



Manufacturing Learning Australia

PML04

Laboratory Operations Training Package

Part 1 — Structure and guidance

Part 2 — Competency standards

PML04 — Laboratory Operations Training Package

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Australian National Training Authority

Level 11, AMP Place

10 Eagle Street

BRISBANE QLD 4000

Phone: (07) 3246 2300

Fax: (07) 3246 2490

Website: www.anta.gov.au

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Published by: Australian Training Products Ltd
Level 25, 150 Lonsdale St
Melbourne 3000
Phone: +61 3 96550600 Fax: +61 3 9639 4684
www.atpl.net.au e-mail: sales@atpl.net.au

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Introductory information

Important note to users

Training Packages are not static documents; they are amended periodically to reflect the latest industry practices and are version controlled. It is essential that the latest version is always used.

Check the version number before commencing training or assessment

This Training Package is Version 1 — check whether this is the latest version by going to the National Training Information Service (www.ntis.gov.au) and locating information about the Training Package. Download the Print Version Modification History which shows the latest changes and updates to the Training Package. The NTIS also displays any changes in units of competency and the packaging of qualifications.

Alternatively, contact Manufacturing Skills Council (www.misc.org.au) to confirm the latest version number.

Explanation of version number conventions

The primary release Training Package is Version 1. When changes are made to a Training Package, sometimes the version number is changed and sometimes it is not, depending on the extent of the change. When a Training Package is reviewed it is considered to be a new Training Package for the purposes of version control, and is Version 1. Do not confuse the version number with the Training Package's national code (which remains the same during its period of endorsement).

Version modification history:

PML04 — Laboratory Operations Training Package

The version details of this endorsed Training Package are in the table below. The latest information is at the top of the table.

Version	Release Date	Comments
1	14 May, 2005	Correction to PMLTEST303B, minor format corrections
1	20 October, 2004	Primary release of the fully revised Training Package (replacing PML99)

Explanation of the review date

The review date (shown on the title page and in the footer of each page) indicates when the Training Package is expected to be reviewed in the light of changes such as new technologies and circumstances. The review date is not an expiry date. Endorsed Training Packages and their components remain current until they are reviewed or replaced.

Summary of AQF qualifications in PML04

In this Training Package, the following qualifications are available:

- *Certificate II in Sampling and Measurement* *PML20104*
- *Certificate III in Laboratory Skills* *PML30104*
- *Certificate IV in Laboratory Techniques* *PML40104*
- *Diploma of Laboratory Technology* *PML50104*
- *Advanced Diploma of Laboratory Operations* *PML60104*

Summary of units of competency in PML04

Unit code	Unit title
PMLDATA200A	Record and present data
PMLORG200A	Work within a laboratory/field workplace (induction)
PMLSAMP200A	Collect routine site samples
PMLSAMP201A	Handle and transport samples or equipment
PMLTEST200A	Conduct routine site measurements
PMLCOM300B	Communicate with other people
PMLMAIN300B	Maintain the laboratory fit for purpose
PMLOHS301B	Work safely with instruments that emit ionising radiation
PMLOHS302A	Participate in laboratory/field workplace safety
PMLORG301A	Plan and conduct laboratory/field work
PMLQUAL300B	Contribute to the achievement of quality objectives
PMLQUAL301B	Apply critical control point requirements
PMLSAMP302A	Receive and prepare samples for testing
PMLSCIG300B	Operate basic handblowing equipment
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment
PMLTEST300B	Perform basic tests
PMLTEST303B	Prepare working solutions
PMLTEST304B	Prepare culture media
PMLTEST305B	Perform aseptic techniques
PMLTEST306B	Assist with fieldwork
PMLTEST307B	Prepare trial batches for evaluation
PMLTEST308A	Perform microscopic examination
PMLTEST310A	Perform histological procedures
PMLCAL400A	Perform standard calibrations
PMLDATA400A	Process and interpret data
PMLMAIN400A	Maintain and control stocks
PMLOHS400A	Maintain laboratory/field workplace safety
PMLORG400A	Prepare practical science classes and demonstrations
PMLQUAL400B	Contribute to the ongoing development of HACCP plans
PMLQUAL401B	Apply quality system and continuous improvement processes
PMLSAMP400B	Obtain representative samples in accordance with sampling plan
PMLSAMP401A	Prepare mineral samples for analysis
PMLTEST402B	Prepare, standardise and use solutions
PMLTEST403B	Assist with geotechnical site investigations
PMLTEST404A	Perform chemical tests and procedures

Unit code	Unit title
PMLTEST405A	Perform food tests
PMLTEST406A	Perform physical tests
PMLTEST407A	Perform biological procedures
PMLTEST408A	Undertake environmental field-based monitoring
PMLTEST409A	Capture and manage scientific images
PMLTEST410A	Undertake environmental field-based, remote-sensing monitoring
PMLTEST411A	Perform mechanical tests
PMLTEST412A	Prepare tissue and cell cultures
PMLCAL500A	Perform non-standard calibrations
PMLCAL501A	Create or modify calibration procedures
PMLCAL502A	Create or modify automated calibration procedures
PMLCOM500B	Provide information to customers
PMLDATA500B	Analyse data and report results
PMLDATA501B	Use laboratory application software
PMLMAIN501B	Assist in the maintenance of reference materials
PMLMAIN502A	Maintain instruments and equipment
PMLORG500B	Schedule laboratory work for a small team
PMLQUAL500A	Monitor the quality of test results and data
PMLSCIG501B	Design and manufacture glass apparatus and glass systems
PMLSCIG502B	Perform glass coating, grinding and finishing operations
PMLSCIG503B	Construct, modify and maintain high vacuum systems
PMLTEST501B	Perform microbiological tests
PMLTEST502B	Perform haematological tests
PMLTEST503B	Perform histological tests
PMLTEST504B	Perform chemical pathology tests
PMLTEST505B	Conduct sensory analysis
PMLTEST509B	Perform immunohaematological tests
PMLTEST511B	Supervise earthworks inspection, sampling and testing operations
PMLTEST512A	Apply electrophoretic techniques
PMLTEST513A	Apply routine chromatographic techniques
PMLTEST514A	Perform fire assay techniques
PMLTEST515A	Design and supervise complex environmental field surveys
PMLTEST516A	Provide input to production trials
PMLTEST517A	Perform tissue and cell culture techniques
PMLTEST518A	Perform molecular biology tests and procedures
PMLTEST519A	Prepare animal and plant material for display
PMLTEST520A	Perform complex tests to measure engineering properties of materials
PMLTEST521A	Perform laboratory-based ecological techniques

Unit code	Unit title
PMLTEST522A	Perform complex tests to measure chemical properties of materials
PMLTEST523A	Apply complex instrumental techniques
PMLTEST524A	Apply routine spectrometric techniques
PMLTEST525A	Apply routine electrometric techniques
PMLTEST526A	Perform food analyses
PMLCOM600B	Develop and maintain laboratory documentation
PMLOHS601A	Implement and monitor OHS and environmental management systems
PMLORG600B	Supervise laboratory operations in work/functional area
PMLORG601B	Maintain registration and statutory or legal compliance in work/functional area
PMLORG602B	Manage complex projects
PMLQUAL600B	Maintain quality system and continuous improvement processes within work/functional area
PMLQUAL601B	Conduct an internal audit of the quality system
PMLTEAM600B	Manage and develop teams
PMLTEST601B	Classify building sites
PMLTEST602A	Prepare plans and quality assurance procedures for environmental field activities
PMLTEST603A	Evaluate and select appropriate test methods and/or procedures
PMLTEST700B	Contribute to the development of products and applications
PMLTEST701B	Troubleshoot equipment and production processes
PMLTEST702B	Contribute to the validation of test methods
PMLTEST703B	Develop or adapt analyses and procedures
PMLTEST704B	Integrate data acquisition and interfacing systems

Imported units of competency in PML04

Code and title	Origin
BSZ401A Plan assessment BSZ402A Conduct assessment BSZ403A Review assessment BSZ404A Train small groups	Assessment and Workplace Training (BSZ98)

These BSZ units may be chosen as electives within the PML04 packaging rules for importing relevant units from other endorsed Training Packages.

Overview of Training Packages

WHAT IS A TRAINING PACKAGE?

A Training Package is an integrated set of nationally endorsed competency standards, assessment guidelines and Australian Qualifications Framework (AQF) qualifications for a specific industry, industry sector or enterprise.

Each Training Package:

- provides a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials
- enables nationally recognised qualifications to be awarded through direct assessment of workplace competencies
- encourages the development and delivery of flexible training which suits individual and industry requirements
- encourages learning and assessment in a work-related environment which leads to verifiable workplace outcomes.

How do Training Packages fit within the National Training Framework?

The National Training Framework is made up of the nationally-agreed quality arrangements for the Vocational Education and Training (VET) sector, the Australian Quality Training Framework (AQTF), and Training Packages endorsed by the National Training Quality Council (NTQC).

How are Training Packages developed?

Training Packages are developed by Industry Skills Councils or enterprises to meet the identified training needs of specific industries or industry sectors. To gain national endorsement of Training Packages, developers must provide evidence of extensive research, consultation and support within the industry area or enterprise.

How do Training Packages encourage flexibility?

Training Packages describe the skills and knowledge needed to perform effectively in the workplace without prescribing how people should be trained.

Training Packages acknowledge that people can achieve vocational competency in many ways by emphasising what the learner can do, not how or where they learned to do it. For example, some experienced workers might be able to demonstrate competency against the units of competency, and even gain a qualification, without completing a formal training program.

With Training Packages, assessment and training may be conducted at the workplace, off-the-job, at a training organisation, during regular work, or through work experience, work placement, work simulation or any combination of these.

Who can deliver and assess using Training Packages?

Training and assessment using Training Packages must be conducted by a Registered Training Organisation (RTO) that has the qualifications or specific units of competency on its

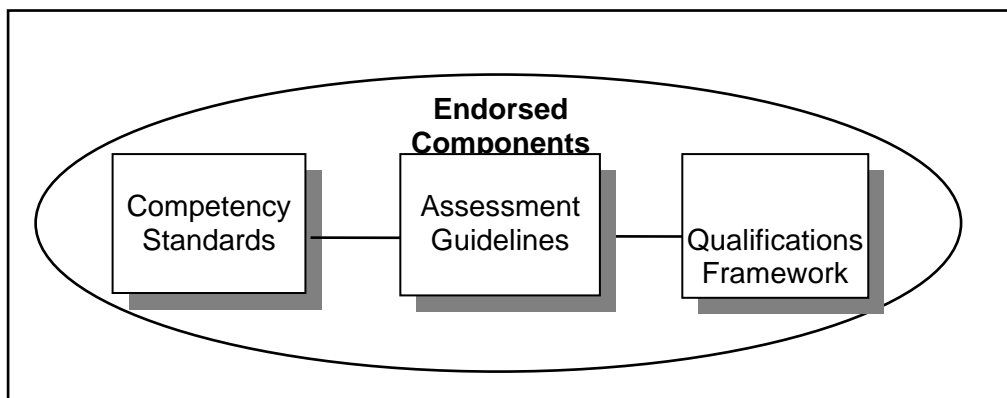
scope of registration, or that works in partnership with another RTO as specified in the *AQTF Standards for Registered Training Organisations*.

TRAINING PACKAGE COMPONENTS

Training Packages are made up of mandatory components endorsed by the NTQC, and optional support materials.

Training Package Endorsed Components

The nationally endorsed components include the Competency Standards, Assessment Guidelines and Qualifications Framework. These form the basis of training and assessment in the Training Package and, as such, they must be used.



Competency Standards

Each unit of competency identifies a discrete workplace requirement and includes the knowledge and skills that underpin competency as well as language, literacy and numeracy; and Occupational Health and Safety requirements. The units of competency must be adhered to in training and assessment to ensure consistency of outcomes.

Assessment Guidelines

The Assessment Guidelines provide an industry framework to ensure all assessments meet industry needs and nationally agreed standards as expressed in the Training Package and the *Standards for Registered Training Organisations*. The Assessment Guidelines must be followed to ensure the integrity of assessment leading to nationally recognised qualifications.

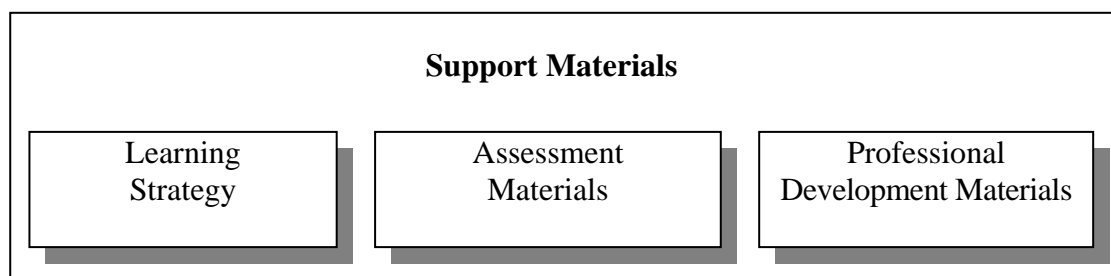
Qualifications Framework

Each Training Package provides details of those units of competency that must be achieved to award AQF qualifications. The rules around which units of competency can be combined to make up a valid AQF qualification in the Training Package are referred to as the 'packaging rules'. The packaging rules must be followed to ensure the integrity of nationally recognised qualifications.

Training Package Support Materials

The endorsed components of Training Packages are complemented and supported by optional support materials that provide for choice in the design of training and assessment to meet the needs of industry and learners.

Training Package support materials can relate to single or multiple units of competency, an industry sector, a qualification or the whole Training Package. They tend to fall into one or more of the categories illustrated below.



Training Package support materials are produced by a range of stakeholders such as RTOs, individual trainers and assessors, private and commercial developers and Government agencies.

Where such materials have been quality assured through a process of ‘noting’ by the NTQC, they display the following official logo. Noted support materials are listed on the National Training Information Service (NTIS), together with a detailed description and information on the type of product and its availability (www.ntis.gov.au).



It is not compulsory to submit support materials for noting; any resources that meet the requirements of the Training Package can be used.

Training Package, Qualification and Unit of Competency codes

There are agreed conventions for the national codes used for Training Packages and their components. Always use the correct codes, exactly as they appear in the Training Package, and with the title always following the code.

Training Package codes

Each Training Package has a unique five-character national code assigned when the Training Package is endorsed, for example PML04. The first three characters are letters identifying the Training Package industry coverage and the last two characters are numbers identifying the year of endorsement.

Qualification codes

Within each Training Package, each qualification has a unique eight-character code, for example PML50104. The first three letters identify the Training Package; the first number identifies the qualification level (noting that arabic numbers are not used in qualification titles themselves); the next two numbers identify the position in the sequence of the qualification at that level; and the last two numbers identify the year in which the qualification was endorsed. (Where qualifications are added after the initial Training Package endorsement, the last two numbers may differ from other Training Package qualifications as they identify the year in which those particular qualifications were endorsed.)

Unit of Competency codes

Within each Training Package, each unit of competency has a unique code. The unit of competency codes are assigned when the Training Package is endorsed, or when new units of

competency are added to an existing endorsed Training Package. A typical code is made up of 12 characters, normally a mixture of uppercase letters and numbers, as in PMLOHS400A. The first three characters signify the Training Package (PML) and these are followed by up to eight characters, relating to an industry sector, function or skill area. The last character is always a letter and identifies which version of the unit of competency it is. The 'A' in the example above indicates that this is the original unit of competency. An incremented version identifier usually means that minor changes have been made. Typically this would mean that wording has changed in the range statement or evidence guide, providing clearer intent. Where changes are made that alter the outcome, a new code is assigned and the title is changed.

Training Package, Qualification and Unit of Competency titles

There are agreed conventions for titling Training Packages and their components. Always use the correct titles, exactly as they appear in the Training Package, and with the code always placed before the title.

Training Package Titles

The title of each endorsed Training Package is unique and relates to the Training Package's broad industry coverage.

Qualification Titles

The title of each endorsed Training Package qualification is unique. Qualification titles use the following sequence:

1. The qualification is identified as either Certificate I, Certificate II, Certificate III, Certificate IV, Diploma or Advanced Diploma
2. The words 'in' (for Certificates I to IV) and 'of' (for Diploma and Advanced Diploma) follow
3. The industry or descriptor follows, for example *Laboratory Technology*.

Unit of Competency titles

Each unit of competency title is unique. Unit of competency titles describe the competency outcome concisely, and are written in sentence case. For example:

- PMLTEST403B Assist with geotechnical site investigations
- PMLTEST404A Perform chemical tests and procedures.

Competency standards

WHAT IS COMPETENCY?

The broad concept of industry competency concerns the ability to perform particular tasks and duties to the standard of performance expected in the workplace. Competency requires the application of specified skills, knowledge and attitudes relevant to effective participation in an industry, industry sector or enterprise.

Competency covers all aspects of workplace performance and involves performing individual tasks; managing a range of different tasks; responding to contingencies or breakdowns; and, dealing with the responsibilities of the workplace, including working with others. Workplace competency requires the ability to apply relevant skills, knowledge and attitudes consistently over time and in the required workplace situations and environments. In line with this concept of competency Training Packages focus on what is expected of a competent individual in the workplace as an outcome of learning, rather than focussing on the learning process itself.

Competency standards in Training Packages are determined by industry to meet identified industry skill needs. Competency standards are made up of a number of units of competency each of which describes a key function or role in a particular job function or occupation. Each unit of competency within a Training Package is linked to one or more AQF qualifications.

CONTEXTUALISATION OF UNITS OF COMPETENCY BY RTOS

Registered Training Organisation (RTOs) may contextualise units of competency to reflect local outcomes required. Contextualisation could involve additions or amendments to the unit of competency to suit particular delivery methods, learner profiles, specific enterprise equipment requirements, or to otherwise meet local needs. However, the integrity of the overall intended outcome of the unit of competency must be maintained.

Any contextualisation of units of competency in this endorsed Training Package must be within the bounds of the following advice. In contextualising units of competency, RTOs:

- must not remove or add to the number and content of elements and performance criteria
- may add specific industry terminology to performance criteria where this does not distort or narrow the competency outcomes
- may make amendments and additions to the range statement as long as such changes do not diminish the breadth of application of the competency and reduce its portability
- may add detail to the evidence guide in areas such as the critical aspects of evidence or resources and infrastructure required where these expand the breadth of the competency but do not limit its use.

COMPONENTS OF UNITS OF COMPETENCY

The components of units of competency are summarised below, in the order in which they appear in each unit of competency.

Unit title

The unit title is a succinct statement of the outcome of the unit of competency. Each unit of competency title is unique, both within and across Training Packages.

Unit descriptor

The unit descriptor broadly communicates the content of the unit of competency and the skill area it addresses. Where units of competency have been contextualised from units of competency from other endorsed Training Packages, summary information is provided. There may also be a brief second paragraph that describes its relationship with other units of competency, and any licensing requirements.

Prerequisite units (optional)

If there are any units of competency that must be completed before the unit, these will be listed.

Application of the unit

This sub-section fleshes out the scope of the unit of competency, its purpose and operation in different contexts, for example, by showing how it applies in the workplace.

Competency field (optional)

The competency field either reflects the way the units of competency are categorised in the Training Package or denotes the industry sector, specialisation or function. It is an optional component of the unit of competency.

Sector (optional)

The industry sector is a further categorisation of the competency field and identifies the next classification, for example an elective or supervision field.

Elements of competency

The elements of competency are the basic building blocks of the unit of competency. They describe in terms of outcomes the significant functions and tasks that make up the competency.

Performance criteria

The performance criteria specify the required performance in relevant tasks, roles, skills and in the applied knowledge that enables competent performance. They are usually written in passive voice. Critical terms or phrases may be written in bold italics and then defined in the range statement, in the order of their appearance in the performance criteria.

Required skills and knowledge

The essential skills and knowledge are either identified separately or combined.

Knowledge identifies what a person needs to know to perform the work in an informed and effective manner.

Skills describe the application of knowledge to situations where understanding is converted into a workplace outcome.

Key competencies

The way the key competencies relate to the unit will be described (unless the developer has described them at the level of the qualification). The key competencies are described in more detail at the end of this section.

Range statement

The range statement provides a context for the unit of competency, describing essential operating conditions that may be present with training and assessment, depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional

contexts. The meanings of key terms used in the performance criteria will also be explained in the range statement.

