Process Manufacturing, Recreational Vehicle and Laboratory Industry Reference Committee

MSL Laboratory Operations Training Package

Companion Volume User Guide

Version 1.0 July 2018

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IBSA
Innovation & Business Skills Australia

Prepared on behalf of the Process Manufacturing, Recreational Vehicle and Laboratory Industry Reference Committee

for the Australian Industry Skills Committee

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Contents

1. Overview

This Companion Volume *User Guide* has been developed to support the MSL Laboratory Operations Training package, Release 2.0. It provides information for Registered Training Organisations (RTOs) and enterprises to support the implementation of training and assessment based on the units of competency, skill sets, and qualifications in the MSL Laboratory Operations Training Package.

This guide provides additional information to that included in the MSL Companion Volume *Implementation Guide*.

This guide includes information about:

- *Foundation skills*, including mapping of all units of competency to the Australian Core Skills Framework (ACSF) and employability skills summaries for each qualification
- *Competency in practice*, including case studies to illustrate practical application of selected units of competency in different industry sectors
- *Glossary*, which includes definitions of terms and phrases included in units of competency that previously existed in the Range Statements of previous versions of MSL units.

2. Foundation skills

ACSF Mapping

This mapping provides ACSF levels for the core skills (Leaning, Reading, Writing, Oral communication and Numeracy) included in each unit of competency in the MSL Laboratory Operation Training Package. The levels are those that should be achieved at the end of a vocational training program. The ACSF levels are not entry requirements, although RTO's could use this information to make a decision about a learner's suitability for enrolment, and plan for what needs to be achieved by the end of the training program.

Unit code	Unit title	Learning	Reading	Writing	Oral Comm	Numeracy
MSL904002	Perform standard calibrations	3	3	3	3	4
MSL905004	Perform non-standard calibrations	3	3	3	3	4
MSL905005	Create or modify calibration procedures	4	3	3	3	4
MSL905006	Create or modify automated calibration procedures	4	3	3	3	4
MSL912001	Work within a laboratory or field workplace (induction)	3	3	3	3	3
MSL913003	Communicate with other people	2	2	2	2	2
MSL913004	Plan and conduct laboratory/field work	3	3	3	3	3
MSL914002	Prepare practical science classes and demonstrations	3	3	3	3	3
MSL915003	Provide information to customers	3	3	3	3	3
MSL915004	Schedule laboratory work for a small team	3	3	3	3	3
MSL916006	Develop and maintain laboratory documentation	5	4	4	4	3
MSL916007	Manage and develop teams	5	4	4	4	3
MSL916008	Supervise laboratory operations in work or functional area	5	4	4	4	3
MSL916009	Maintain registration and statutory or legal compliance in work or functional area	5	5	5	4	3
MSL916010	Manage complex projects	5	5	5	4	3
MSL922001	Record and present data	2	2	2	2	2
MSL924003	Process and interpret data	4	3	3	3	3
MSL924004	Use laboratory application software	4	2	2	2	4
MSL925003	Determine measurements of uncertainty	5	4	4	4	5
MSL925004	Analyse data and report results	4	4	4	4	4
MSL933005	Maintain the laboratory/field workplace fit for purpose	3	3	3	3	3
MSL933006	Contribute to the achievement of quality objectives	3	3	3	3	3
MSL933007	Apply critical control point requirements	3	3	3	3	3
MSL933008	Perform calibration checks on equipment and assist with its maintenance	3	3	3	3	3
MSL934004	Maintain and calibrate instruments and equipment	3	3	3	3	3

Unit code	Unit title	Learning	Reading	Writing	Oral Comm	Numeracy
MSL934005	Contribute to the ongoing development of HACCP plans	3	3	3	3	3
MSL934006	Apply quality system and continuous improvement processes	4	3	3	3	3
MSL934007	Maintain and control stocks	4	2	2	2	3
MSL935005	Authorise the issue of test results	4	3	3	4	4
MSL935006	Assist in the maintenance of reference materials	3	3	3	3	2
MSL935007	Monitor the quality of test results and data	4	4	4	4	4
MSL936003	Maintain quality system and continuous improvement processes within work or functional area	5	5	5	4	4
MSL936004	Conduct an internal audit of the quality system	5	4	4	4	3
MSL943003	Work safely with instruments that emit ionising radiation	3	3	3	3	3
MSL943004	Participate in laboratory or field workplace safety	3	3	3	3	3
MSL944002	Maintain laboratory or field workplace safety	4	4	4	4	3
MSL946002	Implement and monitor WHS and environmental management systems	5	5	5	5	4
MSL952001	Collect routine site samples	2	2	2	2	2
MSL952002	Handle and transport samples or equipment	2	2	2	2	2
MSL953003	Receive and prepare samples for testing	3	2	2	2	2
MSL953004	Operate a robotic sample preparation system	3	2	2	2	2
MSL954003	Relate anatomical and physiological features to laboratory samples	4	4	3	3	3
MSL954004	Obtain representative samples in accordance with sampling plan	4	3	3	3	4
MSL954005	Prepare mineral samples for analysis	4	3	3	3	4
MSL955002	Supervise a robotic sample preparation system	5	4	3	3	4
MSL972001	Conduct routine site measurements	2	2	2	2	3
MSL973013	Perform basic tests	3	3	3	3	3
MSL973014	Prepare working solutions	3	3	2	2	3
MSL973015	Prepare culture media	3	3	2	2	3
MSL973016	Perform aseptic techniques	3	3	2	2	2
MSL973017	Assist with fieldwork	3	2	2	2	2
MSL973018	Prepare trial batches for evaluation	3	3	3	3	3
MSL973019	Perform microscopic examination	3	3	3	3	2
MSL973020	Perform histological procedures	4	3	3	3	3
MSL973021	Conduct field-based acceptance tests for construction materials	3	2	2	2	3
MSL973022	Conduct laboratory-based acceptance tests for construction materials	2	2	2	2	3

Unit code	Unit title	Learning	Reading	Writing	Oral Comm	Numeracy
MSL973023	Perform fire pouring techniques	3	3	3	3	3
MSL973024	Perform site investigation activities	3	3	3	3	3
MSL974016	Perform physical and mechanical tests	4	4	4	3	4
MSL974017	Prepare, standardise and use solutions	4	4	4	4	4
MSL974018	Conduct geotechnical site investigations	4	4	4	4	4
MSL974019	Perform chemical tests and procedures	4	4	4	4	4
MSL974020	Perform food tests	4	4	4	4	4
MSL974021	Perform biological procedures	4	4	4	4	4
MSL974022	Undertake environmental field-based monitoring	4	4	4	4	4
MSL974023	Capture and manage scientific images	4	4	4	4	4
MSL974024	Undertake field-based, remote-sensing monitoring	4	4	4	4	4
MSL974025	Prepare tissue and cell cultures	4	4	4	4	4
MSL974026	Perform tests to determine the properties of construction materials	4	4	4	3	4
MSL974027	Monitor performance of structures	4	4	4	3	4
MSL974028	Classify soils	4	4	4	3	4
MSL974029	Operate an automated mineral analysis system	4	4	4	3	4
MSL975028	Apply advanced embedding and microtomy skills	5	4	4	4	4
MSL975029	Perform histological tests	5	4	4	4	4
MSL975030	Perform immunohaematological tests	4	4	4	4	4
MSL975031	Supervise sampling, inspections and testing at construction sites	5	4	4	4	4
MSL975032	Provide input to production trials	5	4	4	4	4
MSL975033	Perform tissue and cell culture techniques	5	4	4	4	4
MSL975034	Perform molecular biology tests and procedures	5	4	4	4	4
MSL975035	Perform microbiological tests	4	4	4	4	4
MSL975036	Perform haematological tests	4	4	4	4	4
MSL975037	Perform chemical pathology tests	5	4	4	4	4
MSL975038	Conduct sensory analysis	4	4	4	4	4
MSL975039	Apply electrophoretic techniques	4	4	4	4	4
MSL975040	Apply routine chromatographic techniques	4	4	4	4	4
MSL975041	Perform fire assay techniques	4	4	4	4	4
MSL975042	Design and supervise complex environmental field surveys	5	5	5	5	5
MSL975043	Prepare animal and plant material for display	4	4	4	4	4
MSL975044	Perform complex tests to measure engineering properties of materials	4	4	4	4	4

Unit code	Unit title	Learning	Reading	Writing	Oral Comm	Numeracy
MSL975045	Perform laboratory-based ecological techniques	4	4	4	4	4
MSL975046	Perform complex tests to measure chemical properties of materials	4	4	4	4	4
MSL975047	Apply complex instrumental techniques	5	5	5	4	5
MSL975048	Apply routine spectrometric techniques	4	4	4	4	4
MSL975049	Apply routine electrometric techniques	4	4	4	4	4
MSL975050	Perform food analyses	4	4	4	4	4
MSL975051	Supervise geotechnical site investigations	5	5	5	5	4
MSL975052	Locate record and collect forensic samples	5	4	4	4	4
MSL975053	Perform complex laboratory testing of forensic samples	5	4	4	4	4
MSL975054	Perform physical examination of forensic samples	5	4	4	4	4
MSL975055	Classify building sites	5	4	4	4	4
MSL976004	Prepare plans and quality assurance procedures for environmental field activities	5	5	5	5	4
MSL976005	Evaluate and select appropriate test methods and/or procedures	5	5	5	4	5
MSL977005	Validate test methods	5	5	5	4	5
MSL977006	Contribute to the development of products and applications	5	5	5	4	5
MSL977007	Troubleshoot equipment and/or production processes	5	5	4	4	5
MSL977008	Develop or adapt analyses and procedures	5	5	5	4	5

Employability skills summaries

There are eight employability skills:

- Communication
- Teamwork
- Problem solving
- Initiative and enterprise
- Planning and organising
- Self-management
- Learning
- Technology.

These skills, along with the core skills, underpin vocational training and assessment and are identified holistically for MSL qualifications and presented in the following tables. The summaries are included as a guide to assist trainers and assessors in planning training and assessment strategies.

Employability skills summaries provide examples of how each skill is applied to the occupation covered by the qualification. The detail can vary depending on the context in which the work is carried out, but the skills listed should make up an integral part of the training for each qualification.

