to identify non-conforming aspects of the quality systems</td>
</tr>
<tr>
<td></td>
<td>2.4 Analyse evidence to identify suitable corrective action(s).</td>
</tr>
</tbody>
</table>
3 Report findings

3.1 Document findings from the audit process in the required format

3.2 Present recommendations for corrective action(s)

3.3 Provide strategies for the implementation of the corrective action(s)

4 Complete corrective action

4.1 Develop and implement an action plan to improve the quality system

4.2 Consult with relevant personnel regarding the necessary strategies to improve the quality system

4.3 Evaluate and report the effectiveness of the corrective action after an agreed time interval

4.4 Ensure that relevant certification is maintained.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency represents a thorough examination of various aspects of the quality system. Often laboratory supervisors play a key role in the audit team due to their knowledge of the quality system and their broad technical expertise and specialised knowledge of procedures and technology.

Elements of a quality system may include:

- management responsibility quality system
- contract review
- design control
- document and data control
- purchasing
- control of customer-supplied product
- product identification and traceability
- process control
- inspection and testing
- statistical analysis
- inspection and test status
- control of nonconforming product
- corrective and preventative action
- handling, storage, packaging, preservation and delivery
- control of quality records
- internal quality audits
- training
- servicing
- control of inspection, measuring and test equipment.
Information sources may include:

- enterprise quality manual
- any documentation related to the quality elements being audited
- customer complaints
- training records.

Data records
- certification documentation from clients/suppliers
- material/equipment specifications

Quality manuals and procedures may be based on standards such as:

- ISO 9001, 9002 and 9003, ISO GUIDE 25
- Good laboratory practice (GLP), good manufacturing practice (GMP), the British Standard BS 5750 and the OECD Principles of good laboratory practice
- OHS legislation and codes, regulations and Australian standards that apply to the tasks undertaken in the workplace.

Quality improvement tools and techniques may include:

- run charts, control charts, histograms and scattergrams to present QC data
- PDCA (plan, do, check, act)
- Ishikawa fishbone diagrams, cause and effect diagrams
- logic tree
- similarity/difference analysis
- Pareto charts and analysis
- forcefield/SWOT analysis
- process capability.

Communication may involve:

- managers laboratory and production personnel
- customers and suppliers other personnel with QA responsibilities.

Reporting may involve:

- verbal responses data entry into laboratory or enterprise databases
- written report presentations
- judgement and recommendations.

Documentation could include:

- enterprise quality manual
- audit documents
- safety procedures
- HACCP plans.

- quality (certification or registration) requirements
- standard operating procedures (SOPs)
- work instructions

**Updating information**

Changes in quality standards should be noted. It is anticipated that from the year 2000 onwards ISO Guide 25 will be superseded by ISO IIEC 17025.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to prepare and conduct an audit of the quality system following enterprise procedures. This includes the ability to implement corrective action and monitor its effectiveness. In particular, the assessor should look to see that the candidate:

- implements effective communication strategies before, during and after an audit
- collects and analyses all necessary data/documentation/records
- encourages suggestions and feedback from team members when developing and refining processes
- monitors and reviews the team’s performance
- applies effective problem identification and problem solving techniques
- prepares and maintains quality and audit documentation
- makes recommendations based on the findings of non-conformance items
- initiates and evaluates corrective action and makes appropriate adjustments.

Specific industry

Additional aspects of competency apply for each industry sector below.

Food and beverage processing industries

incorporate food safety and/or HACCP plan requirements into audit monitor and verify critical control limits.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain the:
enterprise quality system, relevant national and international quality standards and protocols
audit process
continuous improvement principles
importance of identifying and reporting non-conformance
documentation processes
problem solving techniques to identify causes and options to remedy problems
workplace communication reporting requirement and procedures
enterprise organisational structure, responsibilities and delegations.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment. Ideally, competency should be assessed within the context of a team based internal quality audit.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML QUAL 600 A – Maintain quality system and continuous improvement processes within work/functional area
PML TEAM 600 A – Manage and develop teams.

This unit of competency should be assessed after:
PML QUAL 401 A – Apply quality systems and continuous improvement processes.
Assessment methods and resources

Competency in this unit should be assessed over a sufficient period of time to enable the candidate to prepare and conduct the audit, report the findings and implement and evaluate any corrective action.

The following assessment methods are suggested:

- observation of the candidate’s performance at key points during the audit
- review of data and reports obtained from audit records
- review of documentation completed by the candidate as part of the development of the audit process
- feedback from team members
- feedback from management regarding the implementation of the internal audit.

Resources may include:

- quality manuals and documentation

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

A new laboratory is being planned and the senior technical officer has been included in the steering committee who are preparing the brief. The committee has decided that the preparation of the brief will include an audit of the safety and operating standards of the current laboratory. The aim of the audit is to compare the current safety operations and facilities that are acceptable within the framework of the current premises with those of a modern building. The audit will monitor equipment, storage facilities and current methodologies in order to determine the necessary infrastructure changes that might be incorporated into the plan, or changes in methodologies that would bypass the need for the building changes through a change in equipment.

**Biomedical and environmental services**

There have been a few problems in the sample reception area. Not all tests specified in requests have been aliquoted and, on a few occasions, a test was deleted because a technical assistant decided that there was insufficient sample provided. The supervisor has decided that the processing system should be reviewed and the reasons for the mistakes and omissions identified.
After tracking the sample arrival, processing, labelling and distribution, the supervisor noted that the technical assistants often could not identify the sample test code. Despite the instruction to seek assistance, they did not contact a supervisor if s/he could not be approached immediately. Sometimes they put the sample aside for the supervisor’s attention and it was forgotten over the shift change. On other occasions, they assigned a test code in good faith.

As a result of the audit, a database of the test codes, sample requirements, distribution destination and conditions for storage was established at sample reception. The technical assistants were shown how to access information that they might require if the supervisor was not available. This action reduced the number of mistakes and the frequency of test omissions, and improved throughput of samples.

**Food and beverage processing industries**

Following an internal audit, a major non-conformance was identified which had resulted in a beverage label listing an ingredient that was not present. A corrective action had been made requiring that a new form be generated for release of label details from the purchasing department. The laboratory supervisor was given the responsibility as part of the audit team to follow up 3 weeks later and confirm that the corrective action had been completed. The laboratory supervisor gathered the data and a copy of the corrective action report and organised a meeting with staff from the purchasing department. During the meeting, the laboratory supervisor checked the revised quality form that now included the signature of the authorising officer from the purchasing department. The laboratory supervisor also reviewed the quality procedures to ensure that the new form’s code was updated and that all old copies were removed. The report was then presented to the audit team for final approval and signing off.

**Key competencies**

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</tr>
</tbody>
</table>
Conduct an internal audit of the quality system
Unit Title:
Manage and develop teams

Unit descriptor

This unit of competency covers the ability of senior technicians/supervisors to develop and empower team members through motivating, mentoring, coaching and promoting team cohesion to achieve planned outcomes.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Promote team</td>
<td>1.1 Clearly define and communicate team goals and roles</td>
</tr>
<tr>
<td>1.1 Effectiveness</td>
<td>1.2 Promote respect for team members through coaching and example</td>
</tr>
<tr>
<td>1.3</td>
<td>1.3 Achieve balanced participation in discussions and activities</td>
</tr>
<tr>
<td>1.4</td>
<td>1.4 Negotiate work roles to balance team goals, job requirements and team members’ strengths, experience, work style and career goals</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5 Apply effective conflict resolution processes and implement them fairly</td>
</tr>
<tr>
<td>1.6</td>
<td>1.6 Provide effective links between senior management, other teams and the work team</td>
</tr>
<tr>
<td>1.7</td>
<td>1.7 Encourage networking to share experiences, expertise and resources</td>
</tr>
<tr>
<td>2 Identify and develop individual potential</td>
<td>2.1 Assess each team member’s strengths and weaknesses against agreed performance requirements, and identify training and development options in consultation with them</td>
</tr>
<tr>
<td>2.2</td>
<td>2.2 Provide opportunities to develop skills through allocation/rotation of work tasks and roles</td>
</tr>
<tr>
<td>2.3</td>
<td>2.3 Encourage the sharing of knowledge and skills through coaching, mentoring and shadowing</td>
</tr>
</tbody>
</table>
3 Monitor individual and team performance

3.1 Review each team member’s performance on a regular basis with the individual
3.2 Recognise achievements and address problems with performance
3.3 Provide constructive feedback on the performance of the team and team members
3.4 Record information relating to individual and team performance following enterprise/statutory procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

The team leader manages the team to improve its performance through leading, facilitating and empowering its members. The team may:

be ongoing with responsibility for particular services or functions, or project based
have a mixture of full and part-time employees and contractors
be separated by distance and work at sites outside the laboratory.