Evidence guide

The evidence guide is critical in assessment as it provides information to the Registered Training Organisation (RTO) and assessor about how the described competency may be demonstrated. The evidence guide does this by providing a range of evidence for the assessor to make determinations, and by providing the assessment context. The evidence guide describes:

- conditions under which competency must be assessed, including variables such as the assessment environment or necessary equipment
- relationships with the assessment of any other units of competency
- suitable methodologies for conducting assessment including the potential for workplace simulation
- resource implications, for example access to particular equipment, infrastructure or situations
- how consistency in performance can be assessed over time, various contexts and with a range of evidence
- the required underpinning knowledge and skills

KEY COMPETENCIES

All Training Packages require the integration of key competencies either in each unit of competency, or across a qualification, depending on industry needs and preferences.

The key competencies were first defined in 1992 in the project report, *Putting General Education to Work: The Key Competencies Report* (Mayer Committee 1992). The skills and knowledge they describe are essential for effective workplace participation and involve the sorts of capabilities commonly used by employers as selection criteria. They underpin the ability of employees to adapt to technological, organisational, societal and functional change.

The key competencies are generic, in that they apply to work in general, rather than to particular occupations or industries. They focus on the application of knowledge and skills in an integrated way in workplace situations. The seven key competencies are:

- 1 **Collecting, analysing and organising information**
The capacity to locate, sift and sort information in order to select what is required and to present it in a useful way, and to evaluate both the information itself and the sources and methods used to collect it.
- 2 **Communicating ideas and information**
The capacity to communicate effectively with others using the range of spoken, written, graphic and other non-verbal means of expression.
- 3 **Planning and organising activities**
The capacity to plan and organise one's own work activities, including making good use of time and resources, sorting out priorities and monitoring one's performance.
- 4 **Working with others in teams**
The capacity to interact effectively with other people both on a one-to-one basis and in groups, including understanding and responding to the needs of a client and working effectively as a member of a team to achieve a shared goal.
- 5 **Solving problems**
The capacity to apply problem-solving strategies in purposeful ways, both in

situations where the problem and the solution are clearly evident and in situations requiring creative thinking and a creative approach to achieve a desired outcome.

6 Using mathematical ideas and techniques

The capacity to use mathematical ideas, such as number and space, and techniques such as estimation and approximation, for practical purposes.

7 Using technology

The capacity to apply technology, combining the physical and sensory skills needed to operate equipment with the understanding of scientific and technological principles needed to explore and adapt systems.

Performance levels

There are three levels of performance defined within the key competencies. These are stand-alone levels and do not correspond to the AQF qualification levels.

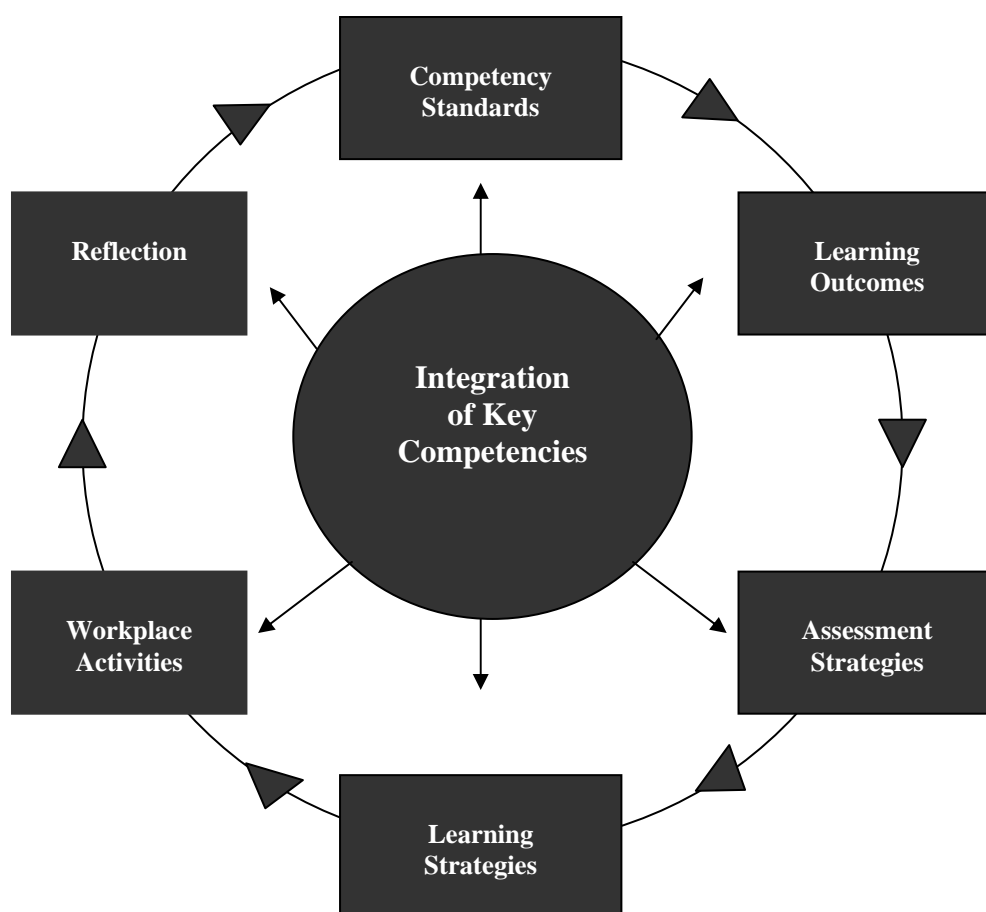
- **Performance Level 1** is concerned with the level of competence needed to *undertake* activities efficiently with sufficient self-management to meet the explicit requirements of the activity, and to make judgements about the quality of outcomes against established criteria.
- **Performance Level 2** describes the competence needed to *manage* activities requiring the selection, application and integration of a number of elements, and to select from established criteria to judge quality of process and outcome.
- **Performance Level 3** describes the competence needed to *evaluate and reshape* processes, to establish and use principles in order to determine appropriate ways of approaching activities, and to establish criteria for judging quality of process and outcome.

However, relating performance to the specific industry or workplace context may be more useful than interpreting the somewhat abstracted performance levels provided above. Where the key competencies are defined in the unit of competency, you will find them in a table, together with examples of their application, to help with assessment of their performance.

Also, in evaluating the level of performance for the key competencies, consider the performance expectations at the AQF qualification level involved.

Delivery and Assessment of Key Competencies

The key competencies are integral to workplace competency, and, as such must be explicitly considered in the design, customisation, delivery and assessment of Vocational Education and Training programs as represented diagrammatically below.



Background to PML04

The industry

This area covers a diverse group of technical and scientific occupations located across the whole of industry. In reality, the groups covered include scientific and technical employees involved in a variety of science-based occupations across many industries.

They are not located in any single ANZSIC classification, but are contained in a number of ASCO classifications, such as:

Minor Group 311 Medical and Science Technical Officers and Technicians

Minor Group 312 Building and Engineering Associate Professionals.

Other classifications also include people whose work involves testing or monitoring of materials and processes using scientific methods and/or equipment.

In general terms, the occupations covered are those in which non-professional employees use scientific techniques and equipment to carry out tests, and to operate and manage scientific processes. The core of these jobs is the use of scientific techniques, equipment and related knowledge.

A range of factors has driven the need for Vocational Education and Training in these occupations. First amongst them is the increasing regulation of standards relating to use of materials and equipment. Testing and monitoring of environmental and health hazards in the food processing and rural sectors are typical areas where this is observed. Similarly, testing of product safety is particularly important in the manufacturing industry.

A second area of demand emerges particularly from the greater attention to quality within manufacturing and construction. Testing of materials and products is now an inherent part of design and product quality systems.

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.

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

PML99

The Laboratory Operations Training Package, which was initially endorsed in 1999, has been the principal vehicle for addressing the emerging training and education needs of the people involved in these occupations.

PML99 was developed by Manufacturing Learning Australia with funding provided by the Australian National Training Authority (ANTA). A consulting team led by the Centre for

Training, Assessment and Development, Canberra Institute of Technology (CIT), undertook the development of the endorsed components.

Initially, this Training Package was designed to cater for laboratory and testing activities in the manufacturing, biomedical and food processing industries. In 2000, coverage was subsequently expanded to include construction materials testing and scientific glassblowing.

PML04

The review process

The review of PML99 was conducted in two stages. Phase I consisted of a comprehensive analysis of the existing units and packaging rules to determine strengths and weaknesses and make recommendations for improvement. The Phase I report was completed in October 2002.

The Phase I findings indicated that PML99 should be expanded to cover biotechnology, mineral assaying, specialist calibration technicians and laboratory technicians in educational institutions, and that a Certificate II should be developed to cover the needs of personnel working in manufacturing and field based sampling and/or testing. The pace of change in knowledge and skills requirements in these occupations has been a significant driver for the expansion and redevelopment of PML99.

Following acceptance of the Phase I recommendations by ANTA and the State Training Authorities, Manufacturing Learning Australia was funded to manage the Phase II project to redevelop PML99 based on the Phase I findings. The project commenced in March 2003, with CIT Solutions appointed to undertake the redevelopment work. The final draft of the revised Training Package was completed in June 2004.

The review process was guided by a steering committee consisting of people with a wide range of laboratory and related technical experience who undertook to ensure that the findings of the Phase I report were implemented in Phase II. Members of the committee also provided critical input to development and validation of new units and changes to packaging rules.

In the development phase, national consultations were conducted, using focus groups and individual interviews. Technical experts were used for writing/reviewing units of competency for specific industry areas. Draft new units and revised existing units were validated through a series of workshops in all States and Territories, and with individual technical experts. The validation drafts were also available on the MLA website throughout the project.

Schedule of consultations

When	Where	Workshop/meeting
8/5/03	TAFE NSW Bankstown	Laboratory Toolbox team
6/5/03	Perth: Amdel Ltd, Perth WA Dept of Training	Industry visit, re mineral assay Peter Ward
7/5/03	Perth: E-Central TAFE WA Horticulture and Environmental Science Skills Centre	Doug Hall, Innovating Horticulture Australia Invited technical experts (6 teachers, 2 industry — biotech and revision of Cert III and Diploma units) Kerry Bowe, Christine Cooper and technical experts
8/5/03	Perth	Scientific glassblowers
12-16/5/03	MLV offices Melbourne	Invited technical experts — revision of existing units, all levels
19/5/03	Melbourne	Dr Geoff Crawford — brief to review 47 existing units
20/5/03	Melbourne: Australian Industry Group Vic Curriculum and Assessment Authority	Victorian Industry Liaison Agent for Biotechnology — Brian Curtin, Sally Stevens Robin Tunbridge — VET in Schools
28-29/5/03	CIT Solutions Canberra	Wayne Clancy (Defence) — re calibration units
29/5/03	Canberra	TAFE Science Teachers network managers meeting
30/5/03	Canberra	Meeting with NOHSC re OHS units in PMA04
9-13/6/03	E-Central, Perth	Invited technical experts and industry reps re mineral assay and environmental
18/6/03	Canberra	RTCA — Tony Audley and Shannon Brown, re Animal Tech Diploma
19-21/6/03	Wodonga Institute of TAFE	Karen Stacey + industry experts re new testing and sampling units, qualifications framework
30/6/03, 1/2/7/03	Brisbane	Alan Bartlett Consulting and Department of Main Roads — review of construction materials testing units Review of new calibration units (Wayne Clancy and Alan Bartlett)
10/7/03	Melbourne	Pam Pryor NOHSC re OHS
17/7/03	Auckland NZ	Carl Ammon, NZITO re food industry labs, OHS training and mutual recognition.
21-22/7/03	Sydney	Invited technical experts
12/8/03	Canberra	Environmental industry group meeting
29/8/03	Canberra	Gary Scott — Enviro Industry group meeting
16/9/03	Adelaide	Torrens Valley TAFE — re molecular biology
16/10/03	Barossa Valley	TAFE Science Teachers network meeting
25/11/03	Meadowbank TAFE, Sydney	TAFE NSW group — chemical, manufacturing, food, biological, packaging rules
26/11/03	Sydney	Peptech, North Ryde
16/2/04	Uni of NSW, Sydney	Lynn Ferris, Tim Seary, Lindsay O'Keefe — pathways, recognition, etc
16/2/04	Sydney	Peter Stephenson, Stephenson Environmental Management
17/2/04	Meadowbank TAFE, Sydney	TAFE NSW group — prerequisites, packaging rules, specialisation naming, chemical, food biotechnology, TEST 600B

When	Where	Workshop/meeting
3/3/04	Torrens Valley TAFE, Adelaide	Validation workshop with industry, TAFE and STA representatives
4/3/04	E-Central TAFE, Perth	Validation workshop with industry, TAFE and STA representatives
10/3/04	Melbourne	Validation workshop with industry, TAFE and STA representatives
11/3/04	Devonport	Validation workshop with industry, TAFE and STA representatives
24/3/04	Brisbane	Validation workshop with industry, TAFE and STA representatives
31/3/04	Bankstown TAFE, Sydney	Validation workshop — industry representatives
5/4/04	Canberra	Validation workshop — TAFE and industry (environmental)
14/4/04	Hunter Institute, Newcastle	TAFE NSW — review and development of additional units
21/4/04	Darwin	Validation workshop with industry, TAFE and STA representatives

In addition to the above consultations, significant time was spent reviewing units via email and phone interviews with technical experts and training providers.

The steering committee

The steering committee contributed much time and expertise to this project and their contribution is gratefully acknowledged. The committee members were:

Name	Organisation	Sector	State
Brad Whisson	Amdel Ltd	Mineral assay	WA
Peter Stephenson	Stephenson Environmental Management Australia	Environmental monitoring	NSW
Robin Sherlock	EML Consulting Services	Biotechnology and food	QLD
Maria Lopez-Portillo	Armstrong World Industries (Aust) Pty Ltd	Manufacturing	VIC
David Gaulke	Centre for Industrial Sciences and Extractive Industries, Box Hill Institute of TAFE	Public RTO	VIC
Kim Peterson	Manufacturing and Engineering ESD, TAFE NSW	Public RTO	NSW
Alan Bartlett	Alan Bartlett Consulting	Private RTO	QLD
Brian Curtin	Australian Industry Group	Industry association / biotechnology	VIC
Jillian Blight	Dept of Education and Children's Services, SA	VET in Schools / education	SA
Regina Robertson	National Association of Testing Authorities	Professional body	NSW
John Scott	Office of Training and Tertiary Education	State Training Authority	VIC
Di Paton	Australian National Training Authority	Government	QLD

Industry participants

Many industry people and training providers made time in their busy schedule to participate in this project. Without their expertise and input, the project would not have been able to achieve its objectives and this is also gratefully acknowledged. The participants are listed below.

First name	Last name	Organisation	State	Sector
Ian	Fox	ACT Health	ACT	Environmental
Karen	Pirotta	ACT Health	ACT	Environmental
Geoff	Bell	Canberra Institute of Technology	ACT	RTO
Ron	Boulton	Canberra Institute of Technology	ACT	RTO
Simon	Gilmore	Canberra Institute of Technology	ACT	RTO
Kathy	Korsch	Canberra Institute of Technology	ACT	RTO (enviro)
Kerry	Plunket	Canberra Institute of Technology	ACT	RTO (enviro)
Daniel	Walters	Chem and Phys Lab	ACT	Environmental
Gary	Scott	CIT Solutions	ACT	Environmental
Karen	Pirotta	Ecowise Environmental	ACT	Environmental
Andy	Cumming	Ecowise Environmental	ACT	Environmental
Ross	Knee	Ecowise Environmental	ACT	Environmental
Janine	Goodwin	Environment ACT	ACT	Environmental
Mike	Braysher	Environmental Consultant	ACT	Environmental
Mick	Peterson	NOHSC	ACT	OHS
Shannon	Brown	Rural Training Australia	ACT	Animal
Terry	Weston	Thiess Services	ACT	Environmental
Graham	Mannall	Urban Services	ACT	Environmental
Bob	Neil	Urban Services	ACT	Environmental
Michael	Campbell	Allied Testing Pty Ltd	NSW	Construction Materials
Peter	Colgan	ARPANSA	NSW	Industry association
David	Millar	Aust museum	NSW	Museum
Tim	Ralph	Aust museum	NSW	Museum
Helen	Palfreeman	Australian Govt Analytical Laboratories	NSW	Enviro/chemical
David	Springer	Australian Govt Analytical Laboratories	NSW	Chemical
Chris	Stabb	Australian Soil Testing	NSW	Construction materials testing
Murray	Simpson	Boral Construction Materials	NSW	Construction materials testing
Malcolm	Sherlock	Caltex	NSW	Manufacturing
Darienne	Carraro	CASCO Aust Pty Ltd	NSW	Environmental
Robin	Bentley	CSIRO	NSW	Measurement
Ilya	Budousky	CSIRO	NSW	Measurement
Roger	Gilks	Department of Defence (Navy)	NSW	Calibration
Alistair	Thompson	DET NSW	NSW	Government
Paul	Fennell	Ecowise Environmental	NSW	Environmental
Frouke	de Reuver	Environmental Protection Authority	NSW	Environmental
Tom	Nealon	Fluke Aust Pty Ltd	NSW	Environmental
Flonda	Probert	FUCHS	NSW	Pharmacy
Kylie	Wallace	FUCHS	NSW	Pharmacy
Jocelyn	Hordern-Smith	Gazelle Foods	NSW	Food
David	Barker	Hunter Institute of TAFE	NSW	RTO
David	Batey	Hunter Institute of TAFE	NSW	RTO
Graeme	Fullick	Hunter Institute of TAFE	NSW	RTO
Ed	Krajniak	Hunter Institute of TAFE	NSW	RTO
John	Eames	Laboratory Quality Management Services	NSW	Chemical
Chris	Baker	Lake Macquarie Council	NSW	Environmental
Michael	Chilcott	Manidis Roberts	NSW	Environmental
Keith	Shumack	Manufacturing Cement Holdings Pty Ltd	NSW	Manufacturing
Maree	Stuart	MAS Management Consultancy Services	NSW	Chemical

First name	Last name	Organisation	State	Sector
Michael	McLeay	MD and Associates	NSW	RTO
Alison	Lord	NATA	NSW	Professional body
Regina	Robertson	NATA	NSW	Professional body
Mark	Worrell	NATA	NSW	Professional body
Marian	Haire	National Standards Commission	NSW	Measurement
Penny	Williams	NSW Department of Agriculture	NSW	Rural
Gerry	Gillespie	NSW Dept of Environment and Conservation	NSW	Environmental
David	Edmonds	Peptech	NSW	Biotechnology
Ravi	Bindiga	Qenos Pty Ltd	NSW	Manufacturing
Radha	Krishna	Qenos Pty Ltd	NSW	Manufacturing
John	Dunn	RAAF	NSW	Calibration
Phillip	Hesket	RAAF	NSW	Calibration
John	Baird	Royal North Shore Hosp	NSW	Biomedical
Peter	Stephenson	Stephenson Environmental Management	NSW	Environmental
Harry	Albani	Sydney Institute of TAFE	NSW	RTO
Deidre	Coote	Sydney Institute of TAFE	NSW	RTO (biochemistry)
Anne-marie	Skelton	Sydney Institute of TAFE	NSW	RTO (food)
Bronte	Price	TAFE Industry Partnership Centre	NSW	RTO
Margaret	Bamford	TAFE NSW	NSW	RTO
Lee	Cummings	TAFE NSW	NSW	RTO
Grant	Fletcher	TAFE NSW	NSW	RTO (food, mfg)
David	Frith	TAFE NSW	NSW	RTO (Info Tech)
Fiona	Martin	TAFE NSW	NSW	RTO
Kim	Peterson	TAFE NSW	NSW	RTO
Jeanette	Ramos	TAFE NSW	NSW	RTO
Dorey	Russell	TAFE NSW	NSW	RTO
Gary	Wood	TAFE NSW	NSW	RTO
Jude	Nye	TAFE NSW, Granville College	NSW	RTO
Sandy	Pitchfork	TAFE NSW, Granville College	NSW	RTO
John	Rock	TAFE NSW, Granville College	NSW	RTO
Lee	Coleman	Testing and Certification Aust	NSW	Environmental
Maureen	Fletcher	TexSkill	NSW	Construction Materials
Malcolm	Ricketts	Uni of Sydney	NSW	Education
Alexander	Litvak	Unisearch Ltd	NSW	Chemical
Lynn	Ferris	University of NSW	NSW	Education
Lindsay	O'Keeffe	University of NSW	NSW	Education
Tim	Seary	University of NSW	NSW	Education
Sharon	Armstrong	UWS	NSW	Education
Clare	Johnson	Value Added Wheat CRC	NSW	Food
Hayfa	Salman	Value Added Wheat CRC	NSW	Food
Belinda	Chu	Weston Technologies	NSW	Food
Sherry	Duckworth	Weston Technologies	NSW	Food
Owen	Crawford	Alcan — Gove	NT	Manufacturing
Zane	Hughes	Bachelor Institute	NT	RTO
Mila	Ott	Batchelor Institute of Indigenous Education	NT	RTO
Lynne	Chambers	Berrimah Veterinary Laboratory	NT	Animal
Stephen	Beyer	Charles Darwin University	NT	RTO
Neil	Ludvigsen	Charles Darwin University	NT	RTO
Michelle	Parks	Charles Darwin University	NT	RTO
Jodie	Ranford	Charles Darwin University	NT	RTO
David	Boots	CSR Readymix	NT	Manufacturing
Greg	Flanagan	DEET	NT	Government
Rachel	Munnich	DEET	NT	Government
Paul	Daly	Dept of Health and Community Services	NT	Biomedical