MSL20118 Certificate II in Sampling and Measurement	
Employability Skill	Industry/enterprise requirements for this qualification include:
Communication	• Receive and pass on written and oral messages, provide relevant information in response to requests and demonstrate effective interpersonal skills, including conflict resolution techniques • Record and store data, perform basic calculations of scientific quantities, and present information in tables and graphs • Report using verbal responses, data entry into laboratory information management system (LIMS) or enterprise databases and brief written reports using enterprise proformas • Communicate with team members, supervisors and customers effectively and courteously • Interpret work instructions • Complete workplace documentation such as reports
Teamwork	• Liaise with relevant personnel to arrange site access and permits • Seek advice and clarify instructions with supervisors
Problem solving	• Deal with inquiries in accordance with enterprise customer service requirements • Rectify obvious errors and atypical data using enterprise procedures • Identify site hazards and review enterprise safety procedures • Report problems accidents or incidents
Initiative and enterprise	• Identify and report opportunities for improvements in procedures, processes and equipment • Identify hazards associated with samples, preparation methods, reagents and equipment, and implement enterprise control measures
Planning and organising	• Plan and organise daily work activities to ensure the timely completion of tasks • Modify work plans to suit changing conditions and priorities • Assemble and organise specified sampling equipment and materials and maintain own work area
Self-management	• Follow work instructions to perform scientific/technical tasks safely and efficiently • Follow enterprise procedures which reflect work health and safety (WHS), equal opportunity, anti-discrimination and non-harassment legislative requirements • Maintain confidentiality of all client/enterprise data and information • Use appropriate personal protective equipment (PPE) to ensure personal safety when sampling, processing, transferring or disposing of samples
Learning	• Clarify instructions with supervisors to ensure a complete understanding of the task • Identify training opportunities and career options • Seek advice if the required samples cannot be collected or if procedures require modification
Technology	• Use communication, emergency, data recording, sampling measuring and laboratory equipment • Use computers and software to collect and report information

MSL30118 Certificate III in Laboratory Skills	
Employability Skill	**Industry/enterprise requirements for this qualification include**:
Communication	• Receive and pass on written and oral messages, provide relevant information in response to requests, and demonstrate effective interpersonal skills, including conflict resolution techniques • Record and store data, perform basic calculations of scientific quantities and present information in tables and graphs • Report using verbal responses, data entry into laboratory information management system (LIMS) or enterprise databases and brief written reports using enterprise proformas • Communicate with team members, supervisors and customers
Teamwork	• Work effectively with team members who may have diverse work styles, cultures and perspectives when reporting problems, hazards and incidents and results, or contributing to productivity improvements • Promote cooperation and good relations in the team
Problem solving	• Deal with inquiries in accordance with enterprise customer service requirements • Rectify errors in data using enterprise procedures • Resolve simple customer requirements, such as mismatched request forms and specimens
Initiative and enterprise	• Access and provide relevant information that meets own authorisation and confidentiality requirements • Recognise potential incidents and take appropriate corrective action • Identify and report opportunities for improvements in procedures, processes and equipment • Identify hazards associated with samples, preparation methods, reagents and equipment and implement enterprise control measures
Planning and organising	• Plan and organise daily work activities to ensure the timely completion of tasks • Modify work plans to suit changing conditions and priorities • Assemble and organise specified laboratory equipment and materials
Self-management	• Follow enterprise procedures which reflect equal opportunity, anti-discrimination and non-harassment legislative requirements • Maintain enterprise standards of personal hygiene • Conduct work based on ethical values and principles • Review own strengths, weaknesses and work practices for opportunities to continuously improve performance • Maintain confidentiality of all client/enterprise data and information • Use appropriate personal protective equipment (PPE) to ensure personal safety when sampling, processing, transferring or disposing of samples
Learning	• Clarify instructions with supervisors to ensure a complete understanding of the task • Update knowledge and skills and take advantage of skill development opportunities
Technology	• Use communication, emergency, data recording and laboratory equipment. Laboratory equipment includes items such as microscopes, weigh balances, LIMS and centrifuges • Use computers and software to collect and report information

MSL40118 Certificate IV in Laboratory Techniques	
Employability Skill	**Industry/enterprise requirements for this qualification include**:
Communication	• Receive and pass on written and oral messages, provide relevant information in response to requests, and demonstrate effective interpersonal skills, including conflict resolution techniques • Record and store data, perform basic calculations of scientific quantities and present information in tables and graphs • Report using verbal responses, data entry into laboratory information management system (LIMS) and brief written reports • Communicate with team members, supervisors and customers • Interpret standard operating procedures (SOPs) and material safety data sheets (MSDS)
Teamwork	• Work effectively with team members who may have diverse work styles, cultures and perspectives when reporting problems, hazards and incidents and results, or contributing to productivity improvements • Promote cooperation and good relations in the team
Problem solving	• Deal with inquiries in accordance with enterprise customer service requirements • Rectify errors in data using enterprise procedures • Recognise and report non-conformances or problems to appropriate personnel
Initiative and enterprise	• Access and provide relevant information that meets own authorisation and confidentiality requirements • Recognise potential incidents and take appropriate corrective action • Identify and report opportunities for improvements in procedures, processes, quality and equipment • Identify hazards associated with samples, preparation methods, reagents and equipment, and implement enterprise control measures
Planning and organising	• Plan and organise daily work activities to ensure the timely completion of tasks • Modify work plans to suit changing conditions and priorities • Assemble and organise specified laboratory equipment and materials
Self-management	• Follow enterprise procedures which reflect equal opportunity, anti-discrimination and non-harassment legislative requirements • Maintain enterprise standards of personal hygiene • Conduct work based on ethical values and principles and ensure quality and integrity of own work • Review own strengths, weaknesses and work practices for opportunities to continuously improve performance • Maintain security and confidentiality of all client/enterprise data and information • Use appropriate personal protective equipment (PPE) to ensure personal safety when sampling, processing, transferring or disposing of samples
Learning	• Clarify instructions with supervisors to ensure a complete understanding of the task • Update knowledge and skills and take advantage of skill development opportunities • Coach others in participating in work health and safety (WHS) and environmental management issues

Technology	• Use communication, emergency, data recording and equipment, including items such as instruments that emit ionising radiation, calibration standards, laboratory information management systems and earth moving equipment • Select and use computers and software to collect and report information

MSL50118 Diploma of Laboratory Technology	
Employability Skill	**Industry/enterprise requirements for this qualification include**:
Communication	• Communicate appropriately with internal and external customers in order to respond effectively to requests of a specialised technical nature • Write procedures using an unambiguous, logical sequence of instructions that meet statutory and regulatory requirements • Record and store data, perform calculations of scientific quantities and present information in tables and graphs • Report using verbal responses, data entry into laboratory information management system (LIMS) and brief written reports
Teamwork	• Work effectively with team members who may have diverse work styles, cultures and perspectives when reporting problems, hazards and incidents and results, or contributing to productivity improvements • Promote cooperation and good relations in the team • Liaise with peers and technical staff from other laboratories
Problem solving	• Modify and revise existing procedures or substitute alternative instruments and measurement standards • Detect potential or actual non-conformances, assess their significance and recommend preventative or corrective actions • Apply specialised technical knowledge to critically analyse and resolve complex problems and non-conformances where solutions are not obvious or readily available
Initiative and enterprise	• Recommend appropriate preventative/corrective actions to improve sampling, testing and/or calibration activities • Identify hazards associated with samples, preparation methods, reagents and equipment, and implement enterprise control measures • Research current, alternative methods and equipment • Suggest improvements in productivity and quality
Planning and organising	• Modify work plans to suit changing conditions and priorities • Assemble, organise, check and optimise specified laboratory/field equipment and materials • Plan/adjust maintenance schedules in accordance with operational requirements • Plan work sequences to optimise throughput of multiple samples
Self-management	• Follow enterprise procedures which reflect equal opportunity, anti-discrimination and non-harassment legislative requirements • Conduct work based on ethical values and principles and ensure quality and integrity of own work • Review own strengths, weaknesses and work practices for opportunities to continuously improve performance • Maintain security and confidentiality of all client/enterprise data and information • Use appropriate personal protective equipment (PPE) to ensure personal safety when sampling, processing, transferring or disposing of samples
Learning	• Review feedback from other laboratories to assess acceptance of newly created calibration procedures • Update knowledge and skills and take advantage of skill development opportunities

	• Coach others in participating in work health and safety (WHS) and environmental management issues
Technology	• Create, edit, test and document computer controlled calibration procedures for test and measurement instruments • Select and use computers and software to collect and report information • Select, use and optimise laboratory/field equipment, such as calibration equipment, autoanalysers, containment facilities and spectrometers

MSL60118 Advanced Diploma of Laboratory Operations	
Employability Skill	**Industry/enterprise requirements for this qualification include**:
Communication	• Establish and maintain effective communication and consultation with all personnel and clients to ensure smooth and efficient operations • Prepare and maintain quality documentation and keep accurate data records
Teamwork	• Discuss development opportunities with appropriate personnel to assess and confirm requirements • Implement and maintain appropriate participative work health and safety (WHS) processes with employees and their representatives • Empower work groups/teams in dealing with technical and work flow problems and suggest improvements • Develop team members through motivating, mentoring, coaching and promoting team cohesion to achieve planned outcomes
Problem solving	• Troubleshoot testing equipment and testing issues related to production processes, and communication between laboratory processes and computer systems to identify problems and to recommend corrective action • Identify and resolve complex problems by using agreed problem-solving strategies and act to prevent their recurrence • Modify products and applications to meet evaluation recommendations
Initiative and enterprise	• Identify areas for systems improvement • Develop and introduce practices to improve the work environment • Recommend improvements for future projects • Initiate trial and evaluate corrective action and make appropriate adjustments
Planning and organising	• Organise and optimise the use of resources within agreed parameters to achieve planned outcomes • Develop and coordinate rosters to balance job requirements, laboratory efficiency and skill development opportunities • Determine resource requirements, including personnel, time, equipment and materials • Collect relevant information from manuals, specification sheets, diagnostic equipment and software
Self-management	• Recognise limits of own professional expertise and make decisions within limits of responsibility and authority • Ensure work practices are conducted in and ethical and professional manner • Apply safety precautions appropriate to the task • Follows enterprise procedures to document development process
Learning	• Consult specialists as necessary • Provide information to employees and develop and implement training programs • Maintain knowledge of current and new requirements impacting on work/functional area

	• Provide coaching and mentoring support to personnel to change work practices, such as difficulties with meeting targets for performance
Technology	• Select, use and evaluate information directories and databases, online data search facilities and computer networks • Use standard laboratory equipped with appropriate pilot batch manufacturing and testing equipment

3. Competency in practice

Industry representatives have provided case studies to illustrate practical application in different industry sectors of a range of MSL units of competency. They can be used to assist in selecting units of competency, and to help develop training and assessment strategies.

MSL904002 Perform standard calibrations

Background

Calibration work may be simple or highly complex depending upon the type of equipment being calibrated and the accuracy or uncertainties required. Manual calibrations may involve interconnecting equipment and setting the stimulus devices to the settings listed in the procedure. At each setting, the technician must verify that the response or output of the unit under test (UUT) is within the tolerances specified in the procedure. In addition, many procedures require that 'as-found' (before adjustment) and 'as-left' (after adjustment) results are recorded for maintaining the UUT documentation history.

Often calibration technicians must assess and document the total uncertainties for a given measurement by analysing equipment specifications and methodology during calibration. They have to interpret specifications and technical information and demonstrate initiative when adjusting and repairing instruments.

The calibration technician's workload can be routine and repetitive. A perpetual backlog of work and the constant need to reduce turn-around-time to meet client demands, coupled with enterprise productivity goals, can induce stress and mental fatigue if not carefully managed. However, it is essential that all personnel are able to perform tests and associated work tasks without undue pressure that might influence technical judgement if 'integrity of measurement' is to be retained. Errors arising from items incorrectly calibrated will, at best, have to be recalled which wastes time, resources and destabilises enterprise credibility. At worst, if undetected, they may have severe safety implications to personnel or equipment, depending on the nature of the item.