The team operates within:
small, medium and large contexts
internal and external environments
enterprise guidelines covering access and equity principles and practices, licensing requirements, industrial awards, enterprise bargaining agreements
agreed responsibility and accountability requirements
appropriate goals, objectives
given resource parameters.

Monitoring team performance may include:
applying enterprise performance management systems
communicating with senior management, team members and the team as a whole
recording and updating confidential personal data
applying total quality management principles.

Identifying individual potential may require:
comparisons of work requirements against outputs
competency based assessment against standards or enterprise requirements.

Communication within and between teams could involve issues such as:
critical events on shift
urgent or abnormal results that require attention
problems with instruments, reagents, tests and sampling
equipment and material shortages
changes to work priorities, schedules and rosters.

Documentation could include:
job descriptions, person specifications
workplace procedures, OHS and EO policies
licensing/registration requirements
industrial awards and enterprise agreements.

**Updating information**

This competency is not expected to require rapid updating as it is not limited by current versions of legislation, procedures and practice.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated by the ability to work effectively with team members who may have diverse work styles, cultures, and perspectives. Consistent performance at the required standard should be demonstrated. In particular the assessor should look to see that the candidate:

promotes team cohesion by, for example:
- providing clear information and directions when devolving responsibility and accountability
- organising regular team meetings
- involving the team in planning and allocation of tasks
- encouraging the team to openly propose, discuss and resolve issues
- dealing with conflict before it adversely affects team performance
- treating people openly and fairly
- recognising individual and cultural differences
- recognising and rewarding achievement

improves team and individual performance by, for example:
- using appropriate continuous improvement processes to improve team planning and results
- analysing barriers to team effectiveness and developing appropriate strategies to overcome them
- recording individual and team performance
- monitoring individuals’ outputs and providing constructive feedback
- identifying and utilising individuals’ strengths
- identifying individuals’ training needs and providing development opportunities
- supporting the team to share knowledge and skills.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- the organisational structure and layout of the laboratory and enterprise
- enterprise/statutory policies and procedures relating to access and equity
- staff/workgroup practices, relevant sections of industrial awards and enterprise bargaining agreements
- key principles of team dynamics, team leadership and management
- interpersonal/communication strategies for a diverse workforce
- conflict resolution strategies and processes
- key principles of performance management systems
- performance outcomes expected and key indicators
- business goals
- operating budgets and plans for work area.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:

PML ORG 600 A – Supervise laboratory operations in work/functional area.

This unit of competency should be assessed after:

PML TEAM 300 A – Work efficiently as part of a team
PML COM 500 A – Provide information to customers.
Assessment methods and resources

Competency in this unit should be assessed over a sufficient period of time to enable the candidate to initiate and implement improvements.

The following assessment methods are suggested:

- observation of the candidate during team meetings and contact with individual team members
- interview questions with the candidate to assess underpinning knowledge of team dynamics, leadership and management
- review of record systems and documentation of team outputs and performance
- feedback from team members about team processes
- feedback from managers about team performance
- feedback from customers serviced by the team.

Resources may include:

- relevant OHS, EO, licensing, registration policies and procedures
- industrial awards and enterprise agreements.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

A materials testing laboratory introduced a mentoring system as part of its laboratory work teams program. Laboratory assistants and technicians were placed in work teams that included technical specialists. This strategy was designed to enable less experienced team members to develop advanced technical skills on the job. The team leader acted as the mentor, monitored the competency of the less experienced team members and organised work tasks to further develop their skills.

For example, as part of a quality improvement project, the team was asked to propose a way of minimising waste disposal. After discussing a number of alternatives, the team narrowed down the choice to one feasible suggestion, and then investigated the cost and environmental implications with the guidance of the team leader.

**Biomedical and environmental services**

Two technical officers working in the haematology section of a large hospital laboratory explained to their supervisor that they would like to gain experience of making blood films, having learned the basic skills at college. The supervisor agreed, but first assessed their competency against enterprise standards and recognised that they could benefit from some on-the-job training. The supervisor arranged for them to be coached by a more experienced team member. Some time later, they were assessed as competent and able to regularly perform the task.
Food and beverage processing industries

The new laboratory supervisor of a food processing company was keen to develop the professionalism of the laboratory team. The supervisor wanted to enhance the team’s levels of cooperation, participation in the ongoing development of the quality management system and willingness to suggest refinements to the food analyses that they performed. Neither the supervisor nor the team of technicians believed they had the time to devote to in-house professional development exercises. In any event, the technicians were dubious about the effectiveness of these activities. Instead, the supervisor offered to meet the costs of the technicians joining a professional society of their choice, provided that it was closely related to the work performed in the laboratory. Most of the staff accepted this offer.

Over the next few months, a significant improvement in the enthusiasm of the staff and the quality of their work occurred. The supervisor attributed this to an increased sense of esteem for their profession, the forging of links with the laboratory staff of other companies and the opportunity to discuss their work within a wider circle of peers. Some technicians made the time to visit other laboratories, where they were able to assess new work practices and the merits of instrumentation not used in their own workplace. Overall, the supervisor found that the benefits to the operation of the laboratory team greatly outweighed the modest financial cost involved.

Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</tbody>
</table>
Unit Title:
Select appropriate test methods and procedures

Unit descriptor

This unit of competency covers the senior technicians/supervisor’s ability to select appropriate test methods and/or procedures to satisfy the range of testing situations normally encountered in the laboratory. Selection of appropriate methods and procedures may relate to normal testing requirements, “one off” tests sometimes required for special testing situations or tests required to meet an enterprise’s regulatory/accreditation or licensing requirements.

In any of these situations, the senior technician/supervisor is required to demonstrate command of wide ranging, highly specialised technical skills. They are expected to execute sound judgement in the selection of appropriate methodology under the broad guidance of scientists/medical staff/engineers.

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<tr>
<th>ELEMENT OF COMPETENCY</th>
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<tbody>
<tr>
<td>1 Determine sample characteristics and testing requirements</td>
<td>1.1 Examine sample documentation and/or consult with sample supplier to determine nature of sample</td>
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<tr>
<td></td>
<td>1.2 Determine sample characteristics which may affect testing requirements</td>
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<td></td>
<td>1.3 Confirm reason (e.g., OHS or environmental) for testing and determine if regulatory standards apply</td>
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<td></td>
<td>1.4 Determine testing requirements</td>
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<tr>
<td>2 Select test methods</td>
<td>2.1 Identify appropriate standards, reference materials, test methods and procedures which may be applicable</td>
</tr>
<tr>
<td></td>
<td>2.2 Estimate material and personnel requirements and determine OHS requirements</td>
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<td></td>
<td>2.3 Evaluate standards and procedures against testing requirements</td>
</tr>
<tr>
<td></td>
<td>2.4 Select appropriate test methodology consistent with testing requirements and resource availability</td>
</tr>
<tr>
<td></td>
<td>2.5 Recommend selected method to appropriate personnel</td>
</tr>
</tbody>
</table>
Select and evaluate reference materials

3.1 Identify reference materials suitable for intended purpose

3.2 Assess the range of reference materials against intended use

3.3 Determine if legal traceability is required and take appropriate action

Select test method(s) for regulatory and/or licensing requirements

4.1 Ensure that regulatory standards, test methods and procedures used are current

4.2 Determine sample testing requirements according to standard procedures

4.3 Select testing method based on regulatory and/or licensing requirements

4.4 Recommend method to appropriate personnel.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by senior technicians or technical specialists who select appropriate test methods and procedures to meet enterprise, customer and/or regulatory requirements. Factors which may influence method selection include:

- Quantity of sample available for testing
- Levels of detection required
- Type of matrix
- Possible contaminants and resulting interference
- Availability of suitable equipment
- Availability of trained staff
- Cost
- Selectivity of method
- Accuracy/precision
- Method range.

Appropriate methods and procedures will depend on customer, enterprise and/or regulatory/licensing requirements. The choice will depend on laboratory resources available...
and personnel training and skills.