First name	Last name	Organisation	State	Sector
Laqui	Papau	Group Training NT	NT	RTO
Sally	Pointon	Group Training NT	NT	Group Trainer
Sue	Hanson	Hanson Training Services	NT	RTO
Barbara	Pitman	Human Services Training Advisory Council	NT	Biomedical
Sue	Hutton	Menzies School of Health Research	NT	Biomedical
Gil	Court	MITAC	NT	ITAC (Mineral assay, chemical)
Howard	Smith	Nabalco	NT	Manufacturing
Sharnie	Frewen-Lord	Newmont the Granites Gold Mine	NT	Mineral assay
Sharyn	Thacker	Newmont, Tanami Operations — Groundrush	NT	Mineral assay
Steve	Blacklock	Northern Cement	NT	Manufacturing
Marianne	St Clair	Primary Industries TAC	NT	ITAC (Rural)
Steven	Svenssen	Sanderson High School	NT	Education
Debbie	Atkinson	SMIT	NT	ITAC (seafood)
Carl	Ammon	NZ Ind Training Org	NZ	RTO
Peter	Greenham	Alan Bartlett Consulting	QLD	
Wayne	Clancy	ADF Calibration	QLD	Calibration
Alan	Bartlett	Alan Bartlett Consulting	QLD	Construction materials testing
Di	Paton	ANTA	QLD	Government
Rod	Turner	Assessment Answers	QLD	Consultant
Sally	Stevens	Australian Industry Group	QLD	Industry association
Richard	Thompson	Brisbane City Council	QLD	Environmental
Bea	Booth	Cairns Engineering Testing	QLD	Construction materials testing
Lisa	Bateson	Chemicals ITC	QLD	Manufacturing
Blue	O'Shea	Cicase Pty Ltd	QLD	Environmental
Paul	Fraser	Civil Quality Assurance	QLD	Construction materials testing
Mark	Robinson	Civiltrain	QLD	RTO (construction materials)
Mal	Bates	Construction Training Qld	QLD	Construction materials testing
Michael	Sutton	CSR Readymix	QLD	Manufacturing
Maurie	Bellaver	Department of Employment and Training	QLD	Government
Mark	Muscat	Department of Main Roads	QLD	Construction materials testing
Mark	Owttrim	Department of Main Roads	QLD	Construction materials testing
Jon	Oxford	Department of Main Roads	QLD	Construction materials testing
Jan	Rhoades	Department of Main Roads	QLD	Construction materials testing
John	Roberts	Department of Main Roads	QLD	Construction materials testing
Julie	Iverson	Dept Natural Resources and Mines	QLD	Mineral assay
Dave	Lyons	Dept Natural Resources and Mines	QLD	Mineral assay
Victoria	Gordon	Ecobiotics	QLD	Environmental
Robin	Sherlock	EML Consulting Services	QLD	Biotechnology, food
Rai	Pippia	Energex Ltd	QLD	Energy
Rob	Morgan	Food Industries Assoc of Qld	QLD	Industry association
Bruce	Harle	Forest ITAB	QLD	ITAB (forest products)
Paul	Brooks	Incitec Pivot	QLD	Manufacturing
Steve	Cusack	Kase Enterprises	QLD	Construction materials testing
Allen	Reid	Local Government ITB	QLD	ITAB (local govt)
Moya	Hancock	Mackay Sugar School	QLD	Food
Barry	Neville	Metrology Society of Australia	QLD	Calibration
Bill	Johansen	Morrison Geotechnic	QLD	Soil testing
Irena	Morgan-Williams	MWTC Pty Ltd	QLD	Consultant
Amanda	MacFarlane	NATA	QLD	Professional body
Gerry	Ansell	Qld Food ITC	QLD	ITAB (food)
Doug	Crosser	Qld Food ITC	QLD	ITC (food)
Roger	Cater	Qld PM ITAB	QLD	ITAB (manufacturing)
Terri	Sturman	Qld PM ITAB	QLD	ITAB (manufacturing)
Sandra	Lewis	Science Assistants in Secondary Education	QLD	Education

First name	Last name	Organisation	State	Sector
Joe	Langford	Simmonds and Bristow	QLD	Environmental
John	Darling	SIMTARS Calibration Laboratory	QLD	Government — Mineral assay
Caroline	Comino	Southbank Institute of TAFE	QLD	RTO
Michael	Diezmann	Southbank Institute of TAFE	QLD	RTO
Snezana	Dukic	Southbank Institute of TAFE	QLD	RTO
Shane	Brandt	VMS International	QLD	Biomedical
Kevin	Wolff	Wolff Consulting	QLD	Chemical
Jason	Homa	Boral Construction Materials	SA	Construction materials testing
Nigel	Waterhouse	Boral Resources (SA) Limited	SA	Construction materials testing
Terry	Wright	Boral Resources (SA) Limited	SA	Construction materials testing
Kingsley	Valladares	Clinipath	SA	Biomedical
Lesley	Snell	Dept Haematology and Genetic Pathology	SA	Biomedical
Jillian	Blight	Dept of Education and Children's Services	SA	VET in Schools/education
Sherelee	Rose	DFEEST, Quality Branch	SA	Government
Aggie	Van Eyk	DFEEST, Quality Branch	SA	Government
Catherine	Nicholls	Genetics Laboratory, Women and Children's Hospital	SA	Biotechnology
Sue	Fitzsimons	IDEXX Laboratories	SA	Environmental
Tim	Kuchel	IMVS Veterinary Services	SA	Animal
Rosemary	Olds	Marden Senior College	SA	VET in Schools
Coralie	Bee	Murray Institute of TAFE	SA	RTO
Joe	Adam	NGT	SA	RTO
Mark	Warner	RAAF	SA	Calibration
Andrew	Thornton	SA Medical Scientists	SA	Biomedical
Michael	Ellis	Schefenacker Vision Systems	SA	Manufacturing
Gary	Rayner	Schefenacker Vision Systems	SA	Manufacturing
Mick	Dineen	Seaview High School	SA	Education
Wayne	Smith	Spencer TAFE	SA	RTO
Richard	Drogemuller	SSABSA	SA	VET in Schools
Cliff	Rothenberg	SSABSA	SA	VET in Schools
Anne	Gilleade	TAFEBIZSA	SA	Government
Leanne	Coombe	Torrens Valley TAFE	SA	RTO (food)
Jenni	Edsall	Torrens Valley TAFE	SA	RTO
Gary	Hallas	Torrens Valley TAFE	SA	RTO
Ann	Horne	Torrens Valley TAFE	SA	RTO
David	Jones	Torrens Valley TAFE	SA	RTO
Greg	Hince	Analytical Services Tasmania	TAS	Environmental
Ros	Pyrke	Analytical Services Tasmania	TAS	Environmental
Joanne	Dennis	Bonlac Foods Ltd	TAS	Food
Brian	Latta	Carter Holt Harvey	TAS	Manufacturing
Gabe	Gressie	Cascade Brewery Co	TAS	Food
Christine	McCrystal	CS&H and property services ITB	TAS	ITAB (health)
Margaret	Killen	J Boag and Son	TAS	Food
Darrin	Cunningham	NGT	TAS	Group trainer
David	Olden	OPCET	TAS	Government
Kathy	Woolley	OPCET	TAS	Government
Doug	Casey	TAFE Tasmania	TAS	RTO
Glenda	Lentern	TAFE Tasmania	TAS	RTO
David	Perkins	TAFE Tasmania	TAS	RTO
Ottmar	Helm	Training Consultant	TAS	Consultant
Geoff	Crawford	Access Academix	VIC	Biotechnology
Peter	Hodgson	ADFCAL	VIC	Calibration
Peter	Daly	Agilent Tech Aust Pty Ltd	VIC	Manufacturing
David	Allen	Albury City Council	VIC	Environmental
Maria	Lopez-Portillo	Armstrong World Industries	VIC	Manufacturing
Leigh	MacKinnon	Australian Defence Industries	VIC	Calibration

First name	Last name	Organisation	State	Sector
Brian	Curtin	Australian Industry Group	VIC	Biotechnology
Alan	Wheeler	Australian Industry Group	VIC	Biotechnology
Elsbeth	King	Bendigo Regional Institute of TAFE	VIC	RTO
James	Collings	Blue Circle Southern Cement	VIC	Manufacturing
Glenn	Martland	Bostik Findley	VIC	Manufacturing
Henryk	Pinda	Bostik Findley	VIC	Manufacturing
Kay	Stringer	Bostik Findley	VIC	Manufacturing
Peter	Davies	Box Hill Institute of TAFE	VIC	RTO
Jill	Dowler	Box Hill Institute of TAFE	VIC	RTO
Noel	Dowler	Box Hill Institute of TAFE	VIC	RTO
David	Gaulke	Box Hill Institute of TAFE	VIC	RTO
Sue	McInnes	Box Hill Institute of TAFE	VIC	RTO
Robyn	Megna	Box Hill Institute of TAFE	VIC	RTO
Peter	Sheehan	Box Hill Institute of TAFE	VIC	RTO
Bill	Walley	Box Hill Institute of TAFE	VIC	Industry consultant
Alan	Stevenson	Chisholm Institute	VIC	RTO
Philip	Davey	Chisholm Institute of TAFE	VIC	RTO
Denis	Goss	Chisholm Institute of TAFE	VIC	RTO
Mehrdad	Jafari	Chisholm Institute of TAFE	VIC	RTO
Trevor	Lange	Chisholm Institute of TAFE	VIC	RTO
Tuija	Makela	Chisholm Institute of TAFE	VIC	RTO
Peter	Malone	Chisholm Institute of TAFE	VIC	RTO
Werner	Mueller	CSL Bioplasma	VIC	Biotechnology
Brendan	Saville	CSL Bioplasma	VIC	Biotechnology
Lisa	Clingan	Gordon TAFE	VIC	RTO
Rob	Curry	Gordon TAFE	VIC	RTO
David	Benson	Holmesglen Institute of TAFE	VIC	RTO
Karen	McCoy	Holmesglen Institute of TAFE	VIC	RTO
Mariana	Berak	Holmesglen Institute of TAFE	VIC	RTO
Gabrielle	Fountain	Holmesglen Institute of TAFE	VIC	RTO
Alli	Grindrod	Holmesglen Institute of TAFE	VIC	RTO
Ruth	Leslie	Holmesglen Institute of TAFE	VIC	RTO
Kathy	Davern	LaTrobe University R&D Park	VIC	Biotechnology
Bernie	Lebenbaum	Macservise Group	VIC	
John	Molenaar	Manufacturing Learning Victoria	VIC	ITAB (manufacturing)
Nicole	Bettio	Murray Goulburn	VIC	Food
Anna	Davey	National Institute of Forensic Science	VIC	Government
Alex	Prygodicz	NMIT	VIC	Education
Pam	Pryor	NOHSC	VIC	OHS
John	Scott	Office of Training and Tertiary Education	VIC	Government
Tina	Berghella	Oggi Consulting	VIC	Environmental
Ed	Rottinger	RAAF	VIC	Calibration
Trish	Newstead	RMIT	VIC	RTO
Laurence	Motteram	Scientific Devices Aust	VIC	Manufacturing
Lyn	Firminger	Strategic Planning Services	VIC	RTO
Phillip	McGlashan	Swinburne TAFE	VIC	RTO
Peter	Dunne	Swinburne University (TAFE)	VIC	RTO
Linda	Condon	Swinburne University of Technology	VIC	RTO
Janne	Lade	Swinburne University of Technology	VIC	RTO
Ken	McDonald	Swinburne University of Technology	VIC	RTO
Chris	Gamgee	VICOM	VIC	Manufacturing
Eva	Debassy	William Angliss Institute of TAFE	VIC	RTO
Anne	Newton	William Angliss Institute of TAFE	VIC	RTO
Peter	Carey	WIOT	VIC	Manufacturing
Paul	Schupina	Wodonga Institute of TAFE	VIC	Manufacturing
Karen	Stacey	Wodonga Institute of TAFE	VIC	RTO (food)

First name	Last name	Organisation	State	Sector
Sonny	Phang	Addview Training and Educational Services	WA	Environmental
Dennis	Clair	Allira Glassblowing	WA	Scientific glassblowing
Brad	Whisson	Amdel Ltd	WA	Mineral assay
Fritz	Grader	Central TAFE	WA	RTO
John	Cattermoul	Central TAFE, East Perth Campus	WA	RTO
Sue	Brand	Central TAFE, Leederville Campus	WA	RTO
Bruce	Willson	Central TAFE, Leederville Campus	WA	RTO
Kerry	Bowe	Challenger TAFE	WA	RTO
David	Burge	Challenger TAFE	WA	RTO
Adrienne	Cavaney	Challenger TAFE	WA	RTO
John	Flynn	Challenger TAFE	WA	RTO
Ron	Levett	Challenger TAFE	WA	RTO
Geoff	Craggs	Conservation Volunteers Australia	WA	Environmental
Christine	Howitt	Curtin University	WA	RTO
Steve	Milner	Curtin University of Technology	WA	RTO
Lillias	Bovell	Department of Environmental Protection	WA	Environmental
Rick	McKenna	Dept of Defence (Navy)	WA	Calibration
Annette	Firth	e- Central TAFE	WA	RTO
Dominic	Cooper	e-Central TAFE	WA	RTO
Toni	Crossland	e-Central TAFE	WA	RTO
Gun	Dolva	e-Central TAFE	WA	RTO
Linda	Engledow	e-Central TAFE	WA	RTO
Elizabeth	Fitzgerald	e-Central TAFE	WA	RTO
Frits	Grader	e-Central TAFE	WA	RTO
David	Lewis	e-Central TAFE	WA	RTO
Gail	Manton	e-Central TAFE	WA	RTO
Bridget	Van Herk	e-Central TAFE	WA	RTO
Chris	Williams	e-Central TAFE	WA	RTO
Graham	Wood	e-Central TAFE	WA	RTO
Paul	van der Beeke	EnvironmentalSkill International Pty Ltd	WA	RTO
Chris	Fisher	Fisher Biotech	WA	Biotechnology
Doug	Hall	Innovating Horticulture Australia	WA	Agric/horticulture
Phil	Manning	Leederville TAFE	WA	RTO
Odile	Pouliquen-Young	Midland TAFE	WA	RTO
Chee	Sang Chung	Midland TAFE	WA	RTO
Philip	Ladd	Murdoch University	WA	RTO
John	Graham	NATA	WA	Professional body
Mike	Jakins	PMITC of WA	WA	ITAB (manufacturing)
Julie	Micallef	Swan TAFE	WA	RTO
Chris	Smith	Swan TAFE	WA	RTO
Shelley	Smailes	Swan TAFE, Bentley	WA	RTO
John	Pool	Swan TAFE, Midland	WA	RTO
Jennifer	Branigan	Swan TAFE, Midland Campus	WA	RTO
Don	Hardingham	Swan TAFE, Thornlic	WA	RTO
Bill	Hamlett	SWRC TAFE	WA	RTO
Greg	Cole	UWA	WA	Scientific glassblowing
Christine	Cooper	WA TAFE	WA	RTO
Viv	Marshall	WADOT, SWRC TAFE, Bunbury Campus	WA	RTO

Unions

The following Unions were contacted and kept informed of progress throughout the review:

ALHMWU (Matt Warburton, National Industrial Officer)

AWU (Carl Phillips, National Industrial Officer)

AMWU (Ian Curry, National Projects Officer)

APESMA
AEU
ASU
CPSU
CFMEU
HSU

Changes resulting from the review

General comments

PML99 has been extensively reviewed. Although many of the existing units have been carried forward, all units have been updated for changes which have occurred in the workplace since development of PML99.

The changes reflect the findings of the Phase I report and a careful mapping process has been undertaken to ensure that everything covered by PML99 has been included in PML04.

The OHS units have all been reviewed and updated with input from the National Occupational, Health and Safety Commission (NOHSC).

Existing units

Existing units of competency have been updated with respect to:

- size, coverage, currency and titles
- clarity of elements, performance criteria, range of variables and evidence guides
- underpinning knowledge
- language, access and equity issues identified by the equity consultant
- prerequisites.

New units

New units of competency have been developed for new industry sectors and field work, in close cooperation with expert groups and subsequently checked by them for accuracy and completeness. A comprehensive mapping of units in PML99 to units in PML04 follows this section.

Packaging rules

The Qualifications Framework has been reviewed, based on the feedback from Phase I, to increase flexibility by reducing the number of core units and increasing the pool of electives to choose from.

New qualification

A Certificate II in Sampling and Measurement PML20104 has been created for personnel working in production and field based sampling and measurement. The new certificate will also be appropriate for delivery in VET in Schools programs.

“This competency in practice”

The storylines at the end of each unit of competency (a highly regarded feature of PML99) have been reviewed and updated where necessary for all units carried forward to PML04. Additional industry storylines have been developed for all new units of competency.

Assessment guidelines

The assessment guidelines have been reviewed to align with ANTA guidelines and to include issues identified by the equity consultant. The implementation of these guidelines will be similar to the existing assessment guidelines. These model guidelines have been customised by the addition of a section on *Assessment in the laboratory and testing industries*.

Transition arrangements

People with existing qualifications from PML99 will still have that qualification recognised. People who have some units of competency recognised (while not having a full qualification) should have the equivalent unit of competency in PML04 granted. They can then be assessed for the relevant qualification under PML04.

Mapping of qualifications in PML99 to PML04

Qualification title	PML99	PML04	Comment
<i>Certificate II in Sampling and Measurement</i>	No certificate II	PML20104 Total units: 7 Core: 3 Elective: 4	New qualification
<i>Certificate III in Laboratory Skills</i>	PML30199 Total units: 12 Core: 8 Elective: 4	PML30104 Total units: 12 Core: 5 Elective: 7	Equivalent
<i>Certificate IV in Laboratory Techniques</i>	PML40199 Total units: 16 Core: 11 Elective: 5	PML40104 Total units: 16 Core: 5 Elective: 11	Equivalent
<i>Diploma of Laboratory Technology</i>	PML50199 Total units: 20 Core: 13 Elective: 7	PML50104 Total units: 20 Core: 8 Elective: 12	Equivalent
<i>Diploma of Laboratory Technology (Scientific Glassblowing)</i>	PML50200 Total units: 20 Core: 14 Elective: 6	- Refer to PML50104	No separate Diploma for Scientific Glassblowing. Covered by PML50104
<i>Advanced Diploma of Laboratory Operations</i>	PML60199 Total units: 12 Core: 8 Elective: 4	PML60104 Total units: 12 Core: 6 Elective: 6	

Registered Training Providers should seek advice from the relevant State Training Authority regarding extension of scope for PML04.

Mapping of units in PML04 with units in PML99

Mapping of PML99 to PML04

The following mapping (in PML99 code order) shows all the PML99 units and the replacement units in PML04. The next section maps units in PML04 to PML99.