Calibration (1)

A customer delivers a test pressure gauge and requires certification that the gauge conforms to manufacturer's specifications. Personnel in the item reception area log the job and the laboratory supervisor assigns it to a calibration technician. He/she reads the work order and retrieves the approved calibration procedure. The procedure requires the customer's gauge to be tested to 1000 kPa using a hydraulic test station. The technician assembles the required apparatus and personal protective equipment (PPE). The gauge is visually inspected for defects and contamination. The temperature of the environment is checked and the hydraulic test station confirmed as fully operational. The required pressures are applied to the gauge and the indicated readings are transcribed onto the test report. The technician notes that some readings are outside the allowable tolerance and adjustments will have to be made. He/she takes another set of readings after making the necessary adjustments and records them on the report. The technician applies the required labels to the gauge, updates the database, produces a test report and places the item on the quality assurance bench for inspection by the supervisor. The supervisor visually inspects the item and checks the readings on the report. The job has taken two hours to complete.

Calibration (2)

A client has asked the laboratory to calibrate a spectrum analyser to manufacturer's specification. The supervisor assigns the job to a calibration technician who reads the job sheet and locates the appropriate calibration procedure. Although this spectrum analyser will be calibrated partly with the aid of automated technology, the technician estimates that the calibration will still take about nine hours to complete. The

technician reads the procedure and assembles the equipment and allows for the required warm-up time for instrument stabilisation. Possible sources of error are minimised by cleaning connectors and tensioning them with the torque spanner. The technician performs the manual phase of the test and manually records 12 pages of results. The equipment is reconnected for the automated part of the procedure the test recommenced. The technician produces a further six pages of results. These are assessed for errors and non-conformances and all calculations are carefully checked. A final report is produced which accompanies the spectrum analyser to the quality assurance bench for checking by the supervisor. All cables and equipment used for the calibration are returned to the store.

MSL905004 Perform non-standard calibrations

Background
Calibration technicians/specialists have the skills and knowledge to operate, maintain and calibrate a wide variety of complex test equipment and measuring instruments with limited guidance. They must remain abreast of technical and equipment advances, interpret complex technical information accurately and liaise with clients to clarify their needs. They must demonstrate high levels of initiative and concentration when performing technically demanding measurements, providing solutions for non-conforming work and when adjusting or repairing complex instruments. The calibration specialist's workload can be routine and repetitive. A perpetual back-log of work and the constant need to reduce turn-around-time to meet client demands coupled with enterprise productivity goals can induce stress and mental fatigue if not carefully managed. However, it is essential that personnel are able to perform tests and associated work tasks without undue pressure that might influence technical judgement if 'integrity of measurement' is to be retained.

Calibration (**1**)
A client has delivered a new model vibration transducer to the laboratory and would like a full test report on the item. A calibration technician assesses the job. They conclude that because the item is new to the industry, the laboratory will probably not have a documented calibration procedure. A quick ring around the company's other laboratories confirms that a procedure has not been written yet. They analyse the item's technical specifications and realise that although a generic procedure will suffice for most of the tests, it will have to be modified.

The technician reports these concerns to the supervisor who confirms that the client wants to know if the item meets the manufacturer's specifications. Approval is given to the technician to modify a previous procedure. The revised procedure is shown to the supervisor who checks each step and confirms the test is technically justified and all uncertainties have been calculated and documented.

The technician sets up the reference standards, confirms they are fully operational and within specification and begin the test. Each stage of the test is carefully monitored to ensure the data is correct and valid. On completion, another technician conducts the test and the data is compared. The supervisor is confident the test and data are valid and a report is generated, including a method validation summary for the laboratory's records.

Calibration (**2**)
A calibration technician is scheduled to calibrate a client's signal generator in accordance with the manufacturer's procedure. The technician reads the procedure and assembles all the required reference standards but notices the laboratory's reference frequency counter is not available because it has been sent away for calibration. The technician needs to substitute another instrument and so scans the other workbenches. They decide on a particular model and refer to the instrument's technical specifications to confirm that it has all the required ranges and is accurate enough. Convinced this item will do the job, the

technician seeks and gains approval from the supervisor. There is no need to consult with the customer because the substitution will have no negative influence on the results. The technician completes the calibration in accordance with the procedure. In the final report, they document the details of the replacement equipment used in the test to ensure the repeatability of measurements and to comply with statutory regulations.

MSL905005 Create or modify calibration procedures

Background
Calibration specialists have the skills and knowledge to operate, maintain and calibrate a very wide variety of test equipment and measuring instruments with limited guidance. They must remain abreast of technical and equipment advances, interpret complex technical information accurately and liaise with clients to clarify their needs. They must demonstrate high levels of initiative and concentration when performing technically demanding measurements, providing solutions for non-conforming work and when adjusting and repairing complex instruments. Calibration specialists are often asked to modify existing calibration procedures and develop new ones. International and Australian standards specify strict criteria for how this is to be done. Above all, clients must agree that the procedures meet their requirements and the procedures must be validated before use. A considerable understanding of test methods is required and personnel must be able to analyse complex technical specifications and estimate uncertainties.

Calibration
The calibration laboratories within the Australian Defence Force (ADF) have recently been advised that all metric dimensional metrology (for example, micrometers, verniers and dial test indicators) must be calibrated to current Australian Standards. The supervisor of the physical laboratory conveys the new instruction to his staff. One of the technicians is about to begin calibrating a batch of micrometers but because the client's (Defence) calibration requirements have changed, they halt proceedings until a new procedure is drafted. The technician rings the other Defence laboratories and establishes that no procedure for that particular model of micrometer exists and therefore seeks permission from the supervisor to develop one. The laboratory supervisor has no reservations because the technician is a calibration specialist who has worked in the industry for a long time.

The technician first obtains a copy of *AS 2102 Micrometer calipers for external measurement*, copies of the technical specifications relating to the reference standards (gauge blocks and optical flats/parallels) and those for the micrometers themselves. The technician lists all the parameters to be tested and drafts a new results template. They calculate tolerances and uncertainties, amend the template accordingly and neatly lay out raw data, calculations and formulae used for peer review. As the technician goes through each measurement they record the various steps in accordance with enterprise procedures so that the test can be reproduced. The required safety procedures, the environmental conditions and the need for equipment stabilisation are also carefully documented.

On completion of the test, the technician compares the data with the micrometer's previous calibration history and double checks the new methodology against a similar American NAVAIR calibration procedure. They are satisfied that the procedure is fit for purpose, that it meets the client's needs and is technically justified and that the data is valid. The technician then presents the draft procedure for another technician to complete.

The test is reproduced successfully and the documentation is given to the administration staff for word processing. Upon completion, the draft test procedure is emailed to the other six Defence laboratories for comment. Following the correction of minor clerical errors, the procedure is submitted to the military's primary standard laboratory (MSL) for final approval and authorisation.

MSL905006 Create or modify automated calibration procedures

Background
Automated calibration relies heavily on computers to assist technicians do their jobs. While calibration software is used to conduct the actual calibrations, it is usually not necessary to know how to program in a computer programming language to conduct the actual tests. Most systems do not require high-order programming expertise for generating calibration procedures. Often, procedures are self-documenting and resemble familiar manual procedures. Most off-the-shelf applications incorporate error checking, online help screens, tolerance calculation, and test uncertainty ratio checking. Many systems display illustrations that show connection points or operator locations of adjustments in devices being tested. Sample procedures are often provided to guide new users through the steps of writing an automated procedure for an instrument.

Calibration
The laboratory supervisor presents a signal generator to a senior calibration technician/specialist and explains that a client will send another 20 units for calibration if the laboratory can calibrate each item within a day. The laboratory currently has an automation station configured to test similar instruments in five hours and therefore the client's request should present no problem. On closer inspection, the specialist realises that the instrument is fitted with a higher-specification option rendering the laboratory's automated procedure deficient in a number of respects. The specialist searches the internal database for something more applicable but concludes that either a new procedure needs to be sourced externally or the current one needs to be modified.

Checks on the internet confirm that no suitable procedure has been developed yet so they obtain approval from the supervisor to edit the current one. The specialist determines which tests have to be modified and where new instructions have to be compiled. They analyse all the equipment specifications, including calculating the measurement uncertainties and what data is to be collated. Particular attention is paid to highlighting the safety measures that must be observed.

On completion of the software program, the specialist conducts a dummy run to confirm that the program is bug free. A colleague vets the procedure and verifies that each step is technically justified. The supervisor emails a copy of the procedure interstate for external validation by means of inter-laboratory comparison. Following successful feedback, the laboratory obtains agreement from the client to use the procedure, calibrates the instrument in 5.5 hours and returns it with a certificate of conformance. The automated procedure is entered into the laboratory's database as an authorised procedure and distributed to affiliated laboratories.

MSL912001 Work within a laboratory/field workplace (induction)

Environmental
At the start of an induction program, the supervisor asks two new laboratory assistants to introduce themselves to all the staff individually and find out about three major tasks that each person regularly performs. In addition, they watch the company's induction video, complete the necessary paperwork and are assigned a locker and safety equipment. At the end of the day, they report back to the supervisor. On Day Two, the supervisor assigns them to an experienced technician and asks them to shadow him/her. At the end of the day the new assistants are asked to describe two tests they have observed and outline some of the major safety issues involved with each one. On Day Three, they begin bench work by helping to conduct routine tests, such as titrations of industrial waste water samples under guidance of a technician.

Manufacturing
A laboratory assistant was required to complete the company's induction program during their first week of employment. The assistant completed the following activities:

- met with all laboratory staff and discussed their roles and duties
- prepared their own organisational flow chart for the laboratory and recorded the contact details and key function of each staff member
- talked to the laboratory manager about the company's products and services and the laboratory's role in quality assurance
- read through the induction booklet's summary of key company policies, procedures, emergency and risk management plans
- talked to the safety officer about WHS risks in the laboratory and the location of key safety equipment and information
- prepared a plan of the layout of the company site with location of key buildings and services
- shadowed several technicians to observe their daily routines
- prepared a weekly work plan in conjunction with the supervisor.

MSL913003 Communicate with other people

Manufacturing
A technician in a petroleum refinery asked a laboratory assistant to 'go down to the cat and take a sample of the bottoms,' not realising that the assistant had only just started work with the company. The assistant looked at the technician in amazement, not knowing whether to pretend to understand, maintain self esteem, or clarify the instructions for the task. The assistant decided on the latter - to ask for clarification - and the technician repeated the instructions without using jargon. The laboratory assistant then proceeded to the catalytic cracker to take the sample as per the appropriate standard operating procedures.

Biomedical
The regular collection staff were not present when a flustered client came into the outpatient clinic with a domestic container full of straw coloured fluid. The receptionist knew what urine collection containers usually looked like and this was clearly not one. The receptionist called for help from the laboratory in the absence of collection staff. A technical officer was sent. The officer quickly realised that a recollection would be requested and because this would be inconvenient to the patient, tried to seek an explanation from them as to why the correct container was not used. The technical officer then explained as clearly and gently as possible the reasons for the recollection and why the substitute container could not be used. The officer confirmed that the patient was clear on the collection procedure and checked that the labels on the new container were correct.

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

The company laboratory was adjacent to the reception area and laboratory technicians would attend to customers if they happened to see them waiting. The laboratory technicians realised that they could improve company-customer relations. They organised for a buzzer to be installed that connected the reception desk to the laboratory and the reception phone to redirect to the laboratory if it was not answered within a reasonable period of time. Since they could not always attend to the specific needs of the callers, they developed a standard format for recording messages that were passed back to the

reception staff. The laboratory assistants were also trained to receive personal and phone inquires in an appropriate manner. The company found that, even though the laboratory technicians could not always satisfy the immediate demands of customers, the customer satisfaction level was greater when customers were attended to personally than when they were connected to an answering machine or not received at all.