Test methods may be required:
- to control starting materials, in-process materials and products
- to troubleshoot production, environmental, biomedical and food related issues
- for environmental monitoring
- to investigate complaints
- to meet customer requirements
- to meet produce development requirements
- to meet regulatory/accreditation or licensing requirements.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. Test methods and procedures may be or have been prepared from:
- Australian and international standards
- Acts and their regulations
- codes of practice (such as GLP and GMP)
- National Measurement Act
- material safety data sheets (MSDSs)
- standard operating procedures (SOPs)
- equipment manuals
- equipment startup, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

**Updating information**

Changes in codes of practice and applicable standards should be noted.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to select appropriate test methods and procedures to satisfy the range of testing situations normally encountered in the laboratory. In particular, the assessor should look to see that the candidate can:

- identify standards appropriate to testing requirements of the laboratory
- apply enterprise procedures to select appropriate standards
- use method performance measures such as accuracy, precision, linearity, selectivity, range, limit of detection and matrix characteristics in method selection
- clearly document method selection procedure(s)
- identify standards that support compliance with regulatory and/or licensing requirements
- follow OHS procedures and GLP.

Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:

- principles, concepts and enterprise/regulatory requirements related to method selection
- regulatory/licensing testing requirements
- relative advantages/disadvantages of test methods for a range of testing situations
- cost advantages/disadvantages of enterprise test methods
- chemical/physical principles underpinning test method and their application to selection of testing methods for different materials
- enterprise/regulatory requirements regarding recording and reporting.
Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML ORG 600 A – Supervise laboratory operations in work/functional area.

This unit of competency should be assessed after:
at least three (3) units from the PML TEST “500 series”.

Assessment methods and resources

The following assessment methods are suggested:
completion of selection brief or selection proficiency test
oral questioning to establish basis of selection
completion of case studies
feedback from peers and supervisors
examples from selection records and workplace documentation completed by candidate
review of records completed by candidate over a period of time to confirm consistency in
method selection.

Resources may include:
standard laboratory equipped with appropriate equipment and reagents
SOPs and test methods
appropriate Australian and international regulatory standards.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of
each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

Laboratory supervisors who allocate work and review the results of analyses in a
manufacturing environment must be able to determine which procedure to follow to ensure
that they meet regulatory requirements. They must also be able to solve problems to meet
production requirements.
For example, a low vitamin C assay for a vitamin preparation may indicate that the:
- correct amount of vitamin was not added
- batch was not mixed correctly, or
- vitamin C has been degraded by the production process.

In response, the supervisor may take 10 tablet sized samples throughout the batch and use a quick non-stability indicating assay to check mixing and confirm total vitamin C addition. However, to evaluate degradation, a more time consuming stability indicating assay must be chosen.

**Biomedical and environmental services**

The choice of analytical method for protein assay is influenced by the:
- amount of protein likely to be present
- impurities present.

During an extraction procedure, the yield of protein is monitored. At any stage there will be a range of substances used in the extraction. When the extraction is complete and the protein required has been isolated, the amount of protein recovered could range from bulk or gram quantities down to microgram quantities. The technical officer will check through the available methodologies and select procedure(s) that will take account of the above problems. The Biuret assay is used for bulk assay protein, but will require reagent blanks to compensate for the impurities. At later stages of the monitoring, the Bradford reagent will be chosen because of its greater sensitivity and detection of smaller concentrations. It will be chosen over the Folins reagent because the Bradford reagent is not affected by buffer reagents and detergent.

**Food and beverage processing industries**

A technician working in a food company must be able to select test methods appropriate to requirements. For example, if a quick determination of unsaturation in an oil mixture is required, the technician will probably use an appropriate method for determining the iodine value of the mix and compare this with specification. However, at a margarine manufacturing plant where the technician may be required to perform an analysis of fats and oils to determine the % saturated, % monounsaturated and % polyunsaturated components. Then a gas chromatographic method would be run using appropriate computer software and the results checked against specification.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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Unit Title:

Classify building sites

Unit descriptor

This unit of competence covers the ability to classify building sites, including residential, light industrial, commercial and institutional structures, for the purpose of providing guidance for the design of footing systems. This competency is typically performed by para-professionals, often guiding the work of experienced testers.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
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</thead>
<tbody>
<tr>
<td>1 Prepare for on-site operations</td>
<td>1.1 Identify the job, consult with the client and obtain relevant information, drawn from such sources as maps, drawings, specifications and codes of practice</td>
</tr>
<tr>
<td></td>
<td>1.2 Select equipment and materials required for the job</td>
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<tr>
<td></td>
<td>1.3 Identify personal protective equipment and safety procedures as specified for job, and organise site induction as required</td>
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<td></td>
<td>1.4 Record description of the job to be undertaken, compare with specification and resolve any variations</td>
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<td></td>
<td>1.5 Select suitable transport for site access</td>
</tr>
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<td>1.6 Brief support personnel on job requirements</td>
</tr>
<tr>
<td>2 Conduct on-site investigations</td>
<td>2.1 Identify the location of the proposed structure</td>
</tr>
<tr>
<td></td>
<td>2.2 Observe and record physical characteristics of the site including topography, vegetation, recent activity and the presence of underground services</td>
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<tr>
<td></td>
<td>2.3 Conduct subsurface investigations, obtain samples and record strata details, including groundwater conditions, while minimising disturbance and potential contamination of site</td>
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<tr>
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<td>2.4 Perform relevant in-situ testing</td>
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<td>2.5 Clean up on completion, backfilling or sealing the excavation or ensuring that it is left in a safe and uncontaminated condition</td>
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<td>Conduct laboratory testing</td>
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<td>4</td>
<td>Assign a classification to the site</td>
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<tr>
<td>5</td>
<td>Maintain records</td>
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</tbody>
</table>
RANGE OF VARIABLES

The Range of Variables places each unit of competence in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

This unit of competence describes the work conducted by para-professionals.

Operations are performed in accordance with laboratory and/or enterprise procedures, and appropriate legislative requirements. These procedures and requirements include or have been prepared from:

- industry codes of practice
- environmental legislation and regulations
- standard operating procedures (SOPs)
- equipment manuals
- equipment start-up, operation and shutdown procedures
- calibration and maintenance schedules
- quality manuals
- enterprise recording and reporting procedures
- production and laboratory schedules
- material, production and product specifications.

Operations are subject to stringent OH&S requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

Site classification is applicable to single dwelling houses, townhouses and commercial, institutional or light industrial buildings. The classification depends on reactivity of the foundation soils and other potential problems such as mine subsidence, groundwater conditions and slope. These influence the design of footings, so as to minimise damage due to foundation movement during the life of the building.

Tools and equipment used include:

- hand and power augers
- hand tools including shovels, scoops, spanners, wrenches, tape measure
- consumables including sample bags, labels, thin-walled sampling tubes
- documentation including maps, plans, worksheets
- field test equipment including pocket penetrometer, dynamic cone penetrometer, sand penetrometer
- laboratory equipment including balances, ovens, liquid limit apparatus, linear shrinkage troughs, vernier callipers, core swell testing cell, psychrometer
- camera, GPS receiver
- safety clothing and equipment including helmet, boots, earmuffs, glasses.

Typical skills may include:
• working safely in field conditions
• setting up and maintaining tools and equipment
• cleaning equipment before leaving site in compliance with environmental authority requirements
• performing disturbed and undisturbed sampling
• performing in-situ testing
• performing laboratory testing
• interpreting site plans, specifications and codes
• identifying soil and rock materials
• handling and storing samples
• analysing test results and observations.

Typical problems include:
• delays in obtaining test results
• damage to services
• displaced, missing and inaccurate survey markers
• misidentification of samples and sampling locations
• equipment breakdown and breakage
• environmental problems and issues including site access, inclement weather, traffic, wildlife, vegetation, construction activities, contamination of stormwater.

**Updating information**

This unit of competence does not contain detailed information that requires regular updating.
EVIDENCE GUIDES

Each unit of competence has an Evidence Guide that relates directly to the Performance Criteria and the Range of Variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competence

Competence must be demonstrated in the ability to conduct site and laboratory operations, and analyse results to assign a site classification.

In particular the assessor should look to see that the candidate can:

- read and interpret maps, drawings, specifications and codes of practice
- conduct subsurface explorations and log strata
- conduct in-situ testing for site classification purposes
- conduct disturbed and undisturbed sampling
- record project details in writing, by sketching and photography
- conduct laboratory testing for site classification purposes
- analyse test results and observations to assign a site classification
- observe, interpret and report atypical situations
- communicate problems to appropriate personnel
- report results to client.

Essential knowledge

Competence includes the ability to apply and/or explain:

- engineering properties of soil and rock materials
- in-situ and laboratory test methods applicable to site classification
- methods of assigning a site classification
- mathematical principles and processes used in site classification
- provisions and requirements of relevant codes.

Interdependent assessment of unit

This unit may be assessed with:

- PML ORG 600 A – Supervise laboratory operations in work/functional area
- PML COM 500 A – Provide information to customers
- PML DATA 500 A – Analyse data and report results
- PML TEST 600 A – Select appropriate test methods and procedures.
Assessment methods and resources

It is strongly recommended that assessment is conducted through observation over time. The timeframe must allow for adequate assessment of operation under all normal and a range of abnormal conditions. Where this is not practical additional assessment techniques must be used.