PML99 unit code	PML99 Unit title	PML04 unit code	PML04 unit title	Comment
300 series				
PMLCOM300A	Communicate with other people	PMLCOM300B	Communicate with other people	Equivalent
PMLDATA300A	Process and record data	PMLDATA400A	Process and interpret data	Equivalent (re-levelled)
PMLMAIN300A	Maintain the laboratory fit for purpose	PMLMAIN300B	Maintain the laboratory fit for purpose	Equivalent
PMLOHS300A	Work safely in accordance with defined policies and procedures	PMLOHS302A	Participate in laboratory/field workplace safety	New unit, similar in outcome, updated with input from NOHSC
PMLOHS301A	Work safely with instruments that emit ionising radiation	PMLOHS301A	Work safely with instruments that emit ionising radiation	Equivalent
PMLORG300A	Follow established work plan			No equivalent unit — PMLORG300A and PMLTEAM300A replaced by PMLORG301A
PMLQUAL300A	Contribute to the achievement of quality objectives	PMLQUAL300B	Contribute to the achievement of quality objectives	Equivalent
PMLQUAL301A	Apply critical control point requirements	PMLQUAL301B	Apply critical control point requirements	Equivalent
PMLSAMP300A	Handle and transport samples	PMLSAMP201A	Handle and transport samples or equipment	Equivalent — revised to include equipment
PMLSAMP301A	Receive and prepare a range of samples for pathology testing	PMLSAMP302A	Receive and prepare samples for testing	Equivalent — revised to include all industry sectors
PMLSCIG300A	Operate basic handblowing equipment	PMLSCIG300B	Operate basic handblowing equipment	Equivalent
PMLSCIG301A	Repair glass apparatus using simple glassblowing equipment	PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment	Equivalent
PMLTEAM300A	Work efficiently as part of a team			No equivalent unit — PMLORG300A and PMLTEAM300A replaced by PMLORG301A
PMLTEST300A	Perform basic tests	PMLTEST300B	Perform basic tests	Equivalent
PMLTEST301A	Perform biological laboratory procedures	PMLTEST308A + PMLTEST310A	Perform microscopic examination Perform histological procedures	Equivalent — split to accommodate all industry sectors

PML99 unit code	PML99 Unit title	PML04 unit code	PML04 unit title	Comment
PMLTEST302A	Calibrate test equipment and assist with its maintenance			No equivalent unit — calibration checks are included in all 'PMLTEST' units of competency that involve the use of equipment and/or instruments See also: PMLCAL400A, PMLCAL500A, PMLCAL501A, PMLCAL502A and PMLMAIN502A
PMLTEST303A	Prepare working solutions	PMLTEST303B	Prepare working solutions	Equivalent
PMLTEST304A	Prepare culture media	PMLTEST304B	Prepare culture media	Equivalent
PMLTEST305A	Perform aseptic techniques	PMLTEST305B	Perform aseptic techniques	Equivalent
PMLTEST306A	Assist with fieldwork	PMLTEST306B	Assist with fieldwork	Equivalent
PMLTEST307A	Prepare trial batches for evaluation	PMLTEST307B	Prepare trial batches for evaluation	Equivalent
400 series				
PMLQUAL400A	Contribute to the ongoing development of HACCP plans	PMLQUAL400B	Contribute to the ongoing development of HACCP plans	Equivalent
PMLQUAL401A	Apply quality system and continuous improvement processes	PMLQUAL401B	Apply quality system and continuous improvement processes	Equivalent
PMLSAMP400A	Obtain representative samples in accordance with sampling plan	PMLSAMP400B	Obtain representative samples in accordance with sampling plan	Equivalent
PMLTEST400A	Perform instrumental tests/ procedures			No equivalent unit — refer new TEST400 units in PML04 mapping
PMLTEST401A	Perform non-instrumental tests/ procedures			No equivalent unit — refer new TEST400 units in PML04 mapping
PMLTEST402A	Prepare, standardise and use solutions	PMLTEST402B	Prepare, standardise and use solutions	Equivalent
PMLTEST403A	Assist with geotechnical site investigations	PMLTEST403B	Assist with geotechnical site investigations	Equivalent
500 series				
PMLCOM500A	Provide information to customers	PMLCOM500B	Provide information to customers	Equivalent
PMLDATA500A	Analyse data and report results	PMLDATA500B	Analyse data and report results	Equivalent
PMLDATA501A	Use laboratory application software	PMLDATA501B	Use laboratory application software	Equivalent
PMLMAIN500A	Maintain and control stocks	PMLMAIN400A	Maintain and control stocks	Equivalent (re-levelled)
PMLMAIN501A	Assist in the maintenance of reference materials	PMLMAIN501B	Assist in the maintenance of reference materials	Equivalent
PMLORG500A	Schedule laboratory work for a small team	PMLORG500B	Schedule laboratory work for a small team	Equivalent

PML99 unit code	PML99 Unit title	PML04 unit code	PML04 unit title	Comment
PMLSCIG501A	Design and manufacture glass apparatus and glass systems	PMLSCIG501B	Design and manufacture glass apparatus and glass systems	Equivalent
PMLSCIG502A	Perform glass coating, grinding and finishing operations	PMLSCIG502B	Perform glass coating, grinding and finishing operations	Equivalent
PMLSCIG503A	Construct, modify and maintain high vacuum systems	PMLSCIG503B	Construct, modify and maintain high vacuum systems	Equivalent
PMLTEST500A	Calibrate and maintain instruments	PMLCAL400A + PMLMAIN502A	Perform standard calibrations Maintain instruments and equipment	Equivalent (split and revised to current industry standards)
PMLTEST501A	Perform microbiological tests	PMLTEST501B	Perform microbiological tests	Equivalent
PMLTEST502A	Perform haematological tests	PMLTEST502B	Perform haematological tests	Equivalent
PMLTEST503A	Perform histological tests	PMLTEST503B	Perform histological tests	Equivalent
PMLTEST504A	Perform chemical pathology tests	PMLTEST504B	Perform chemical pathology tests	Equivalent
PMLTEST505A	Conduct sensory analysis	PMLTEST505B	Conduct sensory analysis	Equivalent
PMLTEST506A	Apply spectrometric techniques	PMLTEST524A	Apply routine spectrometric techniques	Equivalent
PMLTEST507A	Apply chromatographic and electrophoretic techniques	PMLTEST512A + PMLTEST513A	Apply electrophoretic techniques Apply routine chromatographic techniques	Equivalent
PMLTEST508A	Perform ecological techniques	PMLTEST521A	Perform laboratory-based ecological techniques	Equivalent (more accurate naming)
PMLTEST509A	Perform immunohaematological tests	PMLTEST509B	Perform immunohaematological tests	Equivalent
PMLTEST510A	Perform fieldwork	PMLTEST408A	Undertake environmental field-based monitoring	Equivalent (re-levelled)
PMLTEST511A	Supervise earthworks inspection, sampling and testing operations	PMLTEST511B	Supervise earthworks inspection, sampling and testing operations	Equivalent
600 series				
PMLCOM600A	Develop and maintain laboratory documentation	PMLCOM600B	Develop and maintain laboratory documentation	Equivalent
PMLOHS600A	Implement and monitor risk management processes associated with OH&S and environmental policies and procedures	PMLOHS601A	Implement and monitor OHS and environmental management systems	Equivalent — revised in conjunction with NOHSC
PMLORG600A	Supervise laboratory operations in work/functional area	PMLORG600B	Supervise laboratory operations in work/functional area	Equivalent
PMLORG601A	Maintain registration and statutory or legal compliance in work/functional area	PMLORG601B	Maintain registration and statutory or legal compliance in work/functional area	Equivalent
PMLORG602A	Manage complex projects	PMLORG602B	Manage complex projects	Equivalent

PML99 unit code	PML99 Unit title	PML04 unit code	PML04 unit title	Comment
PMLQUAL600A	Maintain quality system and continuous improvement processes within work/functional area	PMLQUAL600B	Maintain quality system and continuous improvement processes within work/functional area	Equivalent
PMLQUAL601A	Conduct an internal audit of the quality system	PMLQUAL601B	Conduct an internal audit of the quality system	Equivalent
PMLTEAM600A	Manage and develop teams	PMLTEAM600B	Manage and develop teams	Equivalent
PMLTEST600A	Select appropriate test methods and procedures	PMLTEST603A	Evaluate and select appropriate test methods and/or procedures	Equivalent
PMLTEST601A	Classify building sites	PMLTEST601B	Classify building sites	Equivalent
700 series				
PMLTEST700A	Contribute to the development of products and applications	PMLTEST700B	Contribute to the development of products and applications	Equivalent
PMLTEST701A	Troubleshoot equipment and production processes	PMLTEST701B	Troubleshoot equipment and production processes	Equivalent
PMLTEST702A	Contribute to the validation of test methods	PMLTEST702B	Contribute to the validation of test methods	Equivalent
PMLTEST703A	Develop or adapt analyses and procedures	PMLTEST703B	Develop or adapt analyses and procedures	Equivalent
PMLTEST704A	Integrate data acquisition and interfacing systems	PMLTEST704B	Integrate data acquisition and interfacing systems	Equivalent
Imported units				
BSZ401A	Plan assessment	BSZ401A	Plan assessment	Equivalent (latest version to be imported when endorsed)
BSZ402A	Conduct assessment	BSZ402A	Conduct assessment	
BSZ403A	Review assessment	BSZ403A	Review assessment	
BSZ404A	Train small groups	BSZ404A	Train small groups	

Mapping of PML04 to PML99

The following mapping (in PML04 code order) shows all the units in PML04 and maps to relevant units in PML99.

PML04 unit code	Unit title	PML99 unit code	Unit title	Comment
200 series				
PMLDATA200A	Record and present data			New unit — part replaces PMLDATA300A, but not equivalent
PMLORG200A	Work within a laboratory/field workplace (induction)			New unit — no equivalent
PMLSAMP200A	Collect routine site samples			New unit — no equivalent
PMLSAMP201A	Handle and transport samples or equipment	PMLSAMP300A	Handle and transport samples	Equivalent — re-levelled and includes equipment
PMLTEST200A	Conduct routine site measurements			New unit — no equivalent
300 series				
PMLCOM300B	Communicate with other people	PMLCOM300A	Communicate with other people	Equivalent
PMLMAIN300B	Maintain the laboratory fit for purpose	PMLMAIN300A	Maintain the laboratory fit for purpose	Equivalent
PMLOHS301B	Work safely with instruments that emit ionising radiation	PMLOHS301A	Work safely with instruments that emit ionising radiation	Equivalent
PMLOHS302A	Participate in laboratory/field workplace safety	PMLOHS300A	Work safely in accordance with defined policies and procedures	Similar in outcome, updated with input from NOHSC
PMLORG301A	Plan and conduct laboratory/field work	PMLORG300A + PMLTEAM300A	Follow established work plan Work efficiently as part of a team	Equivalent
PMLQUAL300B	Contribute to the achievement of quality objectives	PMLQUAL300A	Contribute to the achievement of quality objectives	Equivalent
PMLQUAL301B	Apply critical control point requirements	PMLQUAL301A	Apply critical control point requirements	Equivalent
PMLSAMP302A	Receive and prepare samples for testing	PMLSAMP301A	Receive and prepare a range of samples for pathology testing	New unit, but equivalent in outcome
PMLSCIG300B	Operate basic handblowing equipment	PMLSCIG300A	Operate basic handblowing equipment	Equivalent
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment	PMLSCIG301A	Repair glass apparatus using simple glassblowing equipment	Equivalent
PMLTEST300B	Perform basic tests	PMLTEST300A	Perform basic tests	Equivalent
PMLTEST303B	Prepare working solutions	PMLTEST303A	Prepare working solutions	Equivalent
PMLTEST304B	Prepare culture media	PMLTEST304A	Prepare culture media	Equivalent
PMLTEST305B	Perform aseptic techniques	PMLTEST305A	Perform aseptic techniques	Equivalent
PMLTEST306B	Assist with fieldwork	PMLTEST306A	Assist with fieldwork	Equivalent
PMLTEST307B	Prepare trial batches for evaluation	PMLTEST307A	Prepare trial batches for evaluation	Equivalent

PML04 unit code	Unit title	PML99 unit code	Unit title	Comment
PMLTEST308A	Perform microscopic examination			New unit — part replaces PMLTEST301A, but not equivalent
PMLTEST310A	Perform histological procedures			New unit — part replaces PMLTEST301A, but not equivalent
400 series				
PMLCAL400A	Perform standard calibrations			New unit — part replaces PMLTEST500A, but not equivalent
PMLDATA400A	Process and interpret data	PMLDATA300A	Process and record data	Equivalent (re-levelled)
PMLMAIN400A	Maintain and control stocks	PMLMAIN500A	Maintain and control stocks	Equivalent (re-levelled)
PMLOHS400A	Maintain laboratory/field workplace safety			New unit — no equivalent
PMLORG400A	Prepare practical science classes and demonstrations			New unit — no equivalent
PMLQUAL400B	Contribute to the ongoing development of HACCP plans	PMLQUAL400A	Contribute to the ongoing development of HACCP plans	Equivalent
PMLQUAL401B	Apply quality system and continuous improvement processes	PMLQUAL401A	Apply quality system and continuous improvement processes	Equivalent
PMLSAMP400B	Obtain representative samples in accordance with sampling plan	PMLSAMP400A	Obtain representative samples in accordance with sampling plan	Equivalent
PMLSAMP401A	Prepare mineral samples for analysis			New unit — no equivalent
PMLTEST402B	Prepare, standardise and use solutions	PMLTEST402A	Prepare, standardise and use solutions	Equivalent
PMLTEST403B	Assist with geotechnical site investigations	PMLTEST403A	Assist with geotechnical site investigations	Equivalent
PMLTEST404A	Perform chemical tests and procedures	PMLTEST400A	Perform instrumental tests/procedures	Equivalent
PMLTEST405A	Perform food tests			New unit — no equivalent
PMLTEST406A	Perform physical tests	PMLTEST401A	Perform non-instrumental tests/procedures	Equivalent
PMLTEST407A	Perform biological procedures			New unit — no equivalent
PMLTEST408A	Undertake environmental field-based monitoring	PMLTEST510A	Perform fieldwork	Equivalent (re-levelled)
PMLTEST409A	Capture and manage scientific images			New unit — no equivalent
PMLTEST410A	Undertake environmental field-based, remote-sensing monitoring			New unit — no equivalent
PMLTEST411A	Perform mechanical tests			New unit — no equivalent
PMLTEST412A	Prepare tissue and cell cultures			New unit — no equivalent
500 series				

PML04 unit code	Unit title	PML99 unit code	Unit title	Comment
PMLCAL500A	Perform non-standard calibrations			New unit — no equivalent
PMLCAL501A	Create or modify calibration procedures			New unit — no equivalent
PMLCAL502A	Create or modify automated calibration procedures			New unit — no equivalent
PMLCOM500B	Provide information to customers	PMLCOM500A	Provide information to customers	Equivalent
PMLDATA500B	Analyse data and report results	PMLDATA500A	Analyse data and report results	Equivalent
PMLDATA501B	Use laboratory application software	PMLDATA501A	Use laboratory application software	Equivalent
PMLMAIN501B	Assist in the maintenance of reference materials	PMLMAIN501A	Assist in the maintenance of reference materials	Equivalent
PMLMAIN502A	Maintain instruments and equipment			New unit — part replaces PMLTEST500A, but not equivalent
PMLORG500B	Schedule laboratory work for a small team	PMLORG500A	Schedule laboratory work for a small team	Equivalent
PMLQUAL500A	Monitor the quality of test results and data			New unit — no equivalent
PMLSCIG501B	Design and manufacture glass apparatus and glass systems	PMLSCIG501A	Design and manufacture glass apparatus and glass systems	Equivalent
PMLSCIG502B	Perform glass coating, grinding and finishing operations	PMLSCIG502A	Perform glass coating, grinding and finishing operations	Equivalent
PMLSCIG503B	Construct, modify and maintain high vacuum system	PMLSCIG503A	Construct, modify and maintain high vacuum system	Equivalent
PMLTEST501B	Perform microbiological tests	PMLTEST501A	Perform microbiological tests	Equivalent
PMLTEST502B	Perform haematological tests	PMLTEST502A	Perform haematological tests	Equivalent
PMLTEST503B	Perform histological tests	PMLTEST503A	Perform histological tests	Equivalent
PMLTEST504B	Perform chemical pathology tests	PMLTEST504A	Perform chemical pathology tests	Equivalent
PMLTEST505B	Conduct sensory analysis	PMLTEST505A	Conduct sensory analysis	Equivalent
PMLTEST509B	Perform immunohaematological tests	PMLTEST509A	Perform immunohaematological tests	Equivalent
PMLTEST511B	Supervise earthworks inspection, sampling and testing operations	PMLTEST511A	Supervise earthworks inspection, sampling and testing operations	Equivalent
PMLTEST512A	Apply electrophoretic techniques			New unit — part replaces PMLTEST507A, but not equivalent
PMLTEST513A	Apply routine chromatographic techniques			New unit — part replaces PMLTEST507A, but not equivalent
PMLTEST514A	Perform fire assay techniques			New unit — no equivalent

PML04 unit code	Unit title	PML99 unit code	Unit title	Comment
PMLTEST515A	Design and supervise complex environmental field surveys			New unit — no equivalent
PMLTEST516A	Provide input to production trials			New unit — no equivalent
PMLTEST517A	Perform tissue and cell culture techniques			New unit — no equivalent
PMLTEST518A	Perform molecular biology tests and procedures			New unit — no equivalent
PMLTEST519A	Prepare animal and plant material for display			New unit — no equivalent
PMLTEST520A	Perform complex tests to measure engineering properties of materials			New unit — no equivalent
PMLTEST521A	Perform laboratory-based ecological techniques	PMLTEST508A	Perform ecological techniques	Equivalent
PMLTEST522A	Perform complex tests to measure chemical properties of materials			New unit — no equivalent
PMLTEST523A	Apply complex instrumental techniques			New unit — no equivalent
PMLTEST524A	Apply routine spectrometric techniques	PMLTEST506A	Apply spectrometric techniques	Equivalent
PMLTEST525A	Apply routine electrometric techniques			New unit — no equivalent
PMLTEST526A	Perform food analyses			New unit — no equivalent
600 series				
PMLCOM600B	Develop and maintain laboratory documentation	PMLCOM600A	Develop and maintain laboratory documentation	Equivalent
PMLOHS601A	Implement and monitor OHS and environmental management systems	PMLOHS600A	Implement and monitor risk management processes associated with OH&S and environmental policies and procedures	Equivalent — revised in conjunction with NOHSC
PMLORG600B	Supervise laboratory operations in work/functional area	PMLORG600A	Supervise laboratory operations in work/functional area	Equivalent
PMLORG601B	Maintain registration and statutory or legal compliance in work/functional area	PMLORG601A	Maintain registration and statutory or legal compliance in work/functional area	Equivalent
PMLORG602B	Manage complex projects	PMLORG602A	Manage complex projects	Equivalent
PMLQUAL600B	Maintain quality system and continuous improvement processes within work/functional area	PMLQUAL600A	Maintain quality system and continuous improvement processes within work/functional area	Equivalent
PMLQUAL601B	Conduct an internal audit of the quality system	PMLQUAL601A	Conduct an internal audit of the quality system	Equivalent
PMLTEAM600B	Manage and develop teams	PMLTEAM600A	Manage and develop teams	Equivalent

PML04 unit code	Unit title	PML99 unit code	Unit title	Comment
PMLTEST601B	Classify building sites	PMLTEST601A	Classify building sites	Equivalent
PMLTEST602A	Prepare plans and quality assurance procedures for environmental field activities			New unit — no equivalent
PMLTEST603A	Evaluate and select appropriate test methods and/or procedures	PMLTEST600A	Select appropriate test methods and procedures	Equivalent
700 series				
PMLTEST700B	Contribute to the development of products and applications	PMLTEST700A	Contribute to the development of products and applications	Equivalent
PMLTEST701B	Troubleshoot equipment and production processes	PMLTEST701A	Troubleshoot equipment and production processes	Equivalent
PMLTEST702B	Contribute to the validation of test methods	PMLTEST702A	Contribute to the validation of test methods	Equivalent
PMLTEST703B	Develop or adapt analyses and procedures	PMLTEST703A	Develop or adapt analyses and procedures	Equivalent
PMLTEST704B	Integrate data acquisition and interfacing systems	PMLTEST704A	Integrate data acquisition and interfacing systems	Equivalent
Imported units				
BSZ401A	Plan assessment	BSZ401A	Plan assessment	Equivalent (latest version to be imported when endorsed)
BSZ402A	Conduct assessment	BSZ402A	Conduct assessment	
BSZ403A	Review assessment	BSZ403A	Review assessment	
BSZ404A	Train small groups	BSZ404A	Train small groups	

Making the Laboratory Operations Training Package work for your industry

For many people who are not fully familiar with Training Packages, a 500-page document is pretty daunting. Where do you start? What competencies in this Training Package might support your job role or the different job roles in your organisation?