MSL913004 Plan and conduct laboratory/field work

Manufacturing
A plastic processing plant had to halt production because of a suspect raw material. The plant manager immediately requested the polymer testing laboratory to test and identify all batches of polypropylene additives and colouring agents. The laboratory team of three assistants and one technical officer allocated the workload amongst themselves to conduct the twelve different tests within a period of four hours to identify the 'out of specification' materials and report them to the production supervisor. All laboratory assistants had to reschedule their work plan, perform the required tests and assist each other to solve the production problem.

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

Food processing
Each of the technical assistants working in the laboratory of a food processing company was dedicated to performing specific analyses. As a result, they often alternated between periods of inactivity and excessive workload (the latter case had the potential to compromise their health and safety and the accuracy of their food analyses). One of the contributing factors to the periods of intense activity was the need to quickly prepare standard solutions and reagents. The team discussed this problem and agreed that while it was not appropriate for each assistant to become competent to perform every analytical procedure, it was feasible for each person to be able to prepare solutions and reagents used by others. The team developed a central register in which impending shortages of these materials was noted. Each assistant referred to this register when no other work was due and prepared the materials on a 'first in, first out' basis unless a task was given a priority rating. The team found that this strategy more evenly distributed the workload over their shift, improved safety in the laboratory and reduced the risk of error.

MSL914002 Prepare practical science classes and demonstrations

Education (**1**)
A biology class returns from a short excursion where pond water samples have been collected. The teacher plans for the students to identify some of the common microscopic organisms present in the samples and conduct a range of tests for pH, electrical conductivity, turbidity and the presence of nitrates. The teaching assistant prepares, checks and calibrates the monitoring equipment and sets out ten microscopes with clean slides, cover slips and transfer pipettes together with waste buckets and bags for collection of biological material. A sharps container is set out for broken slides and cover slips. At the end of the class, the assistant cleans, checks and stows the microscopes and collects the waste material for disposal. The assistant disposes of the waste according to enterprise procedures.

Education (**2**)
A technical officer has responsibility for the technical support of practical classes in two laboratories. Every semester, he/she prepares a detailed schedule for all classes and field trips in collaboration with the teaching staff. This involves a careful assessment of risks and implementation of controls for each kind of activity to ensure that the institution meets its WHS and environmental management responsibilities. The schedule must also satisfy the science department budget constraints, seasonal variations and the availability of key staff and items of equipment. The officer's daily routine involves the preparation of all equipment, experiments and demonstrations for classes, the checking of equipment before and after its use, general cleaning and maintenance of equipment and work areas and the maintenance of stock levels.

MSL915003 Provide information to customers

Manufacturing
A sales office representative submitted a sample from a customer who had complained that the product was contaminated. A technical officer discussed the problem with the representative and traced the history of the product sample from production batch to the customer's tank. It was found that the product had been delivered to a distributor, who had then sold it to the customer. The technical officer was able to show that the sample should be taken from the distributor's tank rather than the customer's. With a clear understanding of sampling protocols and procedures, the technical officer was able to ensure effort was not wasted on analysing a sample that would not identify the cause of the problem. Direct communication with the representative made sure there were guidelines to prevent the problem happening again.

Biotechnology
A technical officer in a government analytical laboratory often provides information to others about how a sample should be collected, received, labelled and its receipt recorded. This may occur when samples are collected:

- for forensic analysis from a crime scene
- at sporting events for the purpose of testing urine for performance enhancing drugs
- for blood-alcohol determination.

The technical officer conveys instructions using a minimum of jargon about the method and times of collection, the holding temperature, chain of custody requirements and documentation of the sample source. In some cases, the officer may also specify additional requirements governing the safe storage and transport of infectious or hazardous materials.

Food processing
A food processing company has a team of laboratory personnel that perform analysis of food products both for the company and on a fee-for-service basis for other enterprises. The laboratory often receives phone requests for the early release of results when they are needed urgently. Sometimes when this occurs, the individual who performed the analyses is unavailable and no one else is sufficiently informed to provide a verbal report on the data. The laboratory personnel realise that they should organise the way they record their results so that everyone can access, understand and report them quickly. The team develops a centralised system of recording and filing the results. They also organise a series of brief training sessions to share information about the analyses that they perform.

MSL915004 Schedule laboratory work for a small team

Construction materials
A consulting laboratory working with construction industries receives 10-15 samples to test daily. The technical officer schedules the work for three other laboratory team members depending on the type of tests and equipment required. One of the technical officer's main tasks is to determine daily and weekly work priorities and distribute the work among team members to maximise their output and use of laboratory equipment. The technical officer monitors work outputs against the schedule and takes corrective action, if required, to ensure that customers receive results within the agreed timeframe.

Biomedical
At a regular team meeting a technical officer announced changes to the team's work schedules for the following week. The technical officer explained that the changes were part of a strategy to enable the team to become multi-skilled. However, the technical officer neither documented nor distributed written confirmation of the changes, as required. On the set date, confusion and conflict arose as a number of team members insisted on using the old schedules. Valuable time was taken up resolving the problem and confirming the changes with personnel individually. Afterwards, the laboratory supervisor reviewed the relevant communication protocols with the technical officer to emphasise their importance.

MSL916006 Develop and maintain laboratory documentation

Environmental
A water sample thought to contain cadmium had been logged for analysis. Later that day, the technician designated to perform the analysis advised the laboratory supervisor that the procedures had not yet been revised to suit the newly installed analytical equipment. The supervisor created a draft procedure document for the revised procedure and passed it, with an explanation of the reasons for the change, to the appropriate personnel for authorisation. The draft document was approved and the supervisor issued the revised procedures as a control document. The supervisor notified all relevant personnel of the change, removed the old procedures, replaced it with the new document and entered the change in the document control register.

Food processing
Two senior technicians in the laboratory of a food processing company hazard analysis and critical control points (HACCP) team suggested extensive changes to the way the laboratory functioned so that it better supported the HACCP system. The technicians reviewed the existing HACCP documentation and legislation and revised the laboratory documentation that was relevant to the HACCP system. They also organised in-house training to provide each member of the laboratory team with the knowledge and skills essential for successful implementation of this system. Overall, the adoption of a HACCP plan by the company proceeded with relatively few problems, in part because of the involvement of the laboratory staff and the training provided by the company.

MSL916007 Manage and develop teams

Construction materials testing
A materials testing laboratory introduced a mentoring system as part of its laboratory work team's program. Laboratory assistants and technicians were placed in work teams that included technical specialists. This strategy was designed to enable less experienced team members to develop advanced technical skills on the job. The team leader acted as the mentor, monitored the competency of the less

experienced team members and organised work tasks to further develop their skills. For example, as part of a quality improvement project, the team was asked to propose a way of minimising waste disposal. After discussing a number of alternatives, the team narrowed down the choice to one feasible suggestion, and then investigated the cost and environmental implications with the guidance of the team leader.

Biomedical
Two technical officers working in the haematology section of a large hospital laboratory explained to their supervisor that they would like to gain experience of making blood films, having learned the basic skills during their initial training. The supervisor agreed, but first assessed their competency against enterprise standards and recognised that they could benefit from some on-the-job training. The supervisor arranged for them to be coached by a more experienced team member. Sometime later, they were assessed as competent and able to regularly perform the task.

Food processing
The new laboratory supervisor of a food processing company was keen to develop the professionalism of the laboratory team. The supervisor wanted to enhance the team's level of cooperation, participation in the ongoing development of the quality management system and willingness to suggest refinements to the food analyses that they performed. Neither the supervisor nor the team of technicians believed they had the time to devote to in-house professional development exercises. In any event, the technicians were dubious about the effectiveness of these activities. Instead, the supervisor offered to meet the costs of the technicians joining a professional society of their choice, provided that it was closely related to the work performed in the laboratory. Most of the staff accepted this offer. Over the next few months, a significant improvement in the enthusiasm of the staff and the quality of their work occurred. The supervisor attributed this to an increased sense of esteem for their profession, the forging of links with the laboratory staff of other companies and the opportunity to discuss their work within a wider circle of peers. Some technicians made the time to visit other laboratories, where they were able to assess new work practices and the merits of instrumentation not used in their own workplace. Overall, the supervisor found that the benefits to the operation of the laboratory team greatly outweighed the modest financial cost involved.

MSL916008 Supervise laboratory operations in work or functional area

Manufacturing
A laboratory supervisor analysed the costs of regular heavy metal testing of the wastewater stream leaving the company's plant. He/she compared these costs with a quotation from an external environmental consulting company and noted that it would be more cost effective to outsource the current level of testing. However, the supervisor argued that the company should retain this capability in-house given the impact of impending legislation which will require it to develop an environmental management plan and introduce more complex monitoring. He/she demonstrated that it would benefit the company more in the long run if they recruited one new technician, retrained existing laboratory staff and continued to perform all wastewater testing on site.

Food processing
A technical officer had to complete a wide range of chemical analyses that required samples to be ignited for many hours in a muffler furnace, digested with acid, prepared for analysis by atomic absorption spectroscopy and gas chromatography (GC), and titrated against standard solutions. The laboratory supervisor noticed that the number of analyses performed each day by the technician tended to fluctuate widely without an obvious cause. Closer observation showed that the technician's efficiency was dependent on the order in which the analyses were begun and the use of the auto sampler for overnight operation of the GC.

The supervisor suggested several ways to improve the technician's time management. The supervisor installed a timer on the muffler furnace so that it could be operated overnight and organised the technician to perform labour intensive tasks after automated analyses had been initiated. The supervisor then showed the technician the optimum order to perform individual tasks and verified that his instructions were followed over succeeding weeks. The supervisor's actions significantly improved the productivity of the laboratory. Later it became obvious that the technician's time management system was not working as effectively as it had. Again, the supervisor monitored the technician's work and realised that since the daily analytical load was seasonal, a second management system had to be developed that was dedicated to the new season. Both systems were sufficiently flexible to take account of short term fluctuations in workload. In summary, the organisational skills of the supervisor and technician's ability to follow detailed instructions resulted in a more efficient use of company time, labour and resources.

MSL916009 Maintain registration and statutory or legal compliance in work or functional area

Biomedical
A pathology laboratory is preparing for NATA assessment. The role of one laboratory supervisor is to organise information sessions to inform personnel about the standards and codes to be followed for accreditation. These cover issues, such as working with biological, chemical and radiation hazards, the use of safety equipment, the disposal of waste, ethics committee requirements and patient confidentiality. Training is provided to ensure all personnel are equipped with sufficient knowledge and skills to fulfil their responsibilities in line with the relevant codes and standards. The thorough preparation of the laboratory personnel by the laboratory supervisor assists the laboratory to gain NATA accreditation.

Environmental
A laboratory supervisor is asked to do an internal audit of a work area as part of an analytical laboratory's preparation for a NATA assessment. The supervisor checks items, such as the currency of the quality manual and laboratory documentation, the storage of reference standards and compares the documentation of test results with NATA requirements. As a result of this internal audit, the supervisor is confident that the forthcoming NATA assessment will show that the work area complies with all requirements.