The following assessment methods are suggested:

- use of suitable simulation and/or a range of case studies/scenarios
- feedback from peers and supervisors
- examples of completed workplace documentation
- analysis of work completed over a period of time to ensure accurate and consistent work is obtained within required timelines.

In all cases practical assessment should be supported by targeted questioning to assess underpinning knowledge.

Resources may include:

- access to tools, equipment and materials which will allow for appropriate and realistic simulation
- a bank of case studies is required where these form part of the assessment method
- access to more than one workplace or simulated learning environment if the primary workplace or learning environment is unable to provide a suitable range of equipment.

This competency in practice

A geotechnical consultancy has been contracted to perform a site investigation for the purpose of determining the classification of a building site. The client is a structural engineer who will use the information to design a block of townhouses for the site.

A senior technician has been placed in charge of the project, with an experienced tester to perform the site work. A second tester will perform the laboratory testing. The technician is a signatory for all tests for which the organisation is NATA accredited.

The technician obtains a map of the area, and establishes that there is no local information available on conditions in the immediate vicinity. There are no buried services to be damaged during the investigation. She briefs the field tester on the project, specifying the number and suggested locations of boreholes, as well as sampling and testing requirements.

The field tester performs the site investigation: drilling power auger holes, logging and sampling the strata, and performing dynamic cone penetrometer (DCP) tests. He pushes tubes to obtain undisturbed samples of material he classifies as high plasticity clay. He notes the presence of uncontrolled fill in one corner of the site, and takes several photographs with a digital camera.
When the site investigation is completed, the technician inspects the field logs, notes and photographs, and specifies a testing program, including shrink-swell tests on the high plasticity clay.

Using the shrink-swell test result, she calculates the characteristic surface movement. She reviews all the data and assigns a P classification in accordance with AS2870: Residential slabs and footings - Construction. She then prepares a report to the client including a description of the site, the extent and nature of the investigation, test results and bore logs, and the site classification.

Finally, all documentation relating to the project is filed and stored as a complete record in accordance with NATA, quality assurance, and liability requirements, and the results of the investigation are communicated to the client.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The Key Competencies cover the three levels of performance in the following areas:*

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</tbody>
</table>
# Unit Title:

**Contribute to the development of products and applications**

**PML TEST 700 A**

## Unit descriptor

This unit of competency covers the ability to evaluate a product/application brief and to contribute to the development of products and applications to meet the requirements of the brief.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Scope the development project</td>
<td>1.1 Confirm details of new product/application brief</td>
</tr>
<tr>
<td></td>
<td>1.2 Specify new product/application requirements</td>
</tr>
<tr>
<td></td>
<td>1.3 Analyse existing products (internal and external to enterprise) to determine if they meet customer need</td>
</tr>
<tr>
<td></td>
<td>1.4 Interpret and apply relevant Acts, regulations and codes of practice</td>
</tr>
<tr>
<td></td>
<td>1.5 Prepare product development plan</td>
</tr>
<tr>
<td></td>
<td>1.6 Obtain approval for development plan from appropriate personnel</td>
</tr>
<tr>
<td>2 Set scope of project</td>
<td>2.1 Estimate resource requirements, including staffing, equipment and materials needed to undertake the project</td>
</tr>
<tr>
<td></td>
<td>2.2 Identify roles and responsibilities of project team members</td>
</tr>
<tr>
<td></td>
<td>2.3 Identify quality requirements and quality standards</td>
</tr>
<tr>
<td></td>
<td>2.4 Prepare project timelines given the constraints</td>
</tr>
<tr>
<td>Section</td>
<td>Task Description</td>
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<tr>
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<tr>
<td>3</td>
<td>Develop new product formulation</td>
</tr>
<tr>
<td>3.1</td>
<td>Prepare documentation for new product pilot batch(s)</td>
</tr>
<tr>
<td>3.2</td>
<td>Evaluate/recommend materials for new product/application</td>
</tr>
<tr>
<td>3.3</td>
<td>Calculate required quantities of materials and adjust for properties as appropriate</td>
</tr>
<tr>
<td>3.4</td>
<td>Develop/modify products in pilot batch scale in accordance with enterprise and regulatory requirements</td>
</tr>
<tr>
<td>3.5</td>
<td>Arrange for product evaluation against development brief</td>
</tr>
<tr>
<td>3.6</td>
<td>Modify product/application to meet evaluation recommendations</td>
</tr>
<tr>
<td>3.7</td>
<td>Edit documentation and issue to appropriate personnel</td>
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<tr>
<td>3.8</td>
<td>Recommend and evaluate packaging for new product/application</td>
</tr>
<tr>
<td>3.9</td>
<td>Prepare protocol for stability (shelf) testing of new product/application</td>
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<tr>
<td>4</td>
<td>Assist in preparation of quality/regulatory compliance procedures/materials</td>
</tr>
<tr>
<td>4.1</td>
<td>Develop in-process and laboratory testing protocols</td>
</tr>
<tr>
<td>4.2</td>
<td>Prepare product labelling and submit for approval</td>
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<tr>
<td>4.3</td>
<td>Assist in product and analytical method validation</td>
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<tr>
<td>4.4</td>
<td>Implement an effective plant hygiene and asepsis program (if applicable)</td>
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<tr>
<td>4.5</td>
<td>Develop GMP/GLP protocols for approval by appropriate personnel</td>
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<tr>
<td>4.6</td>
<td>Prepare standard operating procedures for quality and laboratory related procedures</td>
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<tr>
<td>4.7</td>
<td>Prepare OHS procedures for the laboratory and manufacturing environment and submit for approval</td>
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<tr>
<td>5</td>
<td>Document and report project outcomes</td>
</tr>
<tr>
<td>5.1</td>
<td>Ensure all project objectives have been achieved</td>
</tr>
<tr>
<td>5.2</td>
<td>Complete project reporting requirements.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by technical specialists who evaluate product/application development briefs and contribute to the development of products and applications to meet the requirements of the brief.

Product/application briefs may be provided by external customers or internal customers such as marketing or production.

At this level, personnel should be able to interpret and explain those sections of legislation, codes, regulations and Australian standards that apply to the tasks undertaken in developing products and applications. They should also be aware of enterprise business goals and the impact of their projects on these goals.

Materials used to manufacture products/applications may include: solvents, emulsifiers, thickeners, surfactants, disintegrants, fillers, moisturising materials, colouring materials, flavours, perfumes, opacifiers, propellants and sunscreens. These will depend on the development brief.

Calculations may be required to adjust properties such as: assay/potency, viscosity, application payload, hardness, moisture content and colour.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. Documentation applicable to this competency may include:

- Australian and international standards
- codes of practice (such as GLP and GMP)
- product formulation documentation
- relevant Acts and their regulations
- suppliers of raw material catalogues
- material safety data sheets (MSDSs)
- standard operating procedures (SOPs)
- equipment and quality manuals
- calibration and maintenance schedules
- enterprise recording and reporting procedures
- material, production and product specifications.
Updating information

Changes in codes of practice and applicable standards should be noted.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to evaluate a product/application brief and contribute to the development of products and applications to meet the requirements of the brief. In particular, the assessor should look to see that the candidate:

- interprets a brief to determine product/application development requirements
- applies theoretical knowledge of starting material and formulation principles to develop product/applications
- uses appropriate procedures to research alternative formulations
- uses “environment friendly” strategies for formulations
- makes formulation recommendations for pilot batch manufacture
- manufactures pilot batches
- evaluates pilot batches against project brief
- evaluates product/application stability
- evaluates the OHS requirements to be observed for each ingredient during manufacture of product/application
- evaluates the OHS suitability of each ingredient for use in the formulation
- ensures that product/application meets regulatory requirements
- follows enterprise procedures to document development process.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- knowledge of theoretical and practical aspects of product/application development
- physical and chemical aspects of product/application development
- principles and practices of operation of a range of pilot batch equipment
- uses, characteristics and limitations of formulation starting materials
- formulation development procedures
- performance outcomes expected and key indicators
- enterprise and regulatory development, quality and stability testing requirements
- business goals
- operating budgets and plans for work area.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
- PML TEST 701 A – Troubleshoot equipment and production processes
- PML TEST 702 A – Contribute to the validation of test methods
- PML TEST 703 A – Develop or adapt analyses and procedures.

This unit of competency should be assessed after:
- PML TEST 600 A – Select appropriate test methods and procedures.