In many instances, Training Packages are used by industry people who are not necessarily interested in delivering full qualifications. In those instances, there are many parts of PML04 you do not need to concern yourself with.

We have identified the most relevant units of competency in PML04 for seven common job roles:

- sampler/tester working in manufacturing or in a field environment
- laboratory/technical assistant working in construction materials testing
- laboratory assistant working in a food company
- technician working in a mineral assay laboratory
- technical assistant working in environmental monitoring
- technical officer working in biotechnology
- calibration technician.

Many industry people will find this useful for:

- recruiting staff
- classifying staff
- designing on-the-job training to upskill existing workers
- buying training
- career pathways planning.

Examples of common job roles

Brief descriptions of these job roles follow. The relevant units of competency can be found in Part 2 of PML04 (*Competency standards*), in code order. If you are interested in full qualifications, refer to the Overview of PML04 Qualifications in the Qualifications Framework which follows this section.

Sampler/Tester working in manufacturing or a field environment

Samplers and testers conduct limited sampling and measurement as part of their duties. In areas such as mineral assay for example, this work forms a whole job role. They apply a restricted range of skills and operational knowledge to perform these tasks and do not generally work inside a laboratory.

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

- An operator in a quarry may take samples from stockpiles and conveyors and conduct simple tests on different grades of aggregates.
- In the sample preparation facility of a mining company, field assistants collect, log and prepare samples to be forwarded for analysis in regional centres.

Some relevant units of competency required for this work include:

<i>PMLSAMP200A</i>	<i>Collect routine site samples</i>
<i>PMLSAMP201A</i>	<i>Handle and transport samples or equipment</i>
<i>PMLTEST200A</i>	<i>Conduct routine site measurements.</i>

If you were interested in a full qualification, the most appropriate one would be the *Certificate II in Sampling and Measurement (PML20104)*.

Laboratory/Technical Assistant working in construction materials testing

Laboratory assistants perform straightforward sampling and testing. They follow set procedures and recipes, and apply well developed technical skills and basic scientific knowledge. The majority of their work involves a predictable flow of parallel or similar tasks within one scientific discipline.

For example a laboratory assistant working in construction materials testing receives and prepares soil samples for classification testing.

Some relevant units of competency required for this work include:

<i>PMLSAMP200A</i>	<i>Collect routine site samples</i>
<i>PMLSAMP201A</i>	<i>Handle and transport samples or equipment</i>
<i>PMLSAMP302A</i>	<i>Receive and prepare samples for testing</i>
<i>PMLTEST300B</i>	<i>Perform basic tests</i>
<i>PMLTEST307B</i>	<i>Prepare trial batches for evaluation.</i>
<i>PMLTEST411A</i>	<i>Perform mechanical tests.</i>

Laboratory Assistant working in a food company

As noted above, 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 the laboratory, but may also perform technical tasks within the production plant.

For example, a laboratory assistant working 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.

Some relevant units of competency required for this work include:

<i>PMLQUAL301B</i>	<i>Apply critical control point requirements</i>
<i>PMLSAMP302A</i>	<i>Receive and prepare samples for testing</i>
<i>PMLTEST300B</i>	<i>Perform basic tests</i>
<i>PMLTEST305B</i>	<i>Perform aseptic techniques</i>
<i>PMLTEST308A</i>	<i>Perform microscopic examination</i>
<i>PMLTEST405A</i>	<i>Perform food tests.</i>

If you were interested in full qualifications, the most appropriate one for the above two job roles would be the *Certificate III in Laboratory Skills (PML30104)*.

Technician working in a mineral assay laboratory

Technical assistants undertake a wide range of sampling and testing that requires the application of a broad range of technical skills and some scientific knowledge. Although technical assistants generally work in a laboratory, they often work closely with other personnel throughout the workplace. The work of technical assistants involves similar tasks within one scientific discipline with occasional peak periods and some interruptions.

For example, a technician 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 technician conducts routine chemical and physical tests and redirects other subsamples for specialised analyses.

Some relevant units of competency required for this work include:

<i>PMLSAMP302A</i>	<i>Receive and prepare samples for testing</i>
<i>PMLSAMP401A</i>	<i>Prepare mineral samples for analysis</i>
<i>PMLTEST404A</i>	<i>Perform chemical tests</i>
<i>PMLTEST406A</i>	<i>Perform physical tests</i>
<i>PMLTEST514A</i>	<i>Perform fire assay techniques.</i>

Technical Assistant working in environmental monitoring

As above, technical assistants undertake a wide range of sampling and testing that requires the application of a broad range of technical skills and some scientific knowledge. The work of technical assistants involves similar tasks within one scientific discipline with occasional peak periods and some interruptions. They may also assist other personnel to solve technical problems.

For example, a technician who works for an environmental consulting company conducts field sampling and testing and operates/maintains several remote sensing sites.

Some relevant units of competency required for this work include:

<i>PMLTEST300B</i>	<i>Perform basic tests</i>
<i>PMSAMP400B</i>	<i>Obtain representative samples in accordance with sampling plan</i>
<i>PMLTEST408A</i>	<i>Undertake environmental field-based monitoring</i>
<i>PMLTEST410A</i>	<i>Undertake environmental field-based, remote-sensing monitoring.</i>

If you were interested in full qualifications, the most appropriate one for the above two job roles would be the *Certificate IV in Laboratory Techniques (PML40104)*.

Technical Officers working in biotechnology, calibration, pathology and chemical analysis laboratories

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.

Biotechnology Technician

A technical officer working in a biotechnology laboratory prepares, maintains and preserves cells and cell lines for the large scale production of monoclonal antibodies.

Some relevant units of competency required for this work include:

<i>PMLTEST305B</i>	<i>Perform aseptic techniques</i>
<i>PMLTEST308A</i>	<i>Perform microscopic examination</i>
<i>PMLTEST412A</i>	<i>Prepare tissue and cell cultures</i>
<i>PMLTEST407A</i>	<i>Perform biological procedures</i>
<i>PMLTEST517A</i>	<i>Perform tissue and cell culture techniques</i>
<i>PMLTEST518A</i>	<i>Perform molecular biology tests.</i>

Calibration Technician

A technical officer working in a calibration laboratory performs standard and non-standard calibrations of equipment provided by clients.

Some relevant units of competency required for this work include:

<i>PMLCAL400A</i>	<i>Perform standard calibrations</i>
<i>PMLCAL500A</i>	<i>Perform non-standard calibrations</i>
<i>PMLCAL501A</i>	<i>Create or modify calibration procedures</i>
<i>PMLCAL502A</i>	<i>Create or modify automated calibration procedures</i>
<i>PMLQUAL500A</i>	<i>Monitor the quality of test results and data.</i>

Pathology Technician

Technical officers who work in pathology laboratories perform a range of tests on body tissues and fluids to measure quantities such as the amount of biological substances. They also prepare cultures, stained tissue sections and thin films to count and classify cells, bacteria and parasites.

Some relevant units of competency required for this work include:

<i>PMLTEST501B</i>	<i>Perform microbiological tests</i>
<i>PMLTEST502B</i>	<i>Perform haematological tests</i>
<i>PMLTEST503B</i>	<i>Perform histological tests</i>
<i>PMLTEST504B</i>	<i>Perform chemical pathology tests.</i>

Chemical Technician/Analyst

Technical officers working in analytical laboratories analyse samples using a range of techniques and instruments. They establish client needs for routine and non-routine samples, optimise enterprise procedures and instruments for specific samples, recognise atypical data and results and troubleshoot common analytical procedure and equipment problems.

Some relevant units of competency required for this work include:

<i>PMLTEST513A</i>	<i>Apply routine chromatographic techniques</i>
<i>PMLTEST522A</i>	<i>Perform complex tests to measure chemical properties of materials</i>
<i>PMLTEST523A</i>	<i>Apply complex instrumental techniques</i>

<i>PMLTEST524A</i>	<i>Apply routine spectrometric techniques</i>
<i>PMLTEST525A</i>	<i>Apply routine electrometric techniques.</i>

If you were interested in a full qualification, the most appropriate one for the above four job roles would be the *Diploma of Laboratory Technology (PML50104)*.

Qualifications Framework

The Australian Qualifications Framework

A brief overview of the Australian Qualifications Framework (AQF) follows. For a full explanation of the AQF see the *AQF Implementation Handbook, 3rd Edition 2002*. You can download it from the Australian Qualifications Advisory Board (AQFAB) website (www.aqf.edu.au) or obtain a hard copy by contacting AQFAB by phone on 03 9639 1606 or by emailing AQFAB at aqfab@curriculum.edu.au

The AQF provides a comprehensive, nationally consistent framework for all qualifications in post-compulsory education and training in Australia. In the Vocational Education and Training (VET) sector it assists national consistency for all trainees, learners, employers and providers by enabling national recognition of qualifications and Statements of Attainment.

Training Package qualifications in the VET sector must comply with the titles and guidelines of the AQF. Endorsed Training Packages provide a unique title for each AQF qualification which must always be reproduced accurately.

QUALIFICATIONS

Training Packages can incorporate the following six AQF qualifications.

- Certificate I in ...
- Certificate II in ...
- Certificate III in ...
- Certificate IV in ...
- Diploma of ...
- Advanced Diploma of ...

On completion of the requirements defined in the Training Package, a Registered Training Organisation (RTO) may issue a nationally recognised AQF qualification. The issuing of AQF qualifications must comply with the advice provided in the *AQF Implementation Handbook* and the *Australian Quality Training Framework Standards for Registered Training Organisations*, particularly Standard 10.

STATEMENT OF ATTAINMENT

Where an AQF qualification is partially achieved through the achievement of one or more endorsed units of competency, an RTO may issue a Statement of Attainment. The issuing of Statements of Attainment must comply with the advice provided in the *AQF Implementation Handbook* and the *Australian Quality Training Framework Standards for Registered Training Organisations*, particularly Standard 10.

Under the *Standards for Registered Training Organisations*, RTOs must recognise the achievement of competencies as recorded on a qualification or Statement of Attainment issued by other RTOs. Given this, recognised competencies can progressively build towards a full AQF qualification.

AQF GUIDELINES AND LEARNING OUTCOMES

The *AQF Implementation Handbook* provides a comprehensive guideline for each AQF qualification. A summary of the learning outcome characteristics and their distinguishing features for each VET-related AQF qualification is provided below.

Certificate I

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and skills would prepare a person to perform a defined range of activities most of which may be routine and predictable.

Applications may include a variety of employment-related skills, including preparatory access and participation skills, broad-based induction skills and/or specific workplace skills. They may also include participation in a team or work group.

Distinguishing features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate knowledge by recall in a narrow range of areas
- demonstrate basic practical skills, such as the use of relevant tools
- perform a sequence of routine tasks given clear direction
- receive and pass on messages/information.

Certificate II

Characteristics of Learning Outcomes

Breadth, depth and complexity of knowledge and skills would prepare a person to perform in a range of varied activities or knowledge application where there is a clearly defined range of contexts in which the choice of actions required is usually clear and there is limited complexity in the range of operations to be applied.

Performance of a prescribed range of functions involving known routines and procedures and some accountability for the quality of outcomes.

Applications may include some complex or non-routine activities involving individual responsibility or autonomy and/or collaboration with others as part of a group or team.

Distinguishing features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate basic operational knowledge in a moderate range of areas;
- apply a defined range of skills;
- apply known solutions to a limited range of predictable problems;
- perform a range of tasks where choice between a limited range of options is required;
- assess and record information from varied sources;
- take limited responsibility for own outputs in work and learning.

Certificate III***Characteristics of Learning Outcomes***

Breadth, depth and complexity of knowledge and competencies would cover selecting, adapting and transferring skills and knowledge to new environments and providing technical advice and some leadership in resolution of specified problems. This would be applied across a range of roles in a variety of contexts with some complexity in the extent and choice of options available.

Performance of a defined range of skilled operations, usually within a range of broader related activities involving known routines, methods and procedures, where some discretion and judgement is required in the selection of equipment, services or contingency measures and within known time constraints.

Applications may involve some responsibility for others. Participation in teams including group or team coordination may be involved.

Distinguishing features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate some relevant theoretical knowledge
- apply a range of well-developed skills
- apply known solutions to a variety of predictable problems
- perform processes that require a range of well-developed skills where some discretion and judgement is required
- interpret available information, using discretion and judgement
- take responsibility for own outputs in work and learning
- take limited responsibility for the output of others.

Certificate IV***Characteristics of Learning Outcomes***

Breadth, depth and complexity of knowledge and competencies would cover a broad range of varied activities or application in a wider variety of contexts most of which are complex and non-routine. Leadership and guidance are involved when organising activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature.

Performance of a broad range of skilled applications including the requirement to evaluate and analyse current practices, develop new criteria and procedures for performing current practices and provision of some leadership and guidance to others in the application and planning of the skills.

Applications involve responsibility for, and limited organisation of, others.

Distinguishing features of Learning Outcomes

Do the competencies enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating some theoretical concepts
- apply solutions to a defined range of unpredictable problems
- identify and apply skill and knowledge areas to a wide variety of contexts, with depth in some areas
- identify, analyse and evaluate information from a variety of sources
- take responsibility for own outputs in relation to specified quality standards
- take limited responsibility for the quantity and quality of the output of others.

Diploma***Characteristics of Learning Outcomes***

Breadth, depth and complexity covering planning and initiation of alternative approaches to skills or knowledge applications across a broad range of technical and/or management requirements, evaluation and co-ordination.

The self directed application of knowledge and skills, with substantial depth in some areas where judgement is required in planning and selecting appropriate equipment, services and techniques for self and others.

Applications involve the participation in development of strategic initiatives as well as personal responsibility and autonomy in performing complex technical operations or organising others. It may include participation in teams including teams concerned with planning and evaluation functions. Group or team coordination may be involved.

The degree of emphasis on breadth as against depth of knowledge and skills may vary between qualifications granted at this level.

Distinguishing Features of Learning Outcomes

Do the competencies or learning outcomes enable an individual with this qualification to:

- demonstrate understanding of a broad knowledge base incorporating theoretical concepts, with substantial depth in some areas
- analyse and plan approaches to technical problems or management requirements
- transfer and apply theoretical concepts and/or technical or creative skills to a range of situations
- evaluate information, using it to forecast for planning or research purposes
- take responsibility for own outputs in relation to broad quantity and quality parameters
- take some responsibility for the achievement of group outcomes.

Overview of PML04 qualifications

In this Training Package, the following qualifications are available:

- | | |
|---|-----------------|
| • <i>Certificate II in Sampling and Measurement</i> | <i>PML20104</i> |
| • <i>Certificate III in Laboratory Skills</i> | <i>PML30104</i> |
| • <i>Certificate IV in Laboratory Techniques</i> | <i>PML40104</i> |
| • <i>Diploma of Laboratory Technology</i> | <i>PML50104</i> |
| • <i>Advanced Diploma of Laboratory Operations</i> | <i>PML60104</i> |

The 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.

‘Cross industry’ qualifications have been developed for Certificate II through to Advanced Diploma. Not all qualifications may apply to all sectors. For example, it is likely that enterprises in different sectors will access different qualifications:

- food and manufacturing sectors will access all qualifications
- construction materials sector will access the Certificate II, III and IV qualifications
- biological/environmental sector will access all qualifications.

However, some enterprises in the pathology services sector may only require the Certificate III and Diploma qualifications.

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 import the PML04 units of competency wherever it is appropriate.

Certificate II in Sampling and Measurement — PML20104

In the construction, manufacturing, resources and environmental industry sectors, there is a clear vocational outcome at Certificate II for people working as sampler/testers in production or field operations. The *Certificate II in Sampling and Measurement PML20104* provides a flexible package of competencies which meets their needs.

Certificate III in Laboratory Skills — PML30104

The *Certificate III in Laboratory Skills PML30104* provides a broad and flexible package of competencies which meets the needs of laboratory assistants, instrument operators and similar personnel. The core and wide range of electives is designed to maximise the portability of this qualification, which is the entry level required for laboratory personnel.

Certificate IV in Laboratory Techniques — PML40104

The *Certificate IV in Laboratory Techniques PML40104* provides a broad and flexible package of competencies which meets the needs of technical assistants, instrument operators 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 qualification also addresses the concerns of industry representatives who stated that a gap between the Certificate III and Diploma in the Qualifications Framework could represent a barrier to career progression in some sectors.

Diploma of Laboratory Technology — PML50104

The *Diploma of Laboratory Technology PML50104* provides broad and flexible packages of competencies which meet the needs of technical officers, technical specialists and similar personnel. Because specialisation is an industry requirement for the Diploma, Registered Training Organisations may choose to issue a generic:

- *Diploma of Laboratory Technology* *PML50104*

or, where elective units of competency are packaged to suit a particular industry sector or specialisation, RTOs might issue a:

- *Diploma of Laboratory Technology* *PML50104*
(specialising in XXXXX)

(Refer to the packaging rules for examples of industry specialisations.)

Advanced Diploma of Laboratory Operations — PML60104

The *Advanced Diploma of Laboratory Operations PML60104* provides a broad and flexible package of competencies which meets the needs of laboratory supervisors, senior technical officers and similar personnel.

There is no industry support for an off-the-job only pathway to an *Advanced Diploma in Laboratory Operations PML60104*. To enter the Advanced Diploma qualification, entrants must have completed a *Diploma of Laboratory Technology PML50104* or demonstrate equivalent competency. It is recommended that entrants have had an appropriate period of employment at an occupational level commensurate with a *Diploma of Laboratory Technology PML50104* prior to entry to the *Advanced Diploma of Laboratory Operations PML60104*.

The following units of competency:

<i>PMLTEST700B</i>	<i>Contribute to the development of products and applications</i>
<i>PMLTEST701B</i>	<i>Troubleshoot equipment and production processes</i>
<i>PMLTEST702B</i>	<i>Contribute to the validation of test methods</i>
<i>PMLTEST703B</i>	<i>Develop or adapt analyses or procedures</i>
<i>PMLTEST704B</i>	<i>Integrate data acquisition and interfacing systems</i>

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 qualification 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 three common barriers to career progression in this industry have been identified 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 *PMLOHS302A Participate in laboratory/field workplace safety* are included in several qualifications, once competency has been demonstrated direct credit transfer will apply.