Food processing
A team of technical assistants performs a common set of food analyses that are essential to the operations of a food processing company. After a period of rapid staff turnover, their supervisor noticed that the degree of variance in the analytical results has increased. An internal proficiency study confirmed that this rise was not due to compositional differences between samples. The supervisor sought to overcome this problem by first discussing it with the team. The supervisor realised that some of the recently employed technical assistants did not fully understand some analytical procedures. Furthermore, each member of the team, for various reasons, has a distinct preference for performing some procedures over others and this appeared to influence their competency to conduct all other analyses.

In consultation with the team, the supervisor made several changes to the way they work. A more structured induction of new staff was introduced and where possible each technician was allocated the analyses that they preferred and were most competent to perform. The supervisor also instigated a review of the analytical methods involved and identified the critical steps in each assay as defined by the laboratory's accreditation authority. Particular attention was paid to steps regularly misunderstood by one or more technicians in the past and a series of 'critical operating procedures' were developed. These procedures, together with the SOPs, were clearly displayed in the area where the relevant assay was

conducted. Overall, these actions by the laboratory supervisor improved the work performance and satisfaction of the staff, maintained the laboratory's standards of compliance and enhanced the level of communication and cooperation with the team.

MSL916010 Manage complex projects

Manufacturing
A cosmetics manufacturing company decided to upgrade the image of a product range which included lipsticks, nail lacquers, hair shampoos and conditioners. A technical specialist coordinated the project and organised input from marketing, development, quality assurance and production personnel. The production boundaries were defined through consultation with marketing and it was decided to update shades of shaded products and introduce natural ingredients wherever possible. The project had to be completed within a reasonably short timeframe and within a tight budget which placed overall constraints on the way the project could be handled. After developing and gaining approval for an implementation plan, team members were briefed and development samples produced for approval. Product characteristics were checked and recommendations made for adjustments until each product met requirements. When pilot batch manufacture had been successfully completed, project development processes were fully documented and then passed to production to allow for efficient development of production batches.

Environmental
The quality team in a laboratory has set a goal of getting reports out more quickly and assigned the coordination of the project to one of the senior technical officers. The officer prepared an outline of the project, a timeframe, a resource list and budget. Specific tasks were allocated to members of the quality team according to their abilities and existing work commitments. The officer monitored the project's progress by tracking and adjusting elements as necessary. After the development of a final draft for the revised procedures, a draft project report was prepared for consideration by the quality team.

Food processing
A dairy company currently uses an imported cocoa-based product for the chocolate flavouring of their milk. Following a feasibility study of a range of ingredients, it was decided to investigate further an alternative source on the basis of cost. A technical specialist prepared a project plan that included required personnel, materials, equipment and a detailed GANTT chart. Key personnel from quality assurance, production, engineering, product development and marketing were chosen for the project team. The project was monitored to confirm progress, control expenditure and review the suitability of the alternative product source. At the end of the project, the technical specialist assessed the outcomes and prepared a detailed report that recommended the use of a local ingredient.

MSL922001 Record and present data

Construction materials
A laboratory assistant is given 20 soil samples and asked to test their moisture content by weighing each sample, placing them in an oven for 24 hours and then reweighing them. The assistant performs the tests in accordance with the standard method and then calculates the % water content by dividing the weight loss by the wet weight and multiplying by 100. He/she checks the results. After entering them into the laboratory information management system (LIMS), they notice that they are consistently less than the previous results recorded for soils at the same site. The assistant reports the discrepancy to the supervisor who checks whether the oven was operated at the required temperature. The supervisor then

discovers that the assistant has calculated the moisture content by dividing the weight loss by the wet weight instead of the dry weight. The assistant recalculates the moisture content for the 20 samples and notes that the results are now consistent with previous results.

Manufacturing
On Friday, a laboratory assistant performs the routine set of temperature, pressure and humidity measurements at 10 sites in a refinery. They enter the data on a pre-prepared data sheet that also contains the data recorded for the previous days of that week. The assistant checks the data for any significant variations to that recorded previously. They notice that for site #5, the temperature reading is 250(C which is 100(C below the expected value. The assistant repeats the measurement and gets the same result. After returning to the laboratory, the assistant enters the data into the LIMS and reports the odd result to their supervisor. The supervisor contacts the site manager and finds out that the pipeline at site #5 has been isolated as part of unscheduled maintenance in that part of the site.

MSL924003 Process and interpret data

Manufacturing
A laboratory assistant in a materials testing laboratory was performing routine tensile tests on samples of vinyl sheet. The assistant converted the readings from the machine to appropriate units using a simple calculation and recorded them in the logbook for that test method. After comparing these test results with previous results for the same type of vinyl material, the assistant found that the tensile strength was within the required range. However, it was at the lower rather than the upper end of the range as in previous testing. The assistant discussed the results with the laboratory supervisor. The calibration file for that machine showed that it had been calibrated four months previously and had not needed adjustment. Test results for the same period showed that the machine was giving lower than normal tensile strength readings for the few higher strength materials tested over the last two months. The assistant did some more checks and confirmed this trend. The machine was re-calibrated by the instrument company and the frequency of internal calibration checks by the laboratory assistant was increased. This problem would not have been detected or corrected as quickly without the assistant's initiative and competent recording and retrieval of test results and calibration information.

Biomedical
A technical assistant works in a team with laboratory scientists and technical officers. Analyses of electrolytes are routine and occur in large volume throughput even in this small diagnostic laboratory. The assistant is assigned tasks that contribute to the overall production of results, their reporting and the quality control evaluation of the results. One task is the daily collection of the electrolyte analyses from the internal quality control area. In this case, the technical assistant plots the results on a Levy-Jennings graph and computes the mean value. The assistant reports immediately to the supervisor if the plots show deviations which indicate out-of-control results.

Food processing
Cooking and holding temperatures greatly affect the nutrient composition of processed foods. The CSIRO provides documentation of nutrient losses with temperature variations. For cooked foods, there is the added problem of microbial growth in the so called 'danger zone'. In one laboratory, the technical assistant conducts simple testing of foods using a temperature probe and also measures the temperature of the storage areas, holding trays or bainmaries and individual tray units. Careful documentation of the temperatures of the foods and times of measurement must be kept. The technical assistant supplies the data as tables and a plot of temperature versus time. For quality control purposes, the assistant is directed to use a cross reference of mercury thermometer readings versus probe measurements for

ambient temperature. The assistant plots the thermometer readings against the probe readings and reports to the supervisor if the plot shows a slope other than the defined value.

MSL924004 Use laboratory application software

Manufacturing
A laboratory technician performs tests on starting materials, such as appearance, identity, melting point, moisture content, trace elements, sulfated ash and assay. The results are entered in a computer database that allows trend analysis to be carried out on the test results for materials from each supplier. As a result, the technician may recognise when a supplier is experiencing potential problems with their production process. The technician would then notify the supervisor and/or supplier that there is a high probability that future supplies may be out of specification and that constant monitoring of starting materials will be required.

Biomedical
An important task of the technical officer in a pathology laboratory is to perform statistical analysis for quality control purposes. The software package provides for the input of data, analysis of mean value and variance as well as graphical reporting. The technical officer uses a dedicated software package or a package within the customised pathology data management system in order to assess the validity of the results produced from the analytical instrument.

Food processing
A technical officer is required to perform a nutrient analysis of a food product, the results of which will be displayed on the food container. The output from the nutrient analysis is fed into a software program that calculates the levels of these components 'per portion' and 'per 100g' and displays the information in the correct tabular format. The software package is designed so that the technical officer can input new data or access existing data and manipulate that data to provide a full and accurate nutrient display or report.

MSL925003 Determine measurements of uncertainty

Manufacturing
Production workers in a water meter manufacturing company are required to batch test water meters. Twenty meters are connected together and tested at the same time using a test rig that collects the water in a tank that sits on top of a weighing instrument. The company's production technician needs to ensure that each water meter meets its maximum permissible error and that all measurements have a maximum permissible uncertainty that is below that specified by the regulator. The technician needs to consider the calibration uncertainty of the weighing instrument, any drift in it over time, the resolution of the meters under test and other factors relating to the temperature of the water, its effect on its density and the buoyancy correction for the weighing instrument.

There are a number of corrections that need to be applied in order to achieve an uncertainty less than the maximum permissible uncertainty. Production workers enter readings from the meters into a palm-held device. This data is then downloaded to a computer which uses a spreadsheet program to make the required corrections, tabulate the readings, calculate the uncertainties and determine compliance of each meter with the regulations and produce a report. Uncertainty components may change for different models of water meters that have different flowrates, readability and minimum deliveries. To cope with this, the technician's spreadsheet program has 'look-up' tables for these components according to the water meter model. Once this system was setup there is no ongoing overhead costs for uncertainty estimation. The calibration uncertainty may have to be updated when the weighing instrument is

recalibrated. Estimating uncertainties have highlighted which uncertainty components have the biggest effect on the final uncertainty. This tells the technician which components to focus on and which have little effect.

Chemical

A consulting laboratory analyses beef fat for a meat export company to determine the concentration of the pesticide residue Dieldrin prior to export. The maximum residue limit for Dieldrin in beef fat is 0.2 mg/kg. The technician analyses the sample using a validated gas chromatography (GC) method. To estimate the measurement uncertainty of the analysis he/she needs to take into account such things as the:

- uncertainty from the GC calibration
- uncertainty associated with the reference materials used
- homogeneity of the sample
- calibration of the glassware used for the analysis
- the repeatability
- reproducibility of the method
- uncertainty of the method recovery.

The technician calculates a result and uncertainty of 0.19 ± 0.02 mg/kg. The reported uncertainty suggests to the meat export company that the concentration of Dieldrin in the meat products could be above the residue limit. They can now make informed decisions about whether to sell the meat or not and possibly avoid exporting meat with excessive levels of pesticide residue which could cost the exporter millions of dollars in lost revenue.

Calibration

Technicians in a commercial calibration laboratory routinely calibrate digital multimeters, including 3½ digit hand-held multimeters and high accuracy 6½ digit bench mounted multimeters. From experience, they know that there are some uncertainty components common to each calibration such as the:

- uncertainty of the calibration of their reference instrument (a calibrator)
- drift over time of their reference which they establish from its yearly calibrations over the last 5 years
- repeatability of their measured results at each test point from which they calculate a standard deviation of the mean
- resolution of the multimeter being calibrated.

Because of the higher accuracy of the 6½ digit multimeter, the technicians know that for these instruments they must also consider additional uncertainty components such as the input impedance of cables together with thermal and capacitive effects. (These components may be insignificant in terms of the accuracy of a 3½ digit multimeter). The uncertainty estimation and the rigour required relates to the accuracy required. The tolerance in electrical calibrations is typically the manufacturer's specification and the uncertainty needs to be smaller than that so that they can decide whether an instrument is within specification. A 4:1 tolerance to uncertainty ratio (TUR) is typical. The technician's thorough understanding of uncertainty estimation enables the laboratory to optimise their measurement effort to ensure they achieve the 4:1 ratio in an efficient manner. The laboratory has NATA accreditation which lists not only what calibrations they can perform, but their best accuracy ('least uncertainties of measurement'). As part of the process of gaining accreditation they need to submit to NATA for review their uncertainty estimations to justify the uncertainties that appear in their scope of accreditation and which they report on appropriate instruments.