Assessment methods and resources

The following assessment methods are suggested:
- review of development work completed by the candidate
- review of development briefs completed by candidate over time to ensure that they are implemented consistently within the required timeframe
- feedback from supervisors
- oral or written questioning to assess development and problem solving approaches.
Resources may include:
standard laboratory equipped with appropriate pilot batch manufacturing and testing equipment
on line data search facilities
starting material and product formulation information
scheduling charts and project plans.

This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

Technical specialists who formulate cosmetics products must apply theoretical and practical knowledge during each stage of the formulation process. This is illustrated during the perfuming stage of the product development process for a product range consisting of soap, talc and a water-in-oil emulsion.

For example, soaps are alkaline and the selected perfume must be stable under alkaline conditions. Perfumes consist of a large number of components, and any preferential adsorption of some of these components on the surface of the talc will alter the odour. When perfuming an emulsion, the components of the perfume will partition between the water and oil phases of the emulsion, altering the odour reaching the consumer. To get the three products smelling the same after manufacture requires attention to these theoretical concepts. Stability studies must be planned and carried out to ensure that the products are stable in the chosen packs and smell the same throughout their lifetime. When perfuming this rather small range of products, the technical specialists must apply a wide range of theoretical and practical knowledge to satisfy the product brief.

Food and beverage processing industries

Technical specialists in food research laboratories evaluate product briefs provided by marketing. They then develop products to meet the requirements of the brief and turn the brief into a marketable product. After the product is successfully introduced, technical specialists must continue to upgrade the quality and desirability of products because of shortened product life cycles.

As part of their role technical specialists may be required to apply technical knowledge to:
- reduce ingredient costs of existing formulation
- standardise existing formulations and processes for quality and cost control
- identify solutions to existing problems such as product quality or shelf life
- develop consumer preparation instruction methods
- develop labelling or packaging information
- formulate new or improve existing products
- locate and evaluate new packaging alternatives to meet a range of requirements
- assist in compliance with regulatory standards
- assess consumer preferences
- prepare pilot batches of new products
- assist in scale up of pilot batches to full scale production batches
- test product’s shelf life.

This requires an in-depth knowledge of how to select and use various ingredients for specific applications, as well as the chemistry, technology and regulatory aspects of their job.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:*

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<tr>
<td>ELEMENT OF COMPETENCY</td>
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<tr>
<td>1 Identify abnormal equipment and/or process performance</td>
<td>1.1 Determine whether testing equipment is operating to manufacturer’s specifications</td>
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<td></td>
<td>1.2 Recognise whether equipment outputs are consistent with normal operation</td>
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<td></td>
<td>1.3 Identify signs of equipment degradation and impending failure</td>
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<td></td>
<td>1.4 Inspect equipment outputs to determine nature of the problem</td>
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<td></td>
<td>1.5 Define nature of substandard performance</td>
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<tr>
<td>2 Identify causes of substandard performance</td>
<td>2.1 Select appropriate technical process for investigation</td>
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<td></td>
<td>2.2 Identify causes using fact-finding processes, including interviews with appropriate personnel</td>
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<td>2.3 Review maintenance records to ensure that system doesn’t need simple maintenance</td>
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<td></td>
<td>2.4 Review calibration records to ensure system is within calibration</td>
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<td>2.5 Verify that the appropriate test procedure, materials and equipment were used</td>
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<td>2.6 Conduct performance tests as appropriate to investigation</td>
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<td></td>
<td>2.7 Analyse equipment and/or testing variables to develop list of possible causes</td>
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<td></td>
<td>2.8 Isolate causes using appropriate elimination techniques</td>
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</tr>
</tbody>
</table>
3 Propose corrective action

3.1 Propose and trial corrective action based on investigation

3.2 Monitor trial data to ensure outputs are consistent with normal operation

3.3 Review trial results to confirm validity of corrective action

3.4 Maintain workplace records as required

3.5 Submit report summarising investigation and recommendations.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by technical specialists who troubleshoot laboratory and production problems and make recommendations on the basis of these investigations.

Troubleshooting is the process of using technical knowledge and skills to investigate abnormal performance and assay results. This competency includes troubleshooting testing equipment and testing issues related to production processes. In the case of chromatography, for example, these problems may be related to materials such as laboratory solvents, procedures or equipment components such as columns, injectors, pumps and detectors.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. At this level a good knowledge of both theoretical and practical aspects of laboratory equipment and processes is required. These procedures may include or have been prepared from:

Australian and international standards
codes of practice (such as GLP and GMP)
material safety data sheets (MSDSs)
National Measurement Act
standard operating procedures (SOPs)
equipment manuals
equipment start-up, operation and shutdown procedures
 calibration and maintenance schedules
quality manuals
enterprise recording and reporting procedures
production and laboratory schedules
material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

**Updating information**

Changes in codes of practice and applicable standards should be noted.

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**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to troubleshoot testing equipment and testing issues related to production processes to identify causes of problems and recommend corrective action. In particular, the assessor should look to see that the candidate can:

- identify causes of faulty or substandard performance
- propose adjustments/rectifications/modifications
- test results of adjustments/rectifications/modifications
- locate, interpret and apply relevant information
- maintain relevant workplace records
- identify and safely handle products and materials
- apply safety precautions appropriate to the task.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- detailed knowledge of principles and procedures of testing equipment operation
- characteristics, capabilities and limitations of testing equipment and its components
- troubleshooting procedures for testing equipment
- possible effects of matrix and impurities on analytical method
- troubleshooting procedures for production processes
- regulatory and licensing/testing requirements
- mathematical/statistical procedures for evaluation of test data
- enterprise requirements for problem investigation and reporting.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
- PML TEST 700 A – Contribute to development of new products and applications
- PML TEST 703 A – Develop or adapt analyses and procedures
- PML TEST 702 A – Contribute to validation of test method.

This unit of competency should be assessed after:
- PML TEST 500 A – Calibrate and maintain instruments
- PML TEST 600 A – Select appropriate test methods or procedures.

Assessment methods and resources

The following assessment methods are suggested:
- completion of a troubleshooting brief or a troubleshooting proficiency test
- review of workplace troubleshooting briefs completed by the candidate
- feedback from supervisors
- oral or written questioning to assess underpinning knowledge of equipment operation, troubleshooting procedures and problem solving techniques.
Resources may include:
standard laboratory equipped with appropriate equipment, reagents and test methods
laboratory procedures and SOPs.

This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

Emission spectroscopy is a technique often used by technicians to troubleshoot problems resulting from contamination. For example, a sample of stainless steel that showed signs of corrosion was submitted to a chemical technician for analysis. The technician subjected the sample to a spark and compared the spectra of the composite steel to spectra of a control sample of stainless steel. The technician concluded that the vanadium concentration in the sample was higher than that of the control sample. After double-checking the work, the technician passed the results back to the engineering staff who were able to find the source of error and correct the manufacturing problem.

**Biomedical and environmental services**

The immuno-analyser has become non-functional. The senior technical officer has notified the laboratory manager and logged a call to the service contractor for that equipment. While waiting for the service engineer to call back, the officer checks out the instruction sequence for that assay, diagnostics for the detection unit, and reagent and sample lines, then runs the diagnostic check program provided by the company. By the time the service engineer calls back, the officer has established that the fault is instrument failure.

**Food and beverage processing industries**

A food company received a large number of customer complaints regarding the taste of its flavoured yoghurt product. The technician asked their sales representative to collect samples of the product from sales outlets while s/he collected retained reference samples with the same batch number/expiry date for examination.

The technician developed a strategy for troubleshooting the production process and followed the following steps:
- Analysis of the returned product and reference samples indicated that the sugar concentration was above specification in both, suggesting that an error occurred during manufacturing or packaging.
- Examination of batching sheets with the appropriate product code indicated that the correct formula and quantities of raw materials were used.
- Retention samples were reanalysed and indicated that all were within specification.
- Discussions with operators did not uncover any cause for the defect.
- Observation of the process indicated that a non-standard batching drum was being used.
- Discussions with the operator revealed that the tared standard drum used for weighing raw materials had been damaged and a lighter non-standard drum was being used with the original tare weight.

Analysis of the sugar content in the yoghurt indicated that the increased sugar content was due to the incorrect tare weight.

**Key competencies**

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</tbody>
</table>
## Unit Title:
Contribute to validation of test method

### Unit descriptor
This unit of competency covers the ability to validate test methods following defined protocols to assure that they are based on sound scientific principles and are fit for the purpose for which they are to be used.