Career paths for senior technicians, technical specialists and laboratory supervisors 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

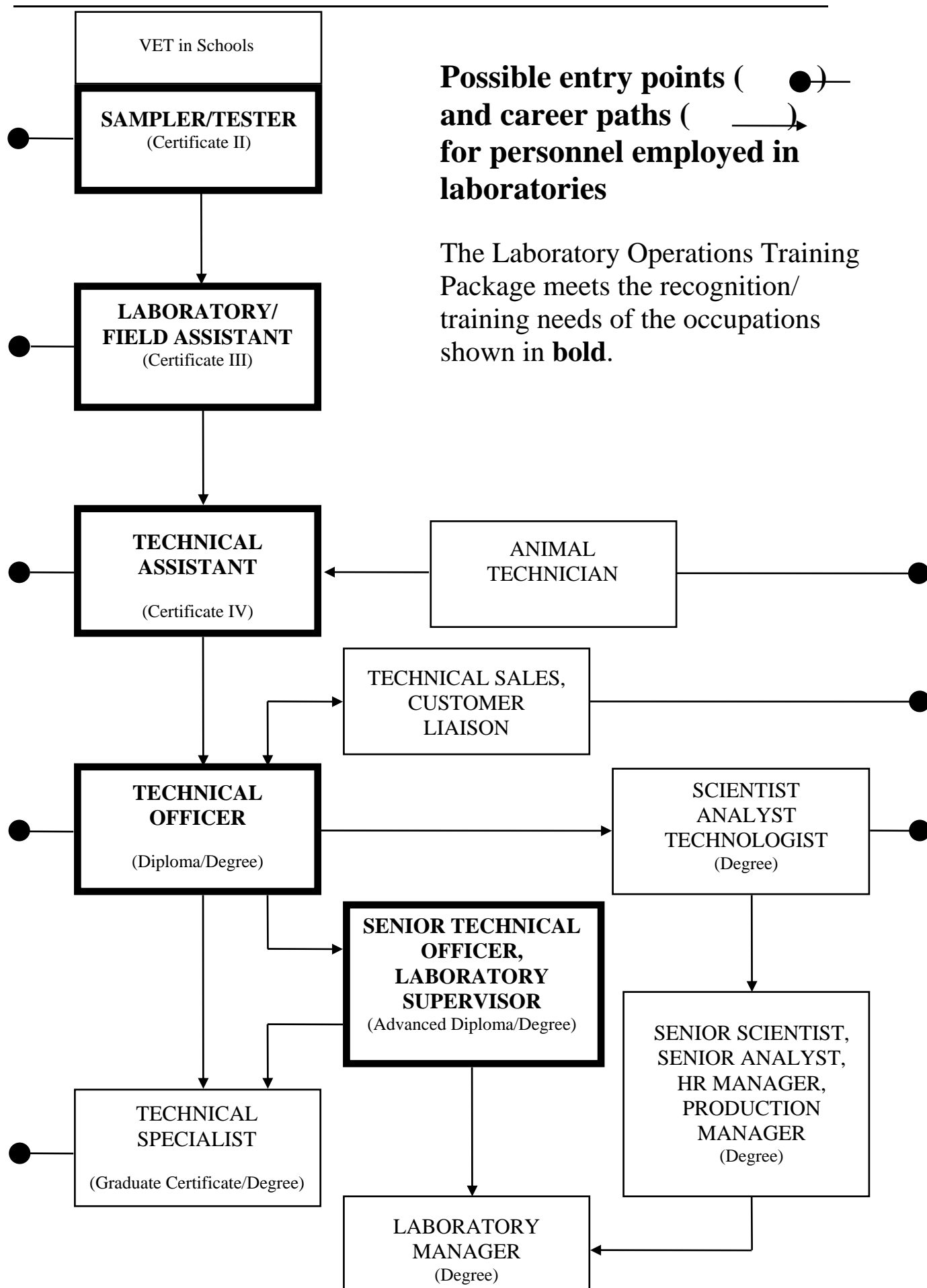
It is possible to complete all qualifications by a New Apprenticeship pathway. Given both the 'cross industry' nature of the qualifications and that laboratory personnel are employed throughout Australia in a variety of industry sectors, it is anticipated that there will be broad uptake of the Training Package in New Apprenticeship pathways.

VET in Schools

The *Certificate II in Sampling and Measurement PML20104* and selected units of competency from the *Certificate III in Laboratory Skills PML30104* are suitable for delivery in VET in Schools programs if arrangements are made for partnerships with RTOs and/or industry to ensure that the competency requirements are met.

Qualifications pathways chart

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.



Packaging rules for PML04 qualifications

The packaging rules for each qualification provide a broad choice of electives that reflect the scope and complexity of the technical work performed by the occupational group. Elective units of competency may also be imported from other Training Packages to reflect the needs of a range of workplace contexts.

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 **core** or **elective** units. The design of the core and elective units of competency enables the same unit to be used in a number of industry sectors and therefore 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 are too large to be accommodated in this way, specialised units of competency have been developed (for example, *PMLTEST310A Perform histological procedures*, *PMLCAL400A Perform standard calibrations* and *PMLTEST512A Apply electrophoretic techniques*).

The table below summarises the relevant number of units in each category for each qualification. See specific packaging rules for each qualification for details.

Qualification	Total	Core	Elective*
PML20104 Certificate II in Sampling and Measurement	7	3	4
PML30104 Certificate III in Laboratory Skills	12	5	7
PML40104 Certificate IV in Laboratory Techniques	16	5	11
PML50104 Diploma of Laboratory Technology	20	8	12
PML60104 Advanced Diploma of Laboratory Operations	12	6	6

Key	
Total	Minimum number of units of competency required to gain the qualification
Core	Minimum number of core units of competency required
Elective	Minimum number of elective units of competency required
*	Refer to the packaging rules governing choice of electives for each qualification

AQF Certificate II

There is a technical role as part of this AQF outcome for the construction, manufacturing, resources and environmental industry sectors.

Occupational group

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

The work they perform

Samplers and testers conduct limited sampling and testing as part of their duties in their particular industry. In some industry sectors (for example, mineral assay) this work forms a whole job role. 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 and perform basic tests 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.
- A field officer working in environmental monitoring may visit a catchment area to collect water samples.
- Sampler/testers take air samples for testing for microbial monitoring of air conditioning or cooling towers.

The competencies they require

The units of competency required have been grouped under two headings over the page. The units listed under the heading **core** are considered to be essential for all people who perform sampling and measurement 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 organisation.

Certificate II in Sampling and Measurement — PML20104

To be awarded a *Certificate II in Sampling and Measurement PML20104*, competency must be achieved in a total of seven (7) units of competency consisting of:

- all three (3) core units
- four (4) elective units.

The elective units must include:

- a minimum of one (1) unit from the PML 200 series shown in *italics* in the table of electives below.
- a maximum of two (2) units from the PML 300 series
- a maximum of two (2) relevant units from other endorsed Training Packages.

NOTE: Units marked with a (*) have prerequisites. See individual units for details

Core units

PMLDATA200A	Record and present data
PMLORG200A	Work within a laboratory/field workplace (induction)
PMLOHS302A	Participate in laboratory/field workplace safety

Elective units

Unit code	Unit title	
<i>PMLSAMP200A</i>	<i>Collect routine site samples</i>	
PMLSAMP201A	Handle and transport samples or equipment	
<i>PMLTEST200A</i>	<i>Conduct routine site measurements</i>	
PMLCOM300B	Communicate with other people	
PMLMAIN300B	Maintain the laboratory fit for purpose	
PMLOHS301B	Work safely with instruments that emit ionising radiation	
PMLORG301A	Plan and conduct laboratory/field work	
PMLQUAL300B	Contribute to the achievement of quality objectives	
PMLQUAL301B	Apply critical control point requirements	
PMLSAMP302A	Receive and prepare samples for testing	
PMLSCIG300B	Operate basic handblowing equipment	
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment	
PMLTEST300B	Perform basic tests	
PMLTEST303B	Prepare working solutions	
PMLTEST304B	Prepare culture media	
PMLTEST305B	Perform aseptic techniques	
PMLTEST306B	Assist with fieldwork	

PMLTEST307B	Prepare trial batches for evaluation	
PMLTEST308A	Perform microscopic examination	
PMLTEST310A	Perform histological procedures	

AQF Certificate III

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

Occupational group

Laboratory assistants, laboratory attendants, instrument operators 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 to prepare and test samples 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 working 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.
- A school laboratory assistant sets up for classes, preparing chemicals and instruments for students to undertake practical work.

The competencies they require

The units of competency required have been grouped under two headings over the page. The units listed under the heading **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.

Certificate III in Laboratory Skills — PML30104

To be awarded a *Certificate III in Laboratory Skills PML30104*, competency must be achieved in a total of twelve (12) units of competency, consisting of:

- all five (5) core units
- seven (7) elective units.

The elective units must include:

- a minimum of four (4) units from the PML 300 series, including at least one (1) of the PML 'TEST300 or SCIG300' series units, shown in *italics* in the table of electives below.
- a maximum of two (2) units from the PML 200 series
- a maximum of two (2) units from the PML 400 series
- a maximum of two (2) relevant units from other endorsed Training Packages.

NOTE: Units marked with (*) have prerequisites. See individual unit for details.

Core units

PMLCOM300B	Communicate with other people
PMLDATA200A	Record and present data
PMLOHS302A	Participate in laboratory/field workplace safety
PMLORG301A	Plan and conduct laboratory/field work
PMLQUAL300B	Contribute to the achievement of quality objectives

Elective units

Unit code	Unit title	
PMLORG200A	Work within a laboratory/field workplace (induction)	
PMLSAMP200A	Collect routine site samples	
PMLSAMP201A	Handle and transport samples or equipment	
PMLTEST200A	Conduct routine site measurements	
PMLMAIN300B	Maintain the laboratory fit for purpose	
PMLOHS301B	Work safely with instruments that emit ionising radiation	
PMLQUAL301B	Apply critical control point requirements	
PMLSAMP302A	Receive and prepare samples for testing	
<i>PMLSCIG300B</i>	<i>Operate basic handblowing equipment</i>	
<i>PMLSCIG301B</i>	<i>Repair glass apparatus using simple glassblowing equipment</i>	
<i>PMLTEST300B</i>	<i>Perform basic tests</i>	
<i>PMLTEST303B</i>	<i>Prepare working solutions</i>	
<i>PMLTEST304B</i>	<i>Prepare culture media</i>	
<i>PMLTEST305B</i>	<i>Perform aseptic techniques</i>	
<i>PMLTEST306B</i>	<i>Assist with fieldwork</i>	
<i>PMLTEST307B</i>	<i>Prepare trial batches for evaluation</i>	

Unit code	Unit title	
PMLTEST308A	<i>Perform microscopic examination</i>	
PMLTEST310A	<i>Perform histological procedures</i>	
PMLCAL400A	Perform standard calibrations	
PMLDATA400A	Process and interpret data	
PMLMAIN400A	Maintain and control stocks	
PMLOHS400A	Maintain laboratory/field workplace safety	
PMLORG400A	Prepare practical science classes and demonstrations	
PMLQUAL400B	Contribute to the ongoing development of HACCP plans	
PMLQUAL401B	Apply quality system and continuous improvement processes	
PMLSAMP400B	Obtain representative samples in accordance with sampling plan	
PMLSAMP401A	Prepare mineral samples for analysis	
PMLTEST402B	Prepare, standardise and use solutions	
PMLTEST403B	Assist with geotechnical site investigations	
PMLTEST404A	Perform chemical tests and procedures	
PMLTEST405A	Perform food tests	*
PMLTEST406A	Perform physical tests	
PMLTEST407A	Perform biological procedures	*
PMLTEST408A	Undertake environmental field-based monitoring	
PMLTEST409A	Capture and manage scientific images	
PMLTEST410A	Undertake environmental field-based, remote-sensing monitoring	
PMLTEST411A	Perform mechanical tests	
PMLTEST412A	Prepare tissue and cell cultures	*

AQF Certificate IV

There is a laboratory role as part of 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.

Occupational group

Technical assistants, technicians, instrument operators 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 range of technical skills 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 wide 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 **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 — PML40104

To be awarded a *Certificate IV in Laboratory Techniques PML40104*, competency must be achieved in a total of sixteen (16) units of competency, consisting of:

- all five (5) core units
- eleven (11) elective units.

The elective units must include:

- a minimum of five (5) units from the PML 400 series units, including at least one (1) of the PML 400 series units shown in *italics* in the table of electives below.
- a maximum of four (4) units from the PML 300 series
- a maximum of three (3) units from the PML 500 series
- a maximum of three (3) relevant units from other endorsed Training Packages. For example, the BSZ units listed below as electives would count for two of these three units.

NOTE: Units marked with (*) have prerequisites. See individual units for details.

Core units

PMLCOM300B	Communicate with other people
PMLDATA400A	Process and interpret data
PMLOHS400A	Maintain laboratory/field workplace safety
PMLORG301A	Plan and conduct laboratory/field work
PMLQUAL401B	Apply quality system and continuous improvement processes

Elective units

Unit code	Unit title	
PMLMAIN300B	Maintain the laboratory fit for purpose	
PMLOHS301B	Work safely with instruments that emit ionising radiation	
PMLQUAL300B	Contribute to the achievement of quality objectives	
PMLQUAL301B	Apply critical control point requirements	
PMLSAMP302A	Receive and prepare samples for testing	
PMLSCIG300B	Operate basic handblowing equipment	
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment	
PMLTEST300B	Perform basic tests	
PMLTEST303B	Prepare working solutions	
PMLTEST304B	Prepare culture media	
PMLTEST305B	Perform aseptic techniques	
PMLTEST306B	Assist with fieldwork	
PMLTEST307B	Prepare trial batches for evaluation	
PMLTEST308A	Perform microscopic examination	
PMLTEST310A	Perform histological procedures	

Unit code	Unit title	
PMLCAL400A	<i>Perform standard calibrations</i>	
PMLMAIN400A	Maintain and control stocks	
PMLORG400A	Prepare practical science classes and demonstrations	
PMLQUAL400B	Contribute to the ongoing development of HACCP plans	
PMLSAMP400B	<i>Obtain representative samples in accordance with sampling plan</i>	
PMLSAMP401A	<i>Prepare mineral samples for analysis</i>	
PMLTEST402B	<i>Prepare, standardise and use solutions</i>	
PMLTEST403B	<i>Assist with geotechnical site investigations</i>	
PMLTEST404A	<i>Perform chemical tests and procedures</i>	
PMLTEST405A	<i>Perform food tests</i>	*
PMLTEST406A	<i>Perform physical tests</i>	
PMLTEST407A	<i>Perform biological procedures</i>	*
PMLTEST408A	<i>Undertake environmental field-based monitoring</i>	
PMLTEST409A	Capture and manage scientific images	
PMLTEST410A	<i>Undertake environmental field-based, remote-sensing monitoring</i>	
PMLTEST411A	<i>Perform mechanical tests</i>	
PMLTEST412A	<i>Prepare tissue and cell cultures</i>	*
PMLCAL500A	Perform non-standard calibrations	*
PMLCAL501A	Create or modify calibration procedures	*
PMLCAL502A	Create or modify automated calibration procedures	*
PMLCOM500B	Provide information to customers	
PMLDATA500B	Analyse data and report results	*
PMLDATA501B	Use laboratory application software	
PMLMAIN501B	Assist in the maintenance of reference materials	
PMLMAIN502A	Maintain instruments and equipment	
PMLORG500B	Schedule laboratory work for a small team	
PMLQUAL500A	Monitor the quality of test results and data	*
PMLSCIG501B	Design and manufacture glass apparatus and glass systems	*
PMLSCIG502B	Perform glass coating, grinding and finishing operations	*
PMLSCIG503B	Construct, modify and maintain high vacuum system	*
PMLTEST501B	Perform microbiological tests	*
PMLTEST502B	Perform haematological tests	*
PMLTEST503B	Perform histological tests	*
PMLTEST504B	Perform chemical pathology tests	*
PMLTEST505B	Conduct sensory analysis	
PMLTEST509B	Perform immunohaematological tests	*
PMLTEST511B	Supervise earthworks inspection, sampling and testing operations	*
PMLTEST512A	Apply electrophoretic techniques	*

Unit code	Unit title	
PMLTEST513A	Apply routine chromatographic techniques	*
PMLTEST514A	Perform fire assay techniques	*
PMLTEST515A	Design and supervise complex environmental field surveys	*
PMLTEST516A	Provide input to production trials	*
PMLTEST517A	Perform tissue and cell culture techniques	*
PMLTEST518A	Perform molecular biology tests and procedures	*
PMLTEST519A	Prepare animal and plant material for display	*
PMLTEST520A	Perform complex tests to measure engineering properties of materials	*
PMLTEST521A	Perform laboratory-based ecological techniques	*
PMLTEST522A	Perform complex tests to measure chemical properties of materials	*
PMLTEST523A	Apply complex instrumental techniques	*
PMLTEST524A	Apply routine spectrometric techniques	*
PMLTEST525A	Apply routine electrometric techniques	*
PMLTEST526A	Perform food analyses	*
	Imported units To ensure that no qualification in this Training Package has an excessive training and assessment focus, the completion of the following three units will only be counted as one (1) elective (Workplace Assessor) in PML04	
BSZ401A BSZ402A BSZ403A	Plan assessment Conduct Assessment Review assessment	
BSZ404A	Train small groups	

AQF Diploma

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

Occupational group

Technical officers, laboratory technicians, analysts 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 standard operating procedures and enterprise methods 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, (for example, cholesterol or creatine)
 - biological function (for example, clotting)
 - the presence of drugs (for example, 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.

The officer also conducts a range of tests on the packaging material used for the company's products.

The competencies they require

The units of competency required have been grouped under two headings in the tables below. The units listed under the heading **core** are considered to be essential for all technical officers. 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.

Diploma of Laboratory Technology — PML50104

To be awarded a *Diploma of Laboratory Technology PML50104*, competency must be achieved in a total of twenty (20) units of competency consisting of:

- all eight (8) core units
- twelve (12) elective units.

The elective units must include:

- a minimum of five (5) units from the PML 500 series units, including at least one (1) of the PML 500 series units shown in *italics* in the table of electives below
- a maximum of three (3) units from the PML 300 series
- a maximum of five (5) units from the PML 400 series
- a maximum of two (2) units from the PML 600 or 700 series units
- a maximum of four (4) relevant units from other endorsed Training Packages. For example, the BSZ units listed below as electives would count for two of these four units.

NOTE: Units marked with (*) have prerequisites. See individual units for details

Core units

PMLCOM300B	Communicate with other people	
PMLCOM500B	Provide information to customers	
PMLDATA400A	Process and interpret data	
PMLDATA500B	Analyse data and report results	*
PMLDATA501B	Use laboratory application software	
PMLOHS400A	Maintain laboratory/field workplace safety	
PMLORG301A	Plan and conduct laboratory/field work	
PMLQUAL401B	Apply quality system and continuous improvement processes	

Elective units

Unit code	Unit title	
PMLMAIN300B	Maintain the laboratory fit for purpose	
PMLOHS301B	Work safely with instruments that emit ionising radiation	
PMLQUAL300B	Contribute to the achievement of quality objectives	
PMLQUAL301B	Apply critical control point requirements	
PMLSAMP302A	Receive and prepare samples for testing	
PMLSCIG300B	Operate basic handblowing equipment	
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment	
PMLTEST300B	Perform basic tests	
PMLTEST303B	Prepare working solutions	
PMLTEST304B	Prepare culture media	
PMLTEST305B	Perform aseptic techniques	

Unit code	Unit title	
PMLTEST306B	Assist with fieldwork	
PMLTEST307B	Prepare trial batches for evaluation	
PMLTEST308A	Perform microscopic examination	
PMLTEST310A	Perform histological procedures	
PMLCAL400A	Perform standard calibrations	
PMLMAIN400A	Maintain and control stocks	
PMLORG400A	Prepare practical science classes and demonstrations	
PMLQUAL400B	Contribute to the ongoing development of HACCP plans	
PMLSAMP400B	Obtain representative samples in accordance with sampling plan	
PMLSAMP401A	Prepare mineral samples for analysis	
PMLTEST402B	Prepare, standardise and use solutions	
PMLTEST403B	Assist with geotechnical site investigations	
PMLTEST404A	Perform chemical tests and procedures	
PMLTEST405A	Perform food tests	*
PMLTEST406A	Perform physical tests	
PMLTEST407A	Perform biological procedures	*
PMLTEST408A	Undertake environmental field-based monitoring	
PMLTEST409A	Capture and manage scientific images	
PMLTEST410A	Undertake environmental field-based, remote-sensing monitoring	
PMLTEST411A	Perform mechanical tests	
PMLTEST412A	Prepare tissue and cell cultures	*
<i>PMLCAL500A</i>	<i>Perform non-standard calibrations</i>	*
<i>PMLCAL501A</i>	<i>Create or modify calibration procedures</i>	*
<i>PMLCAL502A</i>	<i>Create or modify automated calibration procedures</i>	*
PMLMAIN501B	Assist in the maintenance of reference materials	
PMLMAIN502A	Maintain instruments and equipment	
PMLORG500B	Schedule laboratory work for a small team	
PMLQUAL500A	Monitor the quality of test results and data	*
<i>PMLSCIG501B</i>	<i>Design and manufacture glass apparatus and glass systems</i>	*
<i>PMLSCIG502B</i>	<i>Perform glass coating, grinding and finishing operations</i>	*
<i>PMLSCIG503B</i>	<i>Construct, modify and maintain high vacuum system</i>	*
<i>PMLTEST501B</i>	<i>Perform microbiological tests</i>	*
<i>PMLTEST502B</i>	<i>Perform haematological tests</i>	*
<i>PMLTEST503B</i>	<i>Perform histological tests</i>	*
<i>PMLTEST504B</i>	<i>Perform chemical pathology tests</i>	*
<i>PMLTEST505B</i>	<i>Conduct sensory analysis</i>	
<i>PMLTEST509B</i>	<i>Perform immunohaematological tests</i>	*
<i>PMLTEST511B</i>	<i>Supervise earthworks inspection, sampling and testing operations</i>	*