MSL925004 Analyse data and report results

Manufacturing
Before pharmaceutical products can be approved for use in Australia, they must be tested for shelf-life in their Australian sales packs. The shelf life of a preparation is the time of storage which results in a preparation becoming unfit for use, either through chemical decomposition of the active substances or physical deterioration of the preparation. Stability profiles are determined by storing the preparation under a range of temperature conditions and evaluating it at predetermined time intervals. For example, a technical assistant may be required to evaluate the physical parameters of the new tablet to detect any changes in its appearance, hardness, friability, disintegration and dissolution profile. The assistant regularly assays the tablets using a stability indicating assay. The results are plotted and the information gained is used to predict the period of time for which the tablets will meet the appropriate standards for physical characteristics, purity and potency when stored under defined conditions.

Biomedical
Supplementation of vitamins and minerals in the diet as a means to avert a clinical problem is a popular area of research, linking epidemiological and clinical investigation with food analyses. In the example of folate, such combined studies have led to the fortification of a number of foods and the requirement for folate supplementation for women of child bearing age. A typical project team would involve medical staff, a dietician and a scientific or technical officer to perform the assays. One possible line of study is to control the level of supplementation for the person and introduce the micronutrient in a dose form over and above that given in a controlled baseline diet. Blood samples would be collected and the serum micronutrient levels assayed. The technical officer would be responsible for keeping the statistical quality control data and analysing the assays. The technical officer would work with the research team to correlate the serum levels with the dose input. To contribute effectively, the technical officer must understand the significance of the relationships between collected test data and the controlled experimental variables.

Food processing
A state government analytical laboratory recently performed comparative assays of (-carotene using ultraviolet-visible (UV-VIS) spectrometric and high-performance liquid chromatography (HPLC) techniques. In any procedure where the assay is to be replaced, side by side analyses must be performed on multiple samples and the correlations between the data compared statistically. The two procedures are then developed or modified for local laboratories and a routine procedure developed. At this point, technical officers would assay the samples by the two methods. They would ensure that all procedures were followed with close attention to quality control. Precision would be assessed through frequent assays of the same samples. Sensitivity of the assay would be assessed by performing the assay over a range of sample concentrations. The technical officers would carefully document the procedures and record all data for later validation. They may also provide preliminary graphical representations of data for their supervisor.

MSL933005 Maintain the laboratory/field workplace fit for purpose

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

Biomedical and environmental
Laboratory assistants and technical officers routinely examine fluids for micro-organisms using a microscope. They examine fluids, such as urine, seawater, chlorinated pool water, water from catchment areas and bottled water. To maintain microscopes in working order, they thoroughly clean the stage, oculars and each objective after use and sometimes between samples. The 100X objective requires particular care since this is the oil immersion objective. The oil is slightly acidic and will slowly corrode the objective if it is not cleaned thoroughly and regularly. After using the 100X objective they also take care not to drag the other objectives through the oil.

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

MSL933006 Contribute to the achievement of quality objectives

Manufacturing
Laboratory assistants must have a good working knowledge of quality control procedures and how they contribute to the achievement of enterprise quality objectives. An assistant was measuring the moisture content of coke by a standard method. The SOP for this test stated that the limits for moisture should be between 2% and 5% by weight. The assistant obtained a result of 5.8%. The assistant had followed the SOP correctly and performed the determination in triplicate and had confidence in the precision of the result. The assistant recognised and reported the non-conformance to the laboratory supervisor. The production manager took corrective action and modified the drying process to reduce the moisture content and provide a product which met the customer's requirements.

Biomedical
A laboratory assistant working in the pathology department of a rural hospital was responsible for serum lithium estimations by flame photometry. When asked by the office staff when the lithium results would be ready, the assistant replied that the testing schedule of the laboratory meant that the test would not be done until the following week and asked why the office staff needed to know. The answer was that an outpatient clinic was being held, and the results were needed for a consultation. Although samples were often taken a week before the clinic was to be held, the assistant realised that results were not always ready for the clinic because of the testing schedule of the laboratory. The assistant reported the situation to the laboratory supervisor. The supervisor rescheduled lithium testing to match the clinic times, so that results would always be ready for the clinic consultation. This pleased the clinic staff, the patient did not waste a visit, the office staff no longer got irate phone calls and the quality of service was improved overall.

Food processing
A fruit processing company produced many tonnes of solid vegetable waste annually. This was dumped as landfill at considerable cost and the local council was concerned that the method of disposal was not sustainable. The laboratory assistants at the company were included in a quality improvement team to investigate the problem. The team concentrated on alternative production methods to minimise waste yields and additional production methods that would enable the waste to be profitably utilised. They identified four potential uses of the waste: a source of pectin, alcohol and sugar and conversion of raw fruit peel to glazed peel.

A cost-benefit analysis was performed in consultation with supporting industries, including a local winery to assess the merits of these value adding activities. The outcome was that the amount of waste produced by the company was significantly reduced with much of the waste channelled into marketable products with full cost recovery. After some initial doubts, the laboratory personnel realised that they were able to make useful contributions to the project. As a result, they became part of an ongoing investigation of waste minimisation and value adding practices.

MSL933007 Apply critical control point requirements

Food processing
The laboratory is responsible for the monitoring of the complex hazard analysis and critical control points in the food production process. The laboratory assistant gathers data at these points for the recording and checking of the process. All data outside the critical limits are immediately communicated to the laboratory manager and the production manager. Any approved corrective actions undertaken by the laboratory assistant are recorded in the laboratory log of system non-conformance. Suggestions for improvement of the system are also recorded for discussion at the regular team meeting.

MSL933008 Perform calibration checks on equipment and assist with its maintenance

Manufacturing and construction materials testing
Laboratory assistants perform calibration checks and operate a range of laboratory equipment to ensure the quality of products. For example, the labelling on fertilisers specifies the total percentage of nitrogen [N or N(t)], the total percentage of phosphorus [P or P(t)] in all forms and the total percentage of potassium [K]. A 5-10-5 fertiliser contains 5% N, 10% P and 5% K. During the manufacture of fertiliser, an assistant in a quality control laboratory measures the concentration of nitrogen, phosphorus and potassium using standard analytical methods to ensure that the final products are within prescribed specifications. The assistant must pay particular attention to the equipment calibration check. If the equipment is out of calibration no amount of testing skill will result in accurate results. Selling out of specification fertiliser could result in a product recall or claims from users against the manufacturer.

Biomedical and environmental services
Laboratory assistants are quite often involved in routine collections and culturing of cells. Bacterial cells are often cultured and grown to large populations in order to provide material from which to extract biological materials. A quick method of determining when the cell growth has yielded enough cells is to determine the absorbance of the cell culture by measuring absorbance at 600 nm. An absorbance of 1 to 1.5 will give a good cell harvest. This method relies on the assistant being able to perform calibration checks on an ultraviolet-visible (UV-VIS) spectrometer.

Food and beverage processing
A laboratory assistant in the quality control laboratory of a fruit canning company is required to perform calibration checks and maintain and operate a range of equipment, including a pH meter. Canned pears, for example, are routinely checked for pH to ensure safe heat processing. While checking the calibration of the pH meter with the standard buffer solutions, the laboratory assistant found that stable pH readings could not be obtained. On closer inspection, it was found that the pH probe was damaged. This was reported to the supervisor. The probe was replaced and the meter was re-checked for calibration in readiness for routine testing.

Construction Materials Testing
A laboratory assistant has been allocated the task of performing in-house calibration checks on the laboratory's equipment. He/she has previously prepared a wall chart for the year that shows when the required calibration checks fall due in accordance with the NATA Field Application Document (FAD) for construction materials testing. The assistant consults the wall chart and notes that this month's calibration checks include checking the:

- ice points of the liquid-in-glass thermometers
- working sieves against the reference set
- compaction hammers for compliance with specifications
- repeatability of the balances.

A full calibration of one of the laboratory's nuclear density gauges is also required. He/she then telephones the local calibration authority to book the nuclear gauge in for calibration and prepares to perform the other in-house checks.

MSL934004 Maintain and calibrate instruments and equipment

Manufacturing
Starting materials used in manufacturing are often white powders. Infrared spectroscopy is used to positively identify many materials. Two compounds are one and the same if their spectra match in all respects (the position and relative intensity of the absorption bands). For example, if the spectra of a white powder matches the spectra of caffeine, the technician can be sure that the white powder is caffeine, provided that the spectrometer has been correctly maintained and calibrated. The technician routinely checks this using a standard polystyrene film.

Food processing
Technicians in a NATA certified laboratory must do regular checks to ensure that laboratory equipment, such as balances, refractometers and spectrometers are calibrated and in working order. Balances are routinely checked using calibrated masses and appropriate documented methods to ensure that they are weighing within the correct tolerances. If the balance is out of specification, the technician follows appropriate procedures to correct this and/or notifies the manufacturer to arrange for the balance to be serviced.

Food processing
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Biomedical
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MSL934005 Contribute to the ongoing development of HACCP plans

Food processing
The milk room at a dairy processing plant was receiving continuing high microbiological counts that were approaching levels where they could affect the safety of the final product. The laboratory supervisor began to collect and analyse information obtained from data production records, laboratory results and corrective action reports. From the information obtained, the technician produced graphs to show the microbiological count over the past few weeks. From this information he/she concluded that the contamination was due to the ineffectiveness of a sanitiser. Recommendations were forwarded to the Quality Review Committee and included a review of the:

- quality of the sanitising product and an investigation of alternatives
- amount of sanitiser ordered to ensure that it was not being stored beyond its recommended use by date
- reliability of the suppliers to provide quality products.

Following the Quality Review Committee's agreement, the laboratory technician updated the relevant documents and implemented the recommendations. This resulted in the microbiological counts declining to acceptable levels.

MSL934006 Apply quality system and continuous improvement processes

Manufacturing
A quality improvement team at a chemical manufacturing plant was asked to propose a way of minimising the cost of disposing of chromium rich waste. Using appropriate techniques, the team narrowed the alternatives down to the option of burning the waste stream. An experienced technician agreed that this was feasible, but suggested that because the waste was petroleum high in chromium the team should consider the environmental implications. Subsequent research indicated that the permitted chromium levels in the incinerated air waste stream would not exceed 10 ppm, which was less than the air emission standards for the plant. The technician analysed samples of the air waste stream and determined that the chromium levels were below the regulatory standards. He/she then supported the team's suggestion.

Environmental
The manager of an environmental testing laboratory believed that the team of laboratory technicians relied too much on external direction. As a result, the manager requested that whenever technicians asked for assistance they should also be ready to suggest a solution to the problem if at all possible. This strategy was implemented in a non-threatening manner and was accepted by the team. In time, the manager noted that many of the suggestions for solving problems and improving work practices that came from the team were effective and reasonable. Their skill in making realistic recommendations came from their familiarity with many of the issues that needed to be considered. It became the norm that the laboratory technicians were given public credit for suggesting successful strategies that improved safety, productivity and staff morale.

Food processing
A company that produces apple juice uses 30-35% hydrogen peroxide (H_2O_2) to sterilise packaging. A mist of atomised H_2O_2 is sprayed into pre-formed cartons and later removed with a jet of hot sterile air. The laboratory manager was concerned that some batches of product were not sterile after standing at room temperature for several days. The cause of the failure in the sterilisation procedure was not apparent and a technical officer was asked to investigate this problem.