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</thead>
<tbody>
<tr>
<td>1</td>
<td>Confirm that latest editions of manufacturer’s specifications and operating instructions are present</td>
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<tr>
<td></td>
<td>Confirm that equipment is installed as per manufacturer’s specifications</td>
</tr>
<tr>
<td></td>
<td>Confirm that equipment operating instructions exist and conform to manufacturer’s specifications</td>
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<tr>
<td></td>
<td>Confirm that equipment operates as per manufacturer’s design specifications</td>
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<td></td>
<td>Verify that equipment calibration complies with appropriate standards</td>
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<td></td>
<td>Confirm equipment/computer systems are validated</td>
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<td>Confirm method has an acceptable level of uncertainty</td>
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<td>2</td>
<td>Develop validation test protocol in consultation with appropriate personnel</td>
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<td></td>
<td>Ensure protocol is authorised by appropriate personnel</td>
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<tr>
<td></td>
<td>Validate test method according to validation protocol</td>
</tr>
</tbody>
</table>
3 Evaluate and record results

3.1 Evaluate validation results to confirm suitability of testing method

3.2 Obtain approval for evaluation recommendations from appropriate personnel

3.3 Record and file validation records

3.4 Issue validated method according to enterprise procedures

3.5 Evaluate staff training needs and record appropriately

3.6 Recommend update of relevant documentation as a result of the validation.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by technical specialists who validate analytical methods as part of their job.

Validation includes all those procedures which ascertain a method’s technical soundness, performance and suitability for its intended use. Validation is a documented program which provide a high degree of assurance that a specific testing method will consistently produce a reliable result. The nature of the testing method may be physical, chemical, microbiological or a combination of these. The quality of the test method is built in during its design stage, validated in its development stage, and confirmed in its “use” stage.

Test methods requiring validation include new recognised standard test methods and existing test methods which have been modified or new enterprise test methods.

Validation protocols include those checks which should be considered to ensure performance characteristics of test method are scientifically sound. Examples of checks include selectivity, linearity, range, sensitivity, limit of detection, limit of quantitation, accuracy, precision, recovery, ruggedness and robustness. Validation may also include an assessment of the clarity and completeness of the description of the method.
All operations are performed in accordance with laboratory and/or enterprise procedures. These procedures include or have been prepared from:

Australian and international standards such as *Guidelines for Collaborative Study Procedures to Validate Characteristics of a Method of Analysis*, Fourth (Final) Draft; J. of Anal. Chem., Vol 72, No 4, 694-704

United States Pharmacopoeia : General information (1225), Validation of Compendial Methods

NATA guidelines on validation
codes of practice (such as GLP and GMP)
National Measurement Act
material safety data sheets (MSDSs)
standard operating procedures (SOPs)
enterprise recording and reporting procedures
equipment manuals
equipment startup, operation and shutdown procedures
calibration and maintenance schedules
quality manuals
production and laboratory schedules
material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

**Updating information**

This unit of competency does not contain detailed information that requires regular updating.
EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

Cross industry

The following aspects of competency apply to all industry sectors covered by this Training Package.

Competency must be demonstrated in the ability to validate test methods as fit for purpose following a validation protocol established in consultation with appropriate personnel. In particular, the assessor should look to see that the candidate can:

- conduct literature searches on background chemistry of materials to be evaluated, including likely impurities and degradation products
- start up, set up/optimise, calibrate and operate equipment to manufacturer’s specifications
- prepare test samples and standards for validation
- carry out validation tests as per validation protocol
- apply theoretical knowledge and appropriate statistics to interpret validation data and reach correct conclusions
- record results and communicate recommendations as per enterprise procedures
- arrange large amounts of data into logical format so other technical personnel can review and reach the same correct conclusions
- follow OHS procedures and GLP.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- principles, concepts and enterprise/regulatory requirements related to method validation
- detailed knowledge of principles and procedures of testing equipment operation
- characteristics, capabilities and limitations of equipment
- variables which should be validated and criteria for choice
- mathematical/statistical evaluation of results and present data and results in appropriate formats
- enterprise/regulatory requirement regarding validation and reporting.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit of competency may be assessed with:
PML TEST 702 A – Contribute to the development of new products and applications
PML TEST 703 A – Develop or adapt analyses and procedures
PML TEST 701 A – Troubleshoot equipment and production processes.

This unit of competency should be assessed after:
PML TEST 600 A – Select appropriate test methods and procedures.

Assessment methods and resources

The following assessment methods are suggested:
- completion of validation brief or validation proficiency test
- examples of workplace validation briefs completed by candidate
- feedback from supervisors
- oral or written questioning to assess underpinning knowledge of equipment operation, methods and procedures, and problem solving techniques.

Resources may include:
- standard laboratory equipped with appropriate equipment, reagents and test methods validation protocol.
This competency in practice

*Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.*

**Process manufacturing and construction materials industries**

A technical specialist was developing a method for testing samples taken while monitoring a workplace for glutaraldehyde, a toxic chemical. The samples were collected in air monitoring cassettes and on glass fibre filters impregnated with 2,4-dinitrophenylhydrazine. The filters were desorbed with acetonitrile and the DNPH derivative analysed by high-performance liquid chromatography (HPLC) at 365nm. The new method was validated by checking and documenting factors such as selectivity, linearity, range, limit of detection, accuracy, precision, recovery and ruggedness. Although this involved considerable work, the specialist was confident that the testing method would deliver reliable results after completing the validation.

**Biomedical and environmental services**

A number of pituitary hormone assays are to be converted from radioimmunoassay (RIA) to enzyme linked immunosorbent assay (ELISA). Both configurations of assays are available in kit form but the laboratory manager would like the new procedures validated. The task has been given to a senior technical officer. The project involves comparison of the average and variance of results obtained for a number of quality control sera. The variance and precision of the signal output (counts per minute for RIA, absorbance for ELISA) are examined as well as sensitivity estimates for both assays. All investigations are documented and reported in the laboratory notes for accreditation audit purposes.

**Food and beverage processing industries**

A food research laboratory uses the following instrumental techniques:

- ultraviolet-visible spectrometer for colour analysis
- high performance liquid chromatography for food preservative analysis
- inductively coupled plasma-atomic emission spectrometry and flame atomic absorption analysis for metal contaminant analysis.

Each of the above methods is validated to assure that it is are based on sound scientific principles and will deliver results appropriate to requirements. Factors such as accuracy, linearity, range, limit of detection, precision, recovery, ruggedness and selectivity are evaluated and documented. This investigation provides confidence that methods are used within their limits of detection, are linear and selective over the required range, and deliver suitable accuracy and precision. The investigation is documented, as per enterprise requirements, and provides detailed reference for accreditation, audit and future laboratory use.

**Key competencies**

*This information refers to the seven areas of generic competency that underpin effective*
workplace practices. The key competencies cover the three levels of performance in the following areas:

<table>
<thead>
<tr>
<th>Communicating ideas &amp; information</th>
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</tbody>
</table>
Contribute to the validation of test methods
Unit Title:
Develop or adapt analyses and procedures

Unit descriptor

This unit of competency covers the ability to develop or adapt analyses and procedures to meet enterprise and/or regulatory requirements. New analyses and associated procedures may be required to meet a customer’s brief, analyse new products or raw materials, improve laboratory efficiency, or meet changing regulatory requirements.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Determine gaps and deficiencies in present analyses and/or procedures</td>
</tr>
<tr>
<td>1.1</td>
<td>Identify opportunities to improve analyses and/or procedures</td>
</tr>
<tr>
<td>1.2</td>
<td>Identify requirements for new analyses and procedures to meet testing briefs</td>
</tr>
<tr>
<td>1.3</td>
<td>Define the scope of analysis required by the improvement or new testing brief</td>
</tr>
<tr>
<td>1.4</td>
<td>Establish that existing enterprise test methods/procedures do not meet requirements</td>
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<tr>
<td>1.5</td>
<td>Prepare development proposal</td>
</tr>
<tr>
<td>1.6</td>
<td>Confirm development requirements and development proposal with appropriate personnel</td>
</tr>
<tr>
<td>1.7</td>
<td>Obtain authorisation to proceed</td>
</tr>
<tr>
<td>2</td>
<td>Research and propose alternatives</td>
</tr>
<tr>
<td>2.1</td>
<td>Source relevant documented methods/procedures</td>
</tr>
<tr>
<td>2.2</td>
<td>Review relevant documented methods/procedures according to enterprise procedures</td>
</tr>
<tr>
<td>2.3</td>
<td>Consult with relevant technical personnel regarding project development issues</td>
</tr>
<tr>
<td>2.4</td>
<td>Evaluate resource requirements for proposed methods/procedures</td>
</tr>
<tr>
<td>2.5</td>
<td>Ensure that methods/procedures meet OHS, environmental, regulatory and enterprise requirements</td>
</tr>
<tr>
<td>2.6</td>
<td>Document development requirements, timelines and proposed methods/procedures</td>
</tr>
<tr>
<td>2.7</td>
<td>Obtain authorisation to proceed</td>
</tr>
</tbody>
</table>
3 Evaluate alternatives, develop analyses and recommend method/procedure

3.1 Investigate possible alternative methods and procedures and choose appropriate method/procedure
3.2 Develop and/or adapt analytical method or test procedure to meet requirements
3.3 Trial method/procedure against test method/procedure requirements
3.4 Validate method/procedure
3.5 Maintain records to substantiate and justify chosen method/procedure

4 Document and report new method / procedure

4.1 Prepare and/or update analytical method/procedure and associated SOPs
4.2 Obtain final approval for new method/procedure
4.3 Withdraw, document and archive superseded method/procedure
4.4 Issue new method/procedure as per enterprise procedures.

RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the work conducted by technical specialists who develop or adapt analyses and procedures to meet enterprise needs. This work may involve developing new testing methods or adapting existing methods to satisfy a testing need.

All operations must comply with relevant standards, appropriate procedures and/or enterprise requirements. When developing new methods of analyses, the following information sources may be used:

Australian and international standards
local or international enterprise sites
equipment manufacturer’s specified methods
appropriate journals and Internet sites
National Measurement Act
codes of practice (such as GLP and GMP)
material safety data sheets (MSDSs)
standard operating procedures (SOPs)
equipment manuals
equipment startup, operation and shutdown procedures
calibration and maintenance schedules
quality manuals
enterprise recording and reporting procedures
production and laboratory schedules
material, production and product specifications.

All operations are subject to stringent OHS requirements. Relevant standards may include sections of the occupational health and safety legislation, enterprise safety rules and procedures, relevant State and Federal legislation, national standards or codes of practice.

New methods of analysis and related procedures may be required to:

- Analyse raw materials
- Quality control or evaluate the stability of products
- Quality control or evaluate the stability of new formulations of existing products
- Use new technology
- Meet regulatory requirements
- Meet customer requirements
- Improve productivity.

Analyses could include:
- Non-instrumental methods such as gravimetric, titrimetric and qualitative tests
- Spectrometric methods such as UV/visible, IR (including FTIR), NIR, AA, fluorescence
- Chromatographic methods such as thin layer, paper, GC, HPLC, ion chromatography and electrophoresis
- Electrochemical methods such as ion selective electrodes and polarography
- Assays based on biological properties or cell properties for enzyme antibody activity.

Procedures are directions for conducting analyses, either in hard copy or online format.

Concepts relating to method development include:
- Determining and defining development objectives
- Relating chemical and physical characteristic of sample to possible assay methods
- Evaluating criteria to choose appropriate analytical method
- Sample cleanup and preparation techniques
- Preparation, setup and calibration of testing equipment
- Choice of appropriate detection system ensuring accuracy/precision criteria are achieved
- Optimisation of analysis conditions
- Generating, recording and reporting data in format which assists procedure writing.

Criteria for choice of method may also include:
economic factors
safety considerations
resource factors including equipment and personnel
regulatory, accreditation and registration considerations.

**Updating information**

Changes in codes of practice and applicable standards should be noted.

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**EVIDENCE GUIDE**

*Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.*

**Critical aspects of competency**

**Cross industry**

*The following aspects of competency apply to all industry sectors covered by this Training Package.*

Competency must be demonstrated in the ability to develop or adapt analyses and procedures to meet requirements.

In particular, the assessor should look to see that the candidate can:
- interpret a brief to determine testing requirements
- apply theoretical concepts and practical principles to develop or adapt methods to meet requirements
- evaluate existing testing procedures against new testing requirements
- use appropriate procedures to research alternative methods
- make recommendations for modification of existing procedures or development of new procedures based on sound principles
- follow enterprise procedures to document and circulate new procedures.
Essential knowledge

Cross industry

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and explain:
- detailed knowledge of theoretical and practical basis of test/analysis principles and practices of operation of a range of testing equipment characteristics, capabilities and limitations of equipment relative advantages/disadvantages of different analytical methods theoretical procedures for method development method validation requirements enterprise and regulatory testing requirements.

Assessment context

This unit of competency is to be assessed in the workplace or simulated workplace environment.

Interdependent assessment of unit

This unit may be assessed with:
- PML TEST 700 A – Contribute to the development of new products and applications
- PML TEST 701 A – Troubleshoot equipment and production processes
- PML TEST 702 A – Contribute to validation of test method.

This unit of competency should be assessed after:
- PML TEST 600 A – Select appropriate test methods and procedures.

Assessment methods and resources

The following assessment methods are suggested:
- review of development or adaptation of methods completed by candidate examples of workplace development briefs completed by candidate feedback from supervisors oral or written questioning to assess underpinning knowledge of analyses, instrument operation, procedures and problem solving techniques.

Resources may include:
- standard laboratory equipped with appropriate equipment, reagents and test methods online data search facilities.
This competency in practice

Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

Technical specialists often have to apply their practical and theoretical knowledge of laboratory instrumentation to adapt or develop methods to solve specific problems. For example, a technical specialist in a consulting laboratory was asked to determine why heat-sealing bags were not sealing properly. Using infrared spectroscopy, the specialist ran spectra on several samples and noticed a difference in the coating on the bags which didn’t seal compared with the coating on bags which sealed correctly. The spectra indicated that the coatings were different polymers. The technical specialist notified the supplier of the sealing problem and new bags were forwarded. To ensure that the problem didn’t occur again, an infrared spectroscopy test method was developed to ensure that the correct polymer coating was on the new bags. As a result, production flowed smoothly when bags were delivered to the production line.

Biomedical and environmental services

The laboratory manager has determined that there is sufficient demand for a particular enzyme activity assay. Currently, this assay is performed manually by kinetic assay using a spectrometer. A senior technical officer has been given the task of converting the method to one that can be run on the Roche FARA in automated mode. The method will be translated to instructions regarding wavelength, absorbance increase or decrease, time of reading and intervals of the readings, sequence of addition of the reagents and sample, ratio of the volumes (they will be reduced in the automated procedure) and incubation conditions.

Food and beverage processing industries

The water activity of food is affected by temperature. The measurement of water activity takes considerable time, due in part to the time required for the sample to reach the specified test temperature in the instrument. A technician suggested that the test time could be reduced if the samples were presented to the instrument at the test temperature, rather than room temperature. (S)he also raised concerns about water loss which could occur while raising the sample to test temperature.

The technician planned an investigation and ran tests using standard Greenspan salts to compare results from normal testing with testing using prewarmed samples. Prewarmed samples held for 30 minutes in a prewarming cabinet gave different results from the normal test method samples. However, samples held for 15 minutes in the prewarming cabinet did not. A test method was subsequently introduced with samples being held for a maximum of 10 minutes in a prewarming cabinet prior to being loaded into the water activity instrument. This gave excellent statistical correlation with the normal method and provided increased throughput of samples.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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<td>Level 2</td>
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<td>Level 3</td>
</tr>
</tbody>
</table>
Unit Title:
Integrate data acquisition and interfacing systems

Unit descriptor
This unit of competency covers the ability to automate experimental processes for instrument control and the acquisition and communication of data.

<table>
<thead>
<tr>
<th>ELEMENT OF COMPETENCY</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Transform physical data into an electronic form</td>
<td>1.1 Determine operational constraints</td>
</tr>
<tr>
<td></td>
<td>1.2 Select suitable transducer or sensor for electronic data</td>
</tr>
<tr>
<td></td>
<td>1.3 Transform physical phenomena into electronic data stream</td>
</tr>
<tr>
<td>2  Convert electronic data for acceptance by computerised system</td>
<td>2.1 Determine digitisation requirements</td>
</tr>
<tr>
<td></td>
<td>2.2 Condition electronic signals for digital data transformation</td>
</tr>
<tr>
<td></td>
<td>2.3 Configure computer systems for acquisition of experimental data</td>
</tr>
<tr>
<td></td>
<td>2.4 Transform electronic data stream to digital domain</td>
</tr>
<tr>
<td>3  Communicate data to, and between, computerised systems</td>
<td>3.1 Determine operational considerations</td>
</tr>
<tr>
<td></td>
<td>3.2 Prepare communication hardware</td>
</tr>
<tr>
<td></td>
<td>3.3 Configure hardware</td>
</tr>
<tr>
<td></td>
<td>3.4 Implement software to automate laboratory and/or field systems</td>
</tr>
<tr>
<td>4  Document procedures and constraints</td>
<td>4.1 Prepare standard operating procedures for interfaced systems</td>
</tr>
<tr>
<td></td>
<td>4.2 Assist management in the specification of automated laboratory and/or field systems</td>
</tr>
<tr>
<td></td>
<td>4.3 Manage the implementation of automated laboratory and/or field systems.</td>
</tr>
</tbody>
</table>
RANGE OF VARIABLES

The range of variables places each unit of competency in context and allows for differences between enterprises and workplaces, including practices, knowledge and requirements.