Unit code	Unit title	
PMLTEST512A	<i>Apply electrophoretic techniques</i>	*
PMLTEST513A	<i>Apply routine chromatographic techniques</i>	*
PMLTEST514A	<i>Perform fire assay techniques</i>	*
PMLTEST515A	<i>Design and supervise complex environmental field surveys</i>	*
PMLTEST516A	<i>Provide input to production trials</i>	*
PMLTEST517A	<i>Perform tissue and cell culture techniques</i>	*
PMLTEST518A	<i>Perform molecular biology tests and procedures</i>	*
PMLTEST519A	<i>Prepare animal and plant material for display</i>	*
PMLTEST520A	<i>Perform complex tests to measure engineering properties of materials</i>	*
PMLTEST521A	<i>Perform laboratory-based ecological techniques</i>	*
PMLTEST522A	<i>Perform complex tests to measure chemical properties of materials</i>	*
PMLTEST523A	<i>Apply complex instrumental techniques</i>	*
PMLTEST524A	<i>Apply routine spectrometric techniques</i>	*
PMLTEST525A	<i>Apply routine electrometric techniques</i>	*
PMLTEST526A	<i>Perform food analyses</i>	*
PMLCOM600B	Develop and maintain laboratory documentation	
PMLOHS601A	Implement and monitor OHS and environmental management systems	
PMLORG600B	Supervise laboratory operations in work/functional area	*
PMLORG601B	Maintain registration and statutory or legal compliance in work/functional area	
PMLORG602B	Manage complex projects	
PMLQUAL600B	Maintain quality system and continuous improvement processes within work/functional area	
PMLQUAL601B	Conduct an internal audit of the quality system	
PMLTEAM600B	Manage and develop teams	
PMLTEST601B	Classify building sites	*
PMLTEST602A	Prepare plans and quality assurance procedures for environmental field activities	*
PMLTEST603A	Evaluate and select appropriate test methods and/or procedures	
PMLTEST700B	Contribute to the development of products and applications	*
PMLTEST701B	Troubleshoot equipment and production processes	*
PMLTEST702B	Contribute to the validation of test methods	*
PMLTEST703B	Develop or adapt analyses and procedures	*
PMLTEST704B	Integrate data acquisition and interfacing systems	*
	Imported units To ensure that no qualification in this Training Package has an excessive training and assessment focus, the completion of the following three units will only be counted as one (1) elective (Workplace Assessor) in PML04	
BSZ401A	Plan assessment	

Unit code	Unit title	
BSZ402A	Conduct Assessment	
BSZ403A	Review assessment	
BSZ404A	Train small groups	

Packaging for industry specialisations

Because specialisation is an industry requirement for the Diploma, Registered Training Organisations (RTOs) may choose to issue a generic:

- *Diploma of Laboratory Technology* *PML50104*

or where elective units of competency are packaged to suit a particular industry sector or specialisation:

- *Diploma of Laboratory Technology* *PML50104*
(specialising in XXXXX)

Industry sector/specialisations could include, but are not limited to:

- biological testing
- biological and environmental testing
- biotechnology
- calibration
- chemical testing
- construction materials testing
- environmental monitoring
- food testing
- manufacturing testing
- mineral assay
- pathology testing
- scientific glassblowing.

It should be noted that a qualification with a specialisation does not change the title of the qualification, although RTOs may choose to record the specialisation. The AQTF requirements must be complied with and the qualification or Statement of Attainment should clearly specify the units of competency achieved and where appropriate, the specialisation.

AQF Advanced Diploma

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

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.

They 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.

The work of laboratory supervisors 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 require

The units of competency required have been grouped under two headings over the page. The units listed under the heading **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 PML60104*, entrants must have completed a *Diploma of Laboratory Technology PML50104* or be able to demonstrate equivalent competency. It is also recommended that entrants have had an appropriate period of employment at an occupational level commensurate with the *Diploma of Laboratory Technology PML60104* prior to entry to this Advanced Diploma qualification.

Advanced Diploma of Laboratory Operations — PML60104

To be awarded an *Advanced Diploma of Laboratory Operations PML60104*, competency must be achieved in a total of twelve (12) units of competency consisting of:

- all six (6) core units
- six (6) elective units.

The elective units must include a minimum of three (3) units from the PML 600 series units listed in the table of electives below.

The balance can be chosen from the PML 500 series, the PML 700 series or relevant units from other endorsed Training Packages. For example, the BSZ units listed below as electives would count for two of these units.

NOTE: Units marked with (*) have prerequisites. See individual units for details.

Core units

PMLCOM600B	Develop and maintain laboratory documentation
PMLOHS601A	Implement and monitor OHS and environmental management systems
PMLORG600B	Supervise laboratory operations in work/functional area
PMLORG601B	Maintain registration and statutory or legal compliance in work/functional area
PMLQUAL600B	Maintain quality system and continuous improvement processes within work/functional area
PMLTEAM600B	Manage and develop teams

Elective units

Unit code	Unit title	
PMLCAL500A	Perform non-standard calibrations	*
PMLCAL501A	Create or modify calibration procedures	*
PMLCAL502A	Create or modify automated calibration procedures	*
PMLCOM500B	Provide information to customers	
PMLDATA500B	Analyse data and report results	*
PMLDATA501B	Use laboratory application software	
PMLMAIN501B	Assist in the maintenance of reference materials	
PMLMAIN502A	Maintain instruments and equipment	
PMLQUAL500A	Monitor the quality of test results and data	*
PMLSCIG501B	Design and manufacture glass apparatus and glass systems	*
PMLSCIG502B	Perform glass coating, grinding and finishing operations	*
PMLSCIG503B	Construct, modify and maintain high vacuum system	*
PMLTEST501B	Perform microbiological tests	*
PMLTEST502B	Perform haematological tests	*
PMLTEST503B	Perform histological tests	*
PMLTEST504B	Perform chemical pathology tests	*

Unit code	Unit title	
PMLTEST505B	Conduct sensory analysis	
PMLTEST509B	Perform immunohaematological tests	*
PMLTEST511B	Supervise earthworks inspection, sampling and testing operations	*
PMLTEST512A	Apply electrophoretic techniques	*
PMLTEST513A	Apply routine chromatographic techniques	*
PMLTEST514A	Perform fire assay techniques	*
PMLTEST515A	Design and supervise complex environmental field surveys	*
PMLTEST516A	Provide input to production trials	*
PMLTEST517A	Perform tissue and cell culture techniques	*
PMLTEST518A	Perform molecular biology tests and procedures	*
PMLTEST519A	Prepare animal and plant material for display	*
PMLTEST520A	Perform complex tests to measure engineering properties of materials	*
PMLTEST521A	Perform laboratory-based ecological techniques	*
PMLTEST522A	Perform complex tests to measure chemical properties of materials	*
PMLTEST523A	Apply complex instrumental techniques	*
PMLTEST524A	Apply routine spectrometric techniques	*
PMLTEST525A	Apply routine electrometric techniques	*
PMLTEST526A	Perform food analyses	*
PMLORG602B	Manage complex projects	
PMLQUAL601B	Conduct an internal audit of the quality system	
PMLTEST601B	Classify building sites	*
PMLTEST602A	Prepare plans and quality assurance procedures for environmental field activities	*
PMLTEST603A	Evaluate and select appropriate test methods and/or procedures	
PMLTEST700B	Contribute to the development of products and applications	*
PMLTEST701B	Troubleshoot equipment and production processes	*
PMLTEST702B	Contribute to the validation of test methods	*
PMLTEST703B	Develop or adapt analyses and procedures	*
PMLTEST704B	Integrate data acquisition and interfacing systems	*
	Imported units To ensure that no qualification in this Training Package has an excessive training and assessment focus, the completion of the following three units will only be counted as one (1) elective (Workplace Assessor) in PML04	
BSZ401A BSZ402A BSZ403A	Plan assessment Conduct Assessment Review assessment	
BSZ404A	Train small groups	

Prerequisites

Some units of competency have stated prerequisites. In any training program it is expected competency will be attained in the prerequisite units before it is attained in the unit having the prerequisite(s). The prerequisites are to be included in the packaging of qualifications. In recognition of current competency, it is possible to assess the unit and its prerequisites together as an integrated assessment.

Unit of competency		Prerequisite unit(s) of competency
PMLDATA200A	Record and present data	None
PMLORG200A	Work within a laboratory/field workplace (induction)	None
PMLSAMP200A	Collect routine site samples	None
PMLSAMP201A	Handle and transport samples or equipment	None
PMLTEST200A	Conduct routine site measurements	None
PMLCOM300B	Communicate with other people	None
PMLMAIN300B	Maintain the laboratory fit for purpose	None
PMLOHS301B	Work safely with instruments that emit ionising radiation	None
PMLOHS302A	Participate in laboratory/field workplace safety	None
PMLORG301A	Plan and conduct laboratory/field work	None
PMLQUAL300B	Contribute to the achievement of quality objectives	None
PMLQUAL301B	Apply critical control point requirements	None
PMLSAMP302A	Receive and prepare samples for testing	None
PMLSCIG300B	Operate basic handblowing equipment	None
PMLSCIG301B	Repair glass apparatus using simple glassblowing equipment	None
PMLTEST300B	Perform basic tests	None
PMLTEST303B	Prepare working solutions	None
PMLTEST304B	Prepare culture media	None
PMLTEST305B	Perform aseptic techniques	None
PMLTEST306B	Assist with fieldwork	None
PMLTEST307B	Prepare trial batches for evaluation	None
PMLTEST308A	Perform microscopic examination	None
PMLTEST310A	Perform histological procedures	None
PMLCAL400A	Perform standard calibrations	None
PMLDATA400A	Process and interpret data	None
PMLMAIN400A	Maintain and control stocks	None
PMLOHS400A	Maintain laboratory/field workplace safety	None
PMLORG400A	Prepare practical science classes and demonstrations	None

Unit of competency		Prerequisite unit(s) of competency
PMLQUAL400B	Contribute to the ongoing development of HACCP plans	None
PMLQUAL401B	Apply quality system and continuous improvement processes	None
PMLSAMP400B	Obtain representative samples in accordance with sampling plan	None
PMLSAMP401A	Prepare mineral samples for analysis	None
PMLTEST402B	Prepare, standardise and use solutions	None
PMLTEST403B	Assist with geotechnical site investigations	None
PMLTEST404A	Perform chemical tests and procedures	None
PMLTEST405A	Perform food tests	PMLTEST308A
PMLTEST406A	Perform physical tests	None
PMLTEST407A	Perform biological procedures	PMLTEST305B and PMLTEST308A
PMLTEST408A	Undertake environmental field-based monitoring	None
PMLTEST409A	Capture and manage scientific images	None
PMLTEST410A	Undertake environmental field-based, remote-sensing monitoring	None
PMLTEST411A	Perform mechanical tests	None
PMLTEST412A	Prepare tissue and cell cultures	PMLTEST305B
PMLCAL500A	Perform non-standard calibrations	PMLCAL400A
PMLCAL501A	Create or modify calibration procedures	PMLCAL500A
PMLCAL502A	Create or modify automated calibration procedures	PMLCAL501A
PMLCOM500B	Provide information to customers	None
PMLDATA500B	Analyse data and report results	PMLDATA400A
PMLDATA501B	Use laboratory application software	None
PMLMAIN501B	Assist in the maintenance of reference materials	None
PMLMAIN502A	Maintain instruments and equipment	None
PMLORG500B	Schedule laboratory work for a small team	None
PMLQUAL500A	Monitor the quality of test results and data	PMLDATA400A
PMLSCIG501B	Design and manufacture glass apparatus and glass systems	PMLSCIG300B and PMLSCIG301B
PMLSCIG502B	Perform glass coating, grinding and finishing operations	PMLSCIG300B and PMLSCIG301B
PMLSCIG503B	Construct, modify and maintain high vacuum system	PMLSCIG300B and PMLSCIG301B
PMLTEST501B	Perform microbiological tests	PMLTEST407A
PMLTEST502B	Perform haematological tests	PMLTEST407A
PMLTEST503B	Perform histological tests	PMLTEST310A
PMLTEST504B	Perform chemical pathology tests	PMLTEST407A

Unit of competency		Prerequisite unit(s) of competency
PMLTEST505B	Conduct sensory analysis	None
PMLTEST509B	Perform immunohaematological tests	PMLTEST407A
PMLTEST511B	Supervise earthworks inspection, sampling and testing operations	PMLTEST403B or PMLSAMP400B and PMLTEST406A
PMLTEST512A	Apply electrophoretic techniques	PMLTEST303B or PMLTEST402B and PMLTEST404A
PMLTEST513A	Apply routine chromatographic techniques	PMLTEST303B or PMLTEST402B and PMLTEST404A
PMLTEST514A	Perform fire assay techniques	PMLSAMP401A
PMLTEST515A	Design and supervise complex environmental field surveys	PMLTEST408A
PMLTEST516A	Provide input to production trials	PMLTEST404A or PMLTEST405A or PMLTEST406A or PMLTEST411A
PMLTEST517A	Perform tissue and cell culture techniques	PMLTEST412A and PMLTEST407A
PMLTEST518A	Perform molecular biology tests and procedures	PMLTEST407A
PMLTEST519A	Prepare animal and plant material for display	PMLTEST407A
PMLTEST520A	Perform complex tests to measure engineering properties of materials	PMLTEST411A
PMLTEST521A	Perform laboratory-based ecological techniques	PMLTEST407A
PMLTEST522A	Perform complex tests to measure chemical properties of materials	PMLTEST513A or PMLTEST524A
PMLTEST523A	Apply complex instrumental techniques	PMLTEST513A or PMLTEST524A
PMLTEST524A	Apply routine spectrometric techniques	PMLTEST303B or PMLTEST402B and PMLTEST404A
PMLTEST525A	Apply routine electrometric techniques	PMLTEST303B or PMLTEST402B and PMLTEST404A
PMLTEST526A	Perform food analyses	PMLTEST405A or PMLTEST407A
PMLCOM600B	Develop and maintain laboratory documentation	None
PMLOHS601A	Implement and monitor OHS and environmental management systems	None
PMLORG600B	Supervise laboratory operations in work/functional area	None
PMLORG601B	Maintain registration and statutory or legal compliance in work/functional area	None
PMLORG602B	Manage complex projects	None
PMLQUAL600B	Maintain quality system and continuous improvement processes within work/functional area	None
PMLQUAL601B	Conduct an internal audit of the quality system	None
PMLTEAM600B	Manage and develop teams	None
PMLTEST601B	Classify building sites	PMLTEST403B and PMLTEST406A
PMLTEST602A	Prepare plans and quality assurance procedures for environmental field activities	PMLTEST515A

Unit of competency		Prerequisite unit(s) of competency
PMLTEST603A	Evaluate and select appropriate test methods and/or procedures	None
PMLTEST700B	Contribute to the development of products and applications	PMLTEST603A
PMLTEST701B	Troubleshoot equipment and production processes	PMLTEST603A
PMLTEST702B	Contribute to the validation of test methods	PMLTEST603A
PMLTEST703B	Develop or adapt analyses and procedures	PMLTEST603A
PMLTEST704B	Integrate data acquisition and interfacing systems	PMLDATA501B

Customisation guidelines

General advice

This Training Package is relevant to the broad spectrum of Australian industries, and users are encouraged to customise qualifications and contextualise units of competency to suit their enterprise or sector purposes, provided that the customisation rules are followed.

Customisation of this Training Package may be achieved by:

- choosing appropriate electives from units provided in this Training Package (refer to page 65 for packaging for industry specialisations)
- importing elective units from other Training Packages
- contextualising units of competency to better suit an enterprise or industry context.

We welcome and encourage the export of these units to other Training Packages provided the rules below are observed.

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.

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 (for example, 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 other endorsed Training Packages.
- 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.

The training and assessment of workers is seen as a key role for experienced 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:

- | | | |
|-----------|--------------------|----------------------|
| • BSZ401A | Plan assessment | } Workplace assessor |
| • BSZ402A | Conduct assessment | |
| • BSZ403A | Review assessment | |
| • BSZ404A | Train small groups | |

In keeping with the hierarchy of supervision present in laboratories, industry representatives have recommended that the above four BSZ units are appropriate for inclusion in Certificate IV, Diploma and Advanced Diploma qualifications. To ensure that no qualification in this Training Package has an excessive training and assessment focus, the completion of the three units *BSZ401A*, *BSZ402A*, and *BSZ403A* will only be counted as one (1) elective unit (Workplace Assessor) in this Training Package.

Exporting competencies to other Training Packages

PML04 is a cross-industry Training Package, with application across a wide range of industries. It is expected and encouraged that these units of competency will be imported to a number of other Training Packages. All PML04 units may be used provided that:

- the original unit code and unit title are retained
- they are only contextualised to the extent outlined in the section on Competency Standards (page 10)
- the user advises the appropriate Skills Council in writing of the specific competencies exported to enable input during future revisions and ongoing communication.

Contextualising of units of competency

It is vital that these cross-industry standards are able to be used in a wide range of industry sectors and enterprises. To enable this, contextualising of the units of competency is actively encouraged provided the requirements outlined in the earlier section on Competency Standards are met.

Assessment Guidelines

Introduction

These Assessment Guidelines provide the endorsed framework for assessment of units of competency in this Training Package. They are designed to ensure that assessment is consistent with the Australian Quality Training Framework (AQTF) *Standards for Registered Training Organisations*. Assessments against the units of competency in this Training Package *must* be carried out in accordance with these Assessment Guidelines.

Assessment system overview

This section provides an overview of the requirements for assessment when using this Training Package, including a summary of the AQTF requirements; licensing/registration requirements; and assessment pathways.

Benchmarks for assessment

Assessment within the National Training Framework is the process of collecting evidence and making judgements about whether competency has been achieved to confirm whether an individual can perform to the standards expected in the workplace, as expressed in the relevant endorsed unit of competency.

In the areas of work covered by this Training Package, the endorsed units of competency are the benchmarks for assessment. As such, they provide the basis for nationally recognised Australian Qualifications Framework (AQF) qualifications and Statements of Attainment issued by Registered Training Organisations (RTOs).

Australian Quality Training Framework assessment requirements

Assessment leading to nationally recognised AQF qualifications and Statements of Attainment in the Vocational Education and Training sector must meet the requirements of the AQTF as expressed in the *Standards for Registered Training Organisations*.

The *Standards for Registered Training Organisations* can be downloaded from the ANTA website at www.anta.gov.au or can be obtained in hard copy from ANTA. The following points summarise the assessment requirements under the AQTF.

Registration of training organisations

Assessment must be conducted by, or on behalf of, an RTO formally registered by a State or Territory Registering/Course Accrediting Body in accordance with the *Standards for Registered Training Organisations*. The RTO must have the specific units of competency and/or AQF qualifications on its scope of registration. See Section 1 of the *Standards for Registered Training Organisations*.

Quality training and assessment

Each RTO must have systems in place to plan for and provide quality training and assessment across all its operations. See Standard 1 of the *Standards for Registered Training Organisations*.

Assessor competency requirements

Each person involved in training, assessment or client service must be competent for the functions they perform. See Standard 7 of the *Standards for Registered Training*

Organisations for assessor competency requirements. Standard 7 also specifies the competencies that must be held by trainers.

Assessment requirements

The RTOs assessments must meet the requirements of the endorsed components of Training Packages within its scope of registration. See Standard 8 of the *Standards for Registered Training Organisations*.

Assessment strategies

Each RTO must identify, negotiate, plan and implement appropriate learning and assessment strategies to meet the needs of each of its clients. See Standard 9 of the *Standards for Registered Training Organisations*.

Mutual Recognition

Each RTO must recognise the AQF qualifications and Statements of Attainment issued by any other RTO. See Standard 5 of the *Standards for Registered Training Organisations*.