The technical officer examined each unit operation of juice manufacture and determined that the application of H_2O_2 was a critical sterilisation point where failure could occur. The concentration of H_2O_2 in

the atomiser and in opened containers was unpredictable and several problems were found to contribute to this. H_2O_2 was left in the atomiser for up to several days between packaging runs. Containers of H_2O_2 were not always used sequentially, some being opened and then not used for a long time. The containers were stored at room temperature after opening and some may have become contaminated with atmospheric particulates that catalyse the breakdown of H_2O_2.

The recommendations that emerged from the investigation were that:

- fresh H_2O_2 should be used at the beginning of each packaging run
- only one stock container of H_2O_2 should be open at any one time and stored chilled, with residuals discarded after 14 days
- care should be taken to exclude foreign material from the opened vessels of H_2O_2 and the atomiser.

In summary, the intolerance of the company to even low incidences of faulty product and the competency of the technical officer to investigate the processing stream resulted in increased product quality without significant cost.

MSL934007 Maintain and control stocks

Biotechnology

A technical officer arrived at work on Monday morning and discovered that the freezer had been turned off over the weekend and the restriction nucleases had thawed. These enzymes were to be used that morning. The technician needed to check the enzyme activity to determine whether the enzymes had been denatured by the rise in temperature. The technician quickly set up a digestion mix of affected enzyme with some viral DNA of known sequence. The digest produced DNA fragments of expected length, showing the enzyme still had activity. The technician reported the incident along with the results to the supervisor, who decided that the enzymes could be used for that day.

Manufacturing

Neglected chemicals may deteriorate on the shelf and turn into a completely different entity. Not only can this change in identity damage a chemical manufacturing process, it can also present an immediate hazard. For example, this occurred in a storeroom where stored ether built up high levels of peroxides. When it was used in an extraction process to make a starting material in a manufacturing process, the peroxides were concentrated and exploded. The company was fortunate that loss of life didn't occur. The company revised enterprise procedures to ensure that in the future, redundant or outdated stocks are identified and removed.

Food processing

The staff in a confectionary company laboratory use enzyme based methods to routinely analyse sugars (glucose, fructose, sucrose and lactose) in products. Although the enzymes are stored as directed by the manufacturer, typically at -20(C in the dark, they do not retain their activity indefinitely. To avoid using inactive enzyme in an analytical procedure and obtaining a reduced or false negative result, several features of each enzyme preparation are routinely noted. These include the date of purchase, the number of times the enzyme has been thawed and refrozen and its initial activity. Periodically, the enzyme activity is verified and stock is discarded where its activity has fallen to a less than acceptable value. These practices ensure that the analytical methods that use enzymes are performed with functional reagents and give accurate results.

MSL935005 Authorise the issue of test results

Calibration
A calibration technician/specialist has completed testing an instrument and places it with the test report for the relevant signatory to authorise. The laboratory manager physically examines the item to ensure all accessories have been applied. The manager checks the test report for validity and correctness and ensures any abnormalities or departures from normal or specified conditions are reported appropriately. He/she confirms that all data transfers and calculations are accurate and in accordance with SOPs, industry guidelines and the laboratory's accreditation requirements. The manager also ensures that all relevant databases are updated and client confidentiality is maintained. He/she signs the relevant certificates and reports and authorises the release of the results and return of the item to the client.

Construction materials testing
A laboratory supervisor, who is authorised to issue Atterberg Limit test results, receives a set of QC data for gravel that is to be supplied to a local council. The technician has provided Liquid Limit, Plastic Index, Linear Shrinkage data for three samples:

1. 35%, 7%, 3%
2. 35%, 4%, 3%
3. 33%, 5%, 2%

Using a well known 'rule of thumb' that the P.I./L.S. ratio for gravel samples is usually between 2 and 3, the supervisor notes that the ratio for the second sample is 1.3. This indicates a possible error. Although the most likely source of error is in the determination of the Plastic Limit, he/she systematically reviews all of the technician's work. Firstly, he/she checks that all three samples are from the same source and whether their appearance was recorded on receipt. He/she reviews the relevant data records by checking for simple transcription errors, moisture calculation errors, variation in the weights of containers and straightforward weighing errors. He/she also checks if the samples were properly dried to constant mass. Then he/she accesses the client's previous test records to see if any similar sample variability has occurred in the past. After completing all the checks he/she can do from his/her desk, he/she talks to the tester and asks to see the rolled specimens before they disposed of. A visual inspection confirms his/her hunch that the technician's rolling technique is not good enough to obtain reliable results. He/she arranges for the test to be repeated under supervision using surplus sample material and also organises additional training.

Construction materials testing
Asphalt is being laid at night on a busy motorway and the road must be available for traffic by 6 am each day. The construction company's own laboratory is responsible for conducting compaction tests for each lot. The specifications require a field compaction density of 95% of the laboratory compacted density and penalties apply for lots where results are <94%. A technician who is authorised to issue compaction results uses a nuclear density gauge to determine field compaction values in accordance with an established inspection test plan and test method. The data for the latest lot is 95, 94, 93, 93, 93.5, 93 and 93%. The average result is 93.5% and the shift foreman decides to roll and then re-test the lot. The repeat test indicates an average value of 93%. Before completing the test report, the technician reviews all the data, calculations and record of 'standard counts' for the gauge. He/she also checks the laboratory compaction results, gradings and bitumen content for consistency and compliance with mix design. These results indicate a trend of the mix design moving out of specification. The technician informs the plant manager that the test results indicate unacceptable compaction. The manager maintains that the results are borderline and points out that the company has already paid $250K in penalties this month. He/she asks the technician to re-check the compaction results and repeat the tests at different inspection points. He/she also suggests that the technician should find a better sample for the maximum density test. The

technician reviews the results and re-tests further samples but there are no new results that would justify any change to the test report. Therefore, the technician issues the test report unaltered.

MSL935006 Assist in the maintenance of reference materials

Manufacturing
A technical officer in a pharmaceutical laboratory assays each batch of paracetamol tablets before their release for sale using ultraviolet spectrometric analysis. Twenty tablets are ground and a known weight of sample is dissolved in a specified solvent. The ultraviolet absorption is measured and compared with the absorption of a reference standard, which has been similarly treated. The potency of the tablets is calculated and compared to the release limits before being released for sale. The concentration of the reference paracetamol must be accurately known if the assay is to be correct. The standard is packed and stored under conditions that will minimise its breakdown, and the storage conditions are monitored to ensure that the potency remains with acceptable limits.

Biomedical
A technical officer in a histology laboratory was asked to perform a batch of iron stains by the Prussian Blue technique. The officer went to the block repository and chose one of the liver blocks known to contain haemosiderin. The officer checked the block number against the data in the control materials log and then cut four sections to process in parallel for the day's batch and those anticipated over the next few days. Noting that there was only one iron-positive block left, the officer wrote a short memo to the laboratory supervisor suggesting that the pathologist allow for a stock of tissue to be collected the next time they identified a suitable specimen.

Food processing
While many attributes of food can be quantified and specified using chemical reference standards, some attributes are best assessed by comparison with a physical reference sample. For example, the number of poppy seeds on a loaf of bread would be impractical to count. However, comparison with retention samples made with various levels of poppy seeds will give an approximation of the number of seeds on the bread. Suitable reference samples need to be prepared and preserved so that the handling of samples does not result in seeds falling from the sample.

MSL935007 Monitor the quality of test results and data

Manufacturing
The person conducting final quality assurance activities is responsible for ensuring that the results of each calibration or test carried out by the laboratory are reported accurately, unambiguously, clearly and objectively in accordance with specific instructions in the test or calibration method. Test reports and calibration certificates are checked for mistakes, including the correct transfer of data from original worksheets and to ensure all relevant information is documented and is the result of valid measurements. Quality inspectors are also ultimately responsible to their clients for the quality of work produced by outsourced subcontractors.

Environmental
A laboratory regularly collects carbon monoxide (CO) data as part of an air monitoring program. The laboratory operates several remote air sampling sites that take CO samples every three seconds using standard methods. The measurements are stored in data loggers and downloaded to the laboratory's computer every 24 hours. Using a standard software package, the laboratory technician generates 1 hour and 24 hour averages for each site. They then graph the results over a one year period and use the

appropriate Australian Air Quality Standard to determine exceedances for the 1 hour and 24 hour averages. To ensure that any exceedances are genuine, the technician carefully checks factors, such as equipment calibration procedures, seasonal variations in data, artefacts, equipment downtime and maintenance of monitoring equipment over the past year. The verified data and exceedances are reported and compared with previous years' exceedances to determine long term trends in air quality at the sampling sites.

MSL936003 Maintain quality system and continuous improvement processes within work or functional area

Manufacturing
The laboratory supervisor with a pharmaceutical company had participated in the production of a company-wide quality manual. This manual was distributed to the various work teams and an induction program for all workers was undertaken to familiarise them with the demands of the quality system. A transient, sharp improvement in laboratory operations was observed after which the quality metrics fell (although not to pre-quality system levels). The supervisor investigated this phenomenon and found that many of the analytical specifications determined by the company were detailed in the quality manual and nowhere else. Put simply, after an initial period during which laboratory personnel consulted the manual for guidance, there was a tendency for the personnel to rely more on their memories and less on the manual. The supervisor made it clear to personnel that 'guessing' procedures and methodologies was unacceptable. If they were uncertain of something they must consult the manual. Awareness of this problem allowed the supervisor to be more vigilant in monitoring laboratory operations and personnel eventually developed the habit of referring to the manual as required. A subsequent review of the manual went smoothly and efficiently. The staff were familiar with the manual's strengths and shortcomings and had made annotations for improvements that were readily incorporated during the review.

Environmental
Collection of botanical specimens for research purposes required personnel to record data at the time of collection in a prescribed format. A quality audit conducted by the laboratory supervisor indicated that some documentation was incomplete. The supervisor also found that sometimes documentation was completed later, from memory, rather than in the field. The supervisor met with the collectors involved, reinforced the enterprise protocols, explained the importance of diligent record keeping in achieving valid research outcomes and gained a renewed commitment to quality from the personnel. Subsequent quality audits indicated that the personnel had met their commitment and the research work was no longer jeopardised.

Food processing
The laboratory supervisor of a food processing company had noted over recent years that the requests of some customers were virtually impossible to fulfil. For example, one customer wanted a bleached flour which had not undergone any chemical treatment or adulteration for a particular market niche. Another customer wanted analytical results within an unrealistic timeframe. While none of these requests had caused serious friction between the company and its customers, the supervisor decided to take a proactive stance to address the not altogether unreasonable ignorance of some customers. After consulting with the laboratory manager, the supervisor invited all customers to tour the laboratory, during which the aims and limitations of the analytical procedures were explained. The tour gave customers the opportunity to assess their demands of the company and generate more realistic ideas for modifying the company's products to suit their needs. The outcomes of this exercise were that company-customer relations were improved, the future expectations of some customers were more practical and the company's ongoing program of product improvement was facilitated by customer input.

MSL936004 Conduct an internal audit of the quality system

Manufacturing
A new laboratory is being planned and the senior technical officer has been included in the steering committee to prepare the brief. The committee has decided that the preparation of the brief will include an audit of the safety and operating standards of the current laboratory. The aim of the audit will be to compare the current safety operations and facilities that are acceptable within the framework of the current premises with those of a modern building. The audit will monitor equipment, storage facilities and current methodologies in order to determine the necessary infrastructure changes that might be incorporated into the plan, or changes in methodologies that would bypass the need for the building changes through a change in equipment.