Cross industry variables

The following variables may apply to all industry sectors covered by this Training Package.

This unit of competency describes the automation of laboratory systems, particularly the integration of laboratory processes with computer systems. A technical specialist would be expected to implement and troubleshoot the interconnection of laboratory and field equipment. This unit of competency covers only the interconnection, not the design and construction, of scientific equipment or laboratory computers.

Information sources could include:
operation manuals for computer ware, laboratory instruments and field equipment
maintenance agreements with suppliers
specifications of laboratory instruments and field equipment
safe operation requirements for computers and equipment used
environment, safety and emergency procedures
national and international standards covering hardware and software.

Equipment, materials and systems could include:
suitable scientific equipment and instruments
array of sensors and transducers
data acquisition and digital communication interfacing modules
simple troubleshooting equipment (multimeter and breakout boxes)
protocol analysis tools (software or hardware)
turnkey and programmable data acquisition and control software.

Information sources could include:
specifications of laboratory instruments and field equipment
hardware interface standards (eg, EIA RS232, IEEE 488 or IEEE 1394)
data format and management standards (eg, National Pathology Accreditation Advisory Council’s Laboratory Assessment Checklist: Computer Services Section and Analytical Data Interchange protocols).

Equipment, materials and systems could include:
temperature, pressure, light displacement and stress sensors
representative laboratory and field equipment (eg, pH meters, balances, spectrometers or data loggers).
Updating information

Changes in codes of practice and applicable standards should be noted.

EVIDENCE GUIDE

Each unit of competency has an evidence guide that relates directly to the performance criteria and the range of variables. Its purpose is to guide assessment of the unit in the workplace and/or training program.

Critical aspects of competency

The following aspects of competency apply to all industry covered by this Training Package.

Competency must be demonstrated in the ability to:
collect relevant information from manuals, specification sheets, diagnostic equipment and software
construct and correctly route interconnections
implement successful data transfer
manage data transfer
document operational procedures and implementation details
troubleshoot exiting data collection and communication between laboratory processes and computer systems
capture data from non-automated laboratory processes
interconnect laboratory and/or field equipment with computers using both serial and parallel digital communication
integrate laboratory workstations into networked laboratory computer systems
program and interrogate stand alone monitoring equipment.

Essential knowledge

The following knowledge requirements apply to all industry sectors covered by this Training Package.

Competency includes the ability to apply and/or explain:
appropriate technical terminology to communicate effectively with others
relevant numbering systems (binary, decimal and hexadecimal)
basic computer hardware and software concepts
integration of enterprise wide information systems
enterprise OHS and environmental policies
data types used in laboratory and field sciences
scientific concepts relevant to the application.

**Assessment context**

This unit of competency is to be assessed in the workplace or simulated workplace environment.

**Interdependent assessment of unit**

This unit of competency may be assessed with:

- PML TEST 703 A - Develop or adapt analyses and procedures.

This unit of competency should be assessed after:

- PML QUAL 401 A - Apply quality system and continuous improvement processes
- PML DATA 501 A - Use laboratory application software

Any instrumentation based unit such as:

- PML TEST 500 A – Calibrate and maintain instruments
- PML TEST 506 A – Apply spectrometric techniques
- PML TEST 507 A – Apply chromatographic and electrophoretic techniques.

Individual enterprises may choose to add other relevant prerequisites.

**Assessment methods and resources**

The following assessment methods are suggested:

- integrated assessment based on a real or stimulated case study, for example:
  - establish successful data acquisition (sensor selection, acquisition module installation and configuration, suitable signal conditioning and representative analog to digital conversion)
  - troubleshooting defective data capture (covering problems such as resolution and noise)
  - establish successful two-way communication between laboratory or field equipment and a laboratory computer network
  - troubleshoot defective digital communications (incorrect protocol parameters, incorrect hardware configuration)

- oral and written questions associated with electronic data capture, digital communications and associated documentation and standards

- feedback from peers and/or supervisors to confirm that workplace practices and procedures are consistently followed and that the results meet workplace requirements.

Resources may include:

- workplace documents such as manuals, specification sheets, laboratory notebooks and standard operating procedures
- relevant equipment and components, including computer network, suitable instruments and equipment, specimens and samples.

**This competency in practice**
Industry representatives have provided storylines to illustrate the practical application of each unit of competency and show its relevance in a workplace setting.

Process manufacturing and construction materials industries

A manufacturing plant was monitoring wastewater before discharging it from its treatment plant. A multiprobe capable of monitoring up to fifteen parameters such as temperature, dissolved oxygen, pH, conductivity and redox potential was purchased to streamline the monitoring process. The technical specialist checked the documentation accompanying the probe. The documentation indicated that it was compatible with a variety of RS-232, RS-485, RS-422 and SDI-12 data-handling devices. After attaching the probe to the computer system using HyperTerminal in Windows 95, the “Connect” and “Direct to COM port” commands were selected to connect the multiprobe to the computer. The test data was received by the computer and saved and analysed using appropriate data analysis programs.

Biomedical and environmental services

A senior technical officer works for a pathology laboratory that has just installed a new laboratory information management system (LIMS). The LIMS vendor as part of the purchase contract has interfaced all currently operational automated equipment. The laboratory has an older electrolyte analyser, which it uses as a backup unit. It has had frequent use lately. Because of the unit’s age, the technical manuals have been misplaced. The officer has been asked to see if the old unit can be interfaced to the new LIMS to save on manual transcription. The analyser uses a serial interface, which appears to comply with RS232.

By inspection of the connectors and from knowledge of the RS232 standard, the officer determines the analyser to be configured as for data terminal equipment (DTE). The officer then constructs a suitable cable and physically connects the analyser to a PC workstation. Using a simple terminal emulation program, the officer determines the correct communication parameters and basic commands to upload the results to the PC. Using the LIMS open database connectivity capability and a graphical programming language, such as Labview, the officer semi-automates data transfer from the analyser to the PC then to the LIMS. The report on the success of the interconnect prompts management to contract a professional programmer to fully automate the interface in liaison with the officer.
Key competencies

This information refers to the seven areas of generic competency that underpin effective workplace practices. The key competencies cover the three levels of performance in the following areas:

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</table>
OVERLAY UNITS OF COMPETENCY

Unit Title:
Workplace assessor

BSZ 401A, BSZ 402 A and BSZ 403A

Original unit details

Source
BSZ 98 – Training Package for Assessment and Workplace Training.

Unit numbers and titles
There are three linked units of competency:
BSZ 401 A – Plan assessment
BSZ 402 A – Conduct assessment
BSZ 403 A – Review assessment.

Unit descriptor
These units of competency apply to employees who conduct assessment in accordance with an assessment procedure established by the industry, enterprise or training establishment.

Elements of competency and performance criteria
These are identical to the original units of competency.

RANGE OF VARIABLES
These units of competency apply to personnel who conduct assessment as part of their job role or function within an established assessment system.
EVIDENCE GUIDE

Critical aspects of competency

These are identical to the original units of competency.

Essential knowledge

This is identical to the original units of competency.

Assessment context

These units of competency may be assessed in conjunction with other units that form part of a job role or function.

Interdependent assessment of unit

This is identical to the original units of competency.

Assessment methods and resources

These are identical to the original units of competency.

Key competencies

These are identical to the original units of competency.
Unit Title:
Train small groups

Original unit details

Source
BSZ 98 – Training Package for Assessment and Workplace Training.

Unit number and title
• BSZ 404 A – Train small groups.

Unit descriptor
This unit of competency covers the ability to plan, deliver and review training on a one-to-one or small group basis.

Elements of competency and performance criteria
These are identical to the original unit of competency.

RANGE OF VARIABLES

This unit of competency applies to all personnel who provide workplace training as part of their duties. They may provide training infrequently or regularly within an established training system.
EVIDENCE GUIDE

Critical aspects of competency

These are identical to the original unit of competency.

Essential knowledge

This is identical to the original unit of competency.

Assessment context

These units of competency may be assessed in conjunction with other units that form part of a job role or function.

Interdependent assessment of unit

This is identical to the original unit of competency.

Assessment methods and resources

These are identical to the original unit of competency.

Key competencies

These are identical to the original unit of competency.