Access and equity and client services

Each RTO must apply access and equity principles, provide timely and appropriate information, advice and support services that assist clients to identify and achieve desired outcomes. This may include reasonable adjustment in assessment. See Standard 6 of the *Standards for Registered Training Organisations*.

Partnership arrangements

RTOs must have, and comply with, written agreements with each organisation providing training and/or assessment on its behalf. See Standard 1.6 of *Standards for Registered Training Organisations*.

Recording assessment outcomes

Each RTO must have effective administration and records management procedures in place, and must record AQF qualifications and Statements of Attainment issued. See Standards 4 and 10.2 of the *Standards for Registered Training Organisations*.

Issuing AQF qualifications and Statement of Attainment

Each RTO must issue AQF qualifications and Statements of Attainment that meet the requirements of the *AQF Implementation Handbook* and the endorsed Training Packages within the scope of its registration.

An AQF qualification is issued once the full requirements for a qualification, as specified in the nationally endorsed Training Package, are met. A Statement of Attainment is issued where the individual is assessed as competent against fewer units of competency than required for an AQF qualification. See Standard 10 and Section 2 of the *Standards for Registered Training Organisations*.

Licensing/registration requirements

The developers of this Training Package, and ANTA, consider that no licensing or registration requirements apply to RTOs, assessors or candidates with respect to this Training

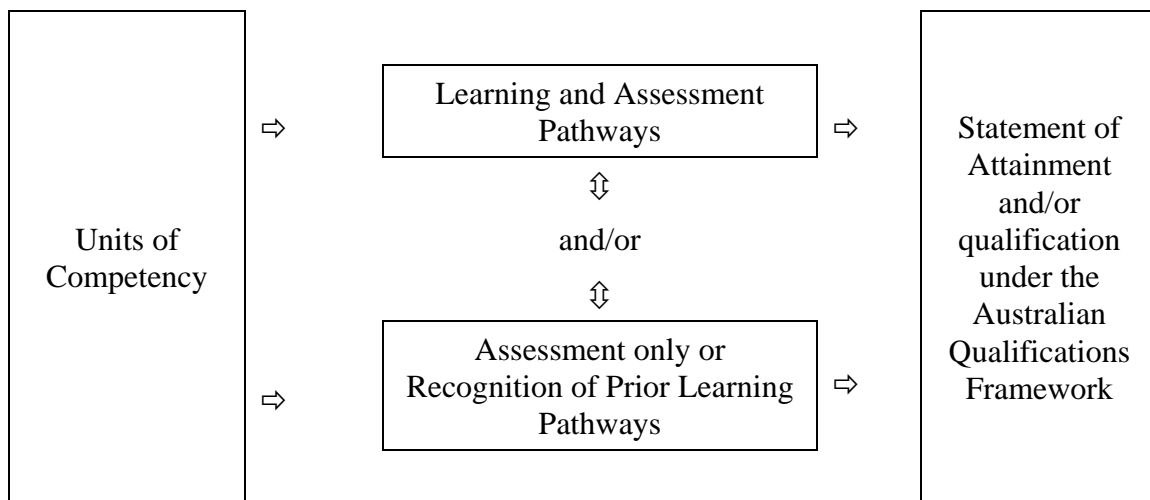
Package. Contact the relevant State or Territory Department(s) to check if there are any licensing or registration requirements with which you must comply.

Pathways

The competencies in this Training Package may be attained in a number of ways including:

- formal or informal education and training
- experiences in the workplace
- general life experience
- any combination of the above.

Assessment under this Training Package leading to an AQF qualification or Statement of Attainment may follow a learning and assessment pathway, an assessment-only or recognition pathway, or a combination of the two as illustrated in the following diagram.



Each of these assessment pathways leads to full recognition of competencies held — the critical issue is that the candidate is competent, not how the competency was acquired.

Assessment, by any pathway, must comply with the assessment requirements set out in the *Standards for Registered Training Organisations*.

Learning and Assessment pathways

Usually, learning and assessment are integrated, with assessment evidence being collected and feedback provided to the candidate at anytime throughout the learning and assessment process. Learning and assessment pathways may include structured programs in a variety of contexts using a range of strategies to meet different learner needs. Structured learning and assessment programs could be: group-based, work-based, project-based, self-paced, action learning-based; conducted by distance or e-learning; and/or involve practice and experience in the workplace.

Learning and assessment pathways to suit New Apprenticeships have a mix of formal structured training and structured workplace experience with formative assessment activities through which candidates can acquire and demonstrate skills and knowledge from the relevant units of competency.

Assessment-only or Recognition of Prior Learning Pathway

Competencies already held by individuals can be formally assessed against the units of competency in this Training Package, and should be recognised regardless of how, when or where they were achieved.

In an Assessment-only or Recognition of Prior Learning (RPL) pathway, the candidate provides current, quality evidence of their competency against the relevant unit of competency. This process may be directed by the candidate and verified by the assessor, such as in the compilation of portfolios; or directed by the assessor, such as through observation of workplace performance and skills application, and oral and/or written assessment. Where the outcomes of this process indicate that the candidate is competent, structured training is not required. The RPL requirements of Standard 8.2 of the *Standards for Registered Training Organisations* must be met.

As with all assessment, the assessor must be confident that the evidence indicates that the candidate is currently competent against the endorsed unit of competency. This evidence may take a variety of forms and might include certification, references from past employers, testimonials from clients, and work samples. The onus is on candidates to provide sufficient evidence to satisfy assessors that they currently hold the relevant competencies. In judging evidence, the assessor must ensure that the evidence of prior learning is:

- authentic (the candidate's own work)
- valid (directly related to the current version of the relevant endorsed unit of competency)
- reliable (shows that the candidate consistently meets the endorsed unit of competency)
- current (reflects the candidate's current capacity to perform the aspect of the work covered by the endorsed unit of competency)
- sufficient (covers the full range of elements in the relevant unit of competency and addresses the four dimensions of competency, namely task skills, task management skills, contingency management skills, and job/role environment skills).

The Assessment-only or Recognition of Prior Learning pathway is likely to be most appropriate in the following scenarios:

- candidates enrolling in qualifications who want recognition for prior learning or current competencies
- existing workers
- individuals with overseas qualifications
- recent migrants with established work histories
- people returning to the workplace
- people with disabilities or injuries requiring a change in career.

Combination of pathways

Where candidates for assessment have gained competencies through work and life experience and gaps in their competence are identified, or where they require training in new areas, a combination of pathways may be appropriate.

In such situations, the candidate may undertake an initial assessment to determine their current competency. Once current competency is identified, a structured learning and

assessment program ensures that the candidate acquires the required additional competencies identified as gaps.

Assessor requirements

This section identifies the mandatory competencies for assessors, and clarifies how others may contribute to the assessment process where one person alone does not hold all the required competencies.

Assessor competencies

The *Standards for Registered Training Organisations* specify mandatory competency requirements for assessors.

For example, Standard 7.3 from the *Standards for Registered Training Organisations* follows:

- 7.3a** The RTO must ensure that assessments are conducted by a person who has:
- i) the following competencies from the Training Package for Assessment and Workplace Training, or demonstrated equivalent competencies:
 - a BSZ401A Plan Assessment
 - b BSZ402A Conduct Assessment
 - c BSZ403A Review Assessment
 - ii) relevant vocational competencies, at least to the level being assessed.
- 7.3b** However, if a person does not have all of the competencies in Standards 7.3 a (i) and 7.3 a (ii), one person with the competencies listed in Standard 7.3 a (i), and one or more persons who have the competencies listed in Standard 7.3 a (ii) may work together to conduct assessments.

Designing Assessment Tools

This section provides an overview on the use and development of assessment tools.

Use of Assessment Tools

Assessment tools provide a means of collecting the evidence that assessors use in making judgements about whether candidates have achieved competency.

There is no set format or process for the design, production or development of assessment tools. Assessors may use prepared assessment tools, such as those specifically developed to support this Training Package, or they may develop their own.

Using Prepared Assessment Tools

If using prepared assessment tools, assessors should ensure these are benchmarked, or mapped, against the current version of the relevant unit of competency. This can be done by checking that the materials are listed on the National Training Information Service (<http://www.ntis.gov.au>). Materials on the list have been noted by the National Training Quality Council as meeting their quality criteria for Training Package support materials.

Developing Assessment Tools

When developing their own assessment tools, assessors must ensure that the tools:

- are benchmarked against the relevant unit or units of competency

- are reviewed as part of the validation of assessment strategies as required under 9.2i of the *Standards for Registered Training Organisations*, and
- meet the assessment requirements expressed in the *Standards for Registered Training Organisations*, particularly Standards 8 and 9.

A key reference for assessors developing assessment tools is BSZ98 *Training Package for Assessment and Workplace Training* and the unit of competency BSZ507A *Develop Assessment Tools*.

Conducting Assessment

This section details the mandatory assessment requirements and provides information on equity in assessment including reasonable adjustment.

Mandatory Assessment Requirements

Assessments must meet the criteria set out in Standard 8 from the *Standards for Registered Training Organisations*. For information, Standard 8 from the *Standards for Registered Training Organisations* is reproduced below.

8 RTO Assessments

The RTOs assessments meet the requirements of the endorsed components of Training Packages and the outcomes specified in accredited courses within the scope of its registration.

8.1 The RTO must ensure that assessments, regardless of whether through a training and assessment pathway or an assessment-only pathway:

- i) comply with the Assessment Guidelines included in the applicable nationally endorsed Training Packages or the assessment requirements specified in accredited courses;
- ii) lead to the issuing of a Statement of Attainment or qualification under the AQF when a person is assessed as competent against nationally endorsed unit(s) of competency in the applicable Training Package or modules specified in the applicable accredited course;
- iii) comply with the principles of validity, reliability, fairness and flexibility;
- iv) provide for applicants to be informed of the context and purpose of the assessment and the assessment process;
- v) where relevant, focus on the application of knowledge and skill to the standard of performance required in the workplace and cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills;
- vi) involve the evaluation of sufficient evidence to enable judgements to be made about whether competency has been attained;
- vii) provide for feedback to the applicant about the outcomes of the assessment process and guidance on future options;
- viii) are equitable for all persons, taking account of cultural and linguistic needs
- ix) provide for reassessment on appeal.

8.2 a) The RTO must ensure that RPL is offered to all applicants on enrolment.

b The RTO must have an RPL process that:

- i) is structured to minimise the time and cost to applicants; and
- ii) provides adequate information and support to enable applicants to gather reliable evidence to support their claim for recognition of competencies currently held, regardless of how, when or where the learning occurred.

Access and Equity

An individual's access to the assessment process should not be adversely affected by restrictions placed on the location or context of assessment beyond the requirements specified in this Training Package.

Reasonable adjustments can be made to ensure equity in assessment for people with disabilities. Adjustments include any changes to the assessment process or context that meet the individual needs of the person with a disability, but do not change competency outcomes. Such adjustments are considered 'reasonable' if they do not impose an unjustifiable hardship on a training provider or employer. When assessing people with disabilities, assessors are encouraged to apply good practice assessment methods with sensitivity and flexibility.

Assessment in the laboratory and testing industries

What criteria must be met when designing 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.

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.

Conducting Assessments

Evidence-gathering methods must be appropriate to the context of the assessment, the assessor and the candidate. 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 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 for this Training Package will provide ways in which to address these matters.

Where assessment is occurring out of the workplace, it is important to ensure that:

- the assessment takes place in a situation as close as possible to workplace reality
- all aspects of competency are assessed
- the assessment takes 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 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.

Assessment considerations for technical units ('TEST' or 'SAMP' prefix)

All units have been written with a focus on a workplace assessment environment. In institutional delivery this can be achieved through simulation of workplace activities, or through work placements.

Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate corrective action.

The performance of TEST units relies on compliance with all the requirements of the organisation's quality management system. Where such systems are mandated by legislation or licensing then the context in which the competence is demonstrated/assessed must meet the requirements of that legislation or license to the satisfaction of the regulatory authority.

Consistent performance should be demonstrated. In particular, the assessor could:

- review test data/results obtained by the candidate over time, particularly to check accuracy, consistency and timeliness of results
- review test records and workplace documentation prepared by the candidate
- observe the candidate conducting sample preparation and a range of test procedures
- obtain feedback from clients, peers and supervisors
- question the candidate about relevant scientific/technical terms, test methods and enterprise procedures, common problems and corrective action
- conduct simulations and role plays to assess the candidate's ability to handle unforeseen problems, respond to simulated emergencies and to simulated working conductions where access to the workplace is not possible.

Specific resources for the Laboratory Operations Training Package

The Resource Generator *

An online library of resources supporting the implementation of Training Packages (www.resourcegenerator.gov.au). Resources are organised under industry specific heading and can also be accessed by selected searchers on competencies and qualifications. Process manufacturing units of competency are live, and resources are available for Laboratory Operations.

Training Package Assessment Guides

Guide #2 — Assessing Competencies in Higher Qualifications — section 5 provides advice on developing assessment tools for PML99 units of competency. Available via the Resource Generator (go to www.resourcegenerator.gov.au/loadpage.asp?TGAG.htm).

Learning and Assessment Delivery Models. Certificate IV in Laboratory Techniques

Model training plans and assessment tools for 20 units of competency in Certificate IV of Laboratory Techniques. Available from <http://trainingsupport.otte.vic.gov.au>. Go to download, Training Package Implementation Guides and Additional Delivery Advice Guides, Laboratory Operations, Additional Resources. Also available from the Victorian Curriculum Maintenance Manager, Trevor Lange on 03 9238 8448 t.lange@chisholm.vic.edu.au.

Laboratory Operations implementation website

The laboratory operations implementation website features up to date information, forums, implementation support, downloadable resource documents, links to online purchasing and online networking options. Visit labops.mlaust.com

Training Package Resources for VET in Schools *

Laboratory Operations: Implementation and Industry Opportunities PML99
CD-ROM For people wishing to implement Cert III in Laboratory Skills PML30199 as a VET in Schools (including New Apprenticeship) program. Available free from the Curriculum Corporation website or CD ROM is \$54.45 <http://www.curriculum.edu.au/vetis>. Phone 03 9207 9600.

Laboratory Operations Series 4 Toolbox

A Toolbox is a collection of resources, suggested learning strategies and supporting material to support on line delivery of qualifications. Toolboxes have a strong focus on effective teaching and learning strategies. The resources are also designed to be portable, flexible and customisable. The Lab Ops toolbox covers 18 units of competency from PML99. It partially supports Certificate III in Laboratory Skills, Certificate IV in Laboratory Techniques and Diploma of Laboratory Technology. Available from Australian Training Products www.atpl.net.au.

Laboratory Management Series 4 Toolbox

Available from Australian Training Products www.atpl.net.au. Stockcode 9996413E \$396

Noted support materials Laboratory Operations (cross-industry) Training Package

- The **Handbook for Trainers and Assessors** gives guidance in the interpretation of the endorsed materials of the Training Package. It also includes information on understanding units of competency, and different approaches to training and assessment in the workplace. Stockcode 6630004RES \$30.80
- The **Assessment Solutions** booklet provides examples of assessment strategies and tools, and templates for planning, conducting and recording assessments. Templates are also included on disk. Stockcode 6630005RES \$60.50
- The **Learning Solutions** booklet provides real-life examples of learning programs and assessment in a variety of industry situations. Stockcode 6630002RES \$25.30

All available from Australian Training Products www.atpl.net.au

Learning resources for Certificate III in Laboratory Skills

Available from ATP www.atpl.net.au Also available for free via the Resource Generator at: www.resourcegenerator.gov.au.

Process Manufacturing Training Packages Guide: Make Training Work kit

This kit is aimed at encouraging people to pick up and start using the relevant package. It covers PMA98, PMB01, PMC99 and PML99. The resources are also useful for current users of Training Packages who wish to increase the efficiency of their assessment and training effort. RTOs will also find the resources useful when working with various process manufacturing enterprises to assist them with the improvement of their training practices. A hyperlinked CD is provided with the kit. (ATP Stockcode 6590023E \$275. www.atpl.net.au).

Further resources and sources of information

The following list of resources and organisations is provided to assist assessors in planning, designing, conducting and reviewing of assessments against this Training Package.

The *Training Package for Assessment and Workplace Training*, is available from:

Australian Training Products Ltd
Telephone: (03) 9655 0600 Fax: (03) 9639 4684
Web: www.atpl.net.au Email: sales@atpl.net.au

Other sources of information

Industry Skills Council

[insert specific ITC contact details]

General resources

AQF Implementation Handbook, third Edition. Australian Qualifications Framework Advisory Board, 2002, aqf.edu.au

Australian Quality Training Framework (AQTF) — for general information go to:
www.anta.gov.au/aqtfWhat.asp

Australian Quality Training Framework (AQTF) — for resources and information go to:
www.anta.gov.au/pubBundle.asp?qsID=10

Australian Quality Training Framework *Standards for Registered Training Organisations*, Australian National Training Authority, Melbourne, 2001. Available in hard copy from ANTA or can be downloaded from
www.anta.gov.au/pubBundle.asp?qsID=10

BSZ98 Training Package for Assessment and Workplace Training. This is available from the following organisations and can be viewed, and components downloaded, from the National Training Information Service (NTIS).

National Training Information Service, an electronic database providing comprehensive information about RTOs, Training Packages and accredited courses — www.ntis.gov.au/

Training Package Development Handbook, Australian National Training Authority, Melbourne, 2001. Available in hard copy from ANTA or can be downloaded from
www.anta.gov.au/publication.asp?qsID=213

Style Guide for Training Package Support Materials, Australian National Training Authority, Melbourne, 2003. Available in hard copy from ANTA or can be downloaded from www.anta.gov.au

Assessment resources

Training Package Assessment Guides — a range of resources to assist RTOs in developing Training Package assessment materials developed by ANTA with funding from the Department of Education, Training and Youth Affairs. It is made up of 10 separate titles, as described at www.anta.gov.au/project/tpAssessment/. Go to www.resourcegenerator.gov.au/loadpage.asp?TPAG.htm

Printed and/or CD ROM versions of the guides can be purchased from Australian Training Products (ATP). The resource includes the following:

- 1 Training Package Assessment Materials Kit
- 2 Assessing Competencies in Higher Qualifications
- 3 Recognition Resource
- 4 Kit to Support Assessor Training
- 5 Candidate's Kit: Guide to Assessment in New Apprenticeships
- 6 Assessment Approaches for Small Workplaces
- 7 Assessment Using Partnership Arrangements
- 8 Strategies for ensuring Consistency in Assessment
- 9 Networking for Assessors
- 10 Quality Assurance Guide for Assessment
- 11 Delivery and Assessment Strategies

Assessment tool design and conducting assessment

VETASSESS and Western Australian Department of Training and Employment 2000, *Designing Tests — Guidelines for designing knowledge based tests for Training Packages*.

Vocational Education and Assessment Centre 1997, *Designing Workplace Assessment Tools, A self-directed learning program*, NSW TAFE.

Manufacturing Learning Australia 2000, *Assessment Solutions*, Australian Training Products, Melbourne.

Rumsey, David 1994, *Assessment practical guide*, Australian Government Publishing Service, Canberra.

Assessor Training

Australian Committee on Training Curriculum (ACTRAC) 1994, *Assessor training program — learning materials*, Australian Training Products, Melbourne.

Australian National Training Authority, *A Guide for Professional Development*, ANTA, Brisbane.

Australian National Training Authority, *Facilitator Packs for Certificate IV in Assessment and Workplace Training*.

Australian National Training Authority, *Learners Packs for Certificate IV in Assessment and Workplace Training*.

Australian Training Products Ltd *Assessment and Workplace Training, Training Package — Toolbox*, ATPL Melbourne.

Green, M, et al. 1997, *Key competencies professional development Package*, Department for Education and Children's Services, South Australia.

Victorian TAFE Association 2000, *The professional development CD: A learning tool*, VTA, Melbourne.

Assessment System Design and Management

Office of Training and Further Education 1998, *Demonstrating best practice in VET project — assessment systems and processes*, OTFE Victoria.

Toop, L., Gibb, J. & Worsnop, P. *Assessment system designs*, Australian Government Publishing Service, Canberra.

Western Australia Department of Training and VETASSESS 1998, *Kit for Skills Recognition Organisations*, WADOT, Perth.