Biomedical
There have been a few problems in the sample reception area. Not all tests specified in requests have been allocated and, on a few occasions, a test was deleted because a technical assistant decided that there was insufficient sample provided. The supervisor has decided that the processing system should be reviewed and the reasons for the mistakes and omissions identified. After tracking the sample arrival, processing, labelling and distribution, the supervisor noted that the technical assistants often could not identify the sample test code. Despite the instruction to seek assistance, they did not contact a supervisor if they could not be approached immediately. Sometimes they put the sample aside for the supervisor's attention and it was forgotten over the shift change. On other occasions, they assigned a test code in good faith. As a result of the audit, a database of the test codes, sample requirements, distribution destination and conditions for storage was established at sample reception. The technical assistants were shown how to access information that they might require if the supervisor was not available. This action reduced the number of mistakes and the frequency of test omissions, and improved throughput of samples.

Food processing
Following an internal audit, a major non-conformance was identified which had resulted in a beverage label listing an ingredient that was not present. A corrective action had been made requiring that a new form be generated for release of label details from the purchasing department. The laboratory supervisor was given the responsibility as part of the audit team to follow up three weeks later and confirm that the corrective action had been completed. The laboratory supervisor gathered the data and a copy of the corrective action report and organised a meeting with staff from the purchasing department. During the meeting, the laboratory supervisor checked the revised quality form that now included the signature of the authorising officer from the purchasing department. The laboratory supervisor also reviewed the quality procedures to ensure that the new form's code was updated and that all old copies were removed. The report was then presented to the audit team for final approval and signing off.

MSL943003 Work safely with instruments that emit ionising radiation

Construction materials testing
Soil moisture density gauges are used extensively for measuring the density of soils, cement treated road base, roller compacted concrete and asphalt. They provide a non-destructive means of monitoring compaction operations during construction, so that additional rolling can be provided before the material sets or is covered with another layer. National and state/territory codes of practice regulate the use of equipment that emits ionising radiation. States and territories also have licensing and registration requirements for people involved in owning, storing, transporting or using such equipment.

Soil moisture density gauges are used on construction sites, so they are transported to the test site in motor vehicles. They must be protected from damage and stored safely and securely while not in use. The operator must ensure that bystanders are kept clear to minimise radiation exposure. Owners of gauges are required to have documented procedures and ensure that operators are adequately trained. To ensure the safety and integrity of the gauge, radiation surveys are required at regular intervals. A hand-held radiation meter is used, and the results recorded.

MSL943004 Participate in laboratory or field workplace safety

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

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

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

MSL944002 Maintain laboratory or field workplace safety

Education
A technical officer working for a university biology school assists honours and final year undergraduate students to perform their own experiments. The students discuss what technical work they want to do with the technical officer and what reagents and equipment will be needed. The technical officer provides MSDS and other information to the student. He/she also conducts a risk assessment to identify and analyse the risks, selects appropriate controls and outlines the risk management process to be used. In some cases, the toxicity of mixtures and the waste generated by experiments may pose an unacceptable level of risk and the technical officer will suggest safer alternatives.

MSL946002 Implement and monitor WHS and environmental management systems

Manufacturing
The smoke alarms have sounded and a general evacuation of the building has commenced. The fire brigade has been summoned in accordance with enterprise procedures. All personnel, except the designated floor wardens, have moved to the assembly area. The supervising staff report to the brigade officers that there is smoke and fumes on the first floor. The brigade officers don respirators and enter the building. A search establishes that a small fire has started in the drying oven when technicians used it to evaporate off a flammable solvent. The incident is the result of a careless mistake. With the cause of the smoke fumes identified, the brigade officers organise for the air conditioning system to exhaust the fumes. Once the building can be accessed, the laboratory supervisor prepares an incident report, organises follow-up counselling for the laboratory staff and implements measures to prevent a recurrence of the hazardous situation.

Food processing
A supervisor in the laboratory of a food processing company was concerned that an audit of the risks associated with the company's activities had never been performed. When individual risk situations were identified they were usually addressed on a case by case basis. The supervisor realised that this approach did not have the rigour to identify less obvious hazards. A risk audit was conducted in cooperation with the laboratory team to overcome this deficiency. The audit progressed well and was performed without unduly disrupting the primary functions of the laboratory. Several previously unrecognised hazards were identified. One of the more esoteric hazards concerned the use of proteases and lipases to selectively digest specific food components. Before the audit, these enzymes were thought harmless. However, it was discovered that these bacterial proteins could provoke a potentially fatal allergic reaction in sensitised individuals especially after inhalation. Furthermore, repeated exposure could induce sensitivity. After this hazard was identified, a SOP was developed for handling these enzymes. Individuals likely to come into close contact with the enzymes were required to regularly undergo an allergen sensitivity test.

MSL952001 Collect routine site samples

Construction materials testing
A laboratory assistant takes daily tar samples from the company's retort which is used to heat tar to reduce its moisture content. The purpose of this sampling program and subsequent testing is to ensure that the water content of the hot tar is at a safe level before the tar is transferred to a road tanker and used for road construction. Serious accidents can occur during the transfer or use of tar as high water content can cause an explosion due to escape of steam. One day, the retort operator was running behind schedule and tried to convince the laboratory assistant that the water content of the tar was the same as yesterday and didn't need to be tested. The laboratory assistant was able to explain that a high water content could lead to a serious explosion and burns for the operator.

Environmental
A new field assistant was collecting samples of environmental run-off during wet weather. To successfully complete the activity, the assistant made sure that they included a sample thief, pipette, or similar to extract the sample, a container with a secure lid, and an indelible marker to write on the label. In addition, the assistant remembered to take sealable, waterproof plastic bags in which to put the containers once the samples were collected and a spare bag to protect the field notebook from rain damage.

Manufacturing
A production operator has been given the task of collecting samples of the recent batches of blended products, prior to drumming and customer delivery. In addition, the operator is required to sample the bulk raw materials stored on-site, and the drummed blend ingredients, including some powdered pigments.

The operator knows that the lab needs the blend samples first and after putting on chemical gloves and safety glasses, accesses each sample point on each of the blend tanks. Because the products are under pressure in the tank manifold, it is important to guard against splashes. Some of the products are flammable hydrocarbons, so the operator ensures that static leads are connected from the tank to the sample vessel during pouring. To sample the drummed product, a sample thief is used and again, safety glasses and chemical gloves are important. The pigments present a dust hazard when being sampled, so the operator applies a protective mask over their nose and mouth, to prevent ingestion while they use a small purpose-built shovel to empty the contents into the sample container.

MSL952002 Handle and transport samples or equipment

Calibration
Calibration laboratories must take special care to ensure that they do not damage test equipment during handling, testing or storage. Information relating to equipment requiring special handling, transport or storage conditions should be provided to those responsible for collecting and transporting the items.

A customer-orientated calibration laboratory offers a door to door calibration service to most of its clients. Once a week their driver arrives at a major facility and takes delivery of several precision measuring instruments. As always, the driver signs the acceptance note paying particular attention that all the items are recorded correctly, including listing all accessories and associated handbooks. But this time, two delicate items require unique transit cases to ensure they are stored and transported upright. Because the laboratory received prior notice, these cases were loaded into the van before setting off as well as a copy of the special transport and packaging instructions. The driver secures all the items in accordance with the accompanied written instructions to ensure their safe travel and minimise damage during transit. Upon return, the driver unloads the van and the instruments are acquitted by administration staff, inspected for damage and booked into the laboratory. The lab supervisor makes sure that their technicians are aware of the special handling requirements of the two delicate instruments.

Biotechnology
During transit, samples must be handled and maintained under conditions which will ensure that their potency and efficacy are maintained. A courier has been asked to transport vaccine samples from the airport to the enterprise for laboratory evaluation. The supervisor faxes the courier company detailed instructions regarding pickup and handling/storage conditions during transit. In this case, the samples are in insulated containers and the temperature is monitored and recorded continuously. The courier collects the samples, puts them in the coolest part of the vehicle, ensuring that the package will not be subject to any sudden jolts, and transports them to the enterprise. After the samples arrive they are checked by the enterprise and appropriate documentation completed.

Biomedical
At 8 am the courier commences the day shift. The shift supervisor identifies the collection centres to be visited. The courier takes the mobile phone from the charger and checks their pager. In the vehicle, the courier logs in the odometer reading, makes a mental note of the fuel level, checks the cooler boxes and other equipment and carefully drives out. Today, there are pickups from four private hospitals and 12 collecting centres in a 200 sq km zone. As they approach the first hospital, there is a call from base with

instructions to collect a tissue biopsy and bring it back immediately. He/she asks the base contact to tell haematology that their 10 am specimen arrival will be 40 minutes late because of this unforseen diversion. Eventually, they complete the round, having remembered to replenish specimen collecting stock at each centre visited.

Environmental (1)
A technical assistant regularly handles and transports sensitive equipment over rough terrain in a 4WD vehicle. After reaching a field site, they are asked to transport expensive water monitoring equipment across an estuary in a small aluminium boat. The assistant notes that the equipment boxes are open to the weather and will need to be made waterproof. Because the water is choppy, the assistant adds extra packing material to cushion the most shock sensitive items. They choose to travel with the equipment rather than entrusting it to the local fisherman. Together, they carefully secure the items on the seats rather than placing them on the floor of the boat which is wet.

Environmental (2)
A waste management authority has sent one of their laboratory technicians to collect six containers that have been found by a member of the public on the verge of an industrial area service road. Given that the materials may be hazardous the technician assembles a full set of safety equipment. They also locate a laptop computer with MSDS information, a list of phone contacts for agencies responsible for handling hazardous materials and suitable containers for storing/transporting potentially hazardous materials. Upon arrival at the site, the technician locates six containers of concentrated sulphuric acid which are clearly labelled. The technician consults the MSDS for information on appropriate handling, storage and transportation procedures and follows them closely.

MSL953003 Receive and prepare samples for testing

Environmental
A laboratory assistant at a hazardous liquid waste recycling plant is required to log in all samples, match all samples with the in-house profile of the source of the waste, label them and activate the tracking procedure. He/she then prepares a sample for a series of standard tests which are determined by the profile of the waste material (acid or alkali, organic or heavy metal, etc). Given the hazardous nature of the waste, the laboratory assistant must use appropriate safety equipment at all times and ensure the safe disposal of all hazardous material. The assistant must work efficiently as these procedures are activated upon arrival of a road tanker and when the hazardous waste has been verified and judged acceptable for treatment at the plant by the laboratory supervisor. The laboratory assistant also liaises with the truck driver, or the referring client, should the samples (and/or subsequent tests) not comply with enterprise conditions for receiving the hazardous waste.

Construction materials testing and mineral assay
A laboratory assistant has received a consignment of disturbed soil samples from a client for classification testing. A test request and field logs have been sent by mail. Each sample is bagged and labelled, with the label showing the name of the client, project, date and sampling location, and a field description of the material. The laboratory policy is that samples weighing more than 20 kg must be bagged so that the individual bags do not exceed this limit and labelled as bag 1 of ..., bag 2 of ..., etc. The assistant checks to ensure all component bags of such samples are present. He/she is careful to handle the samples using safe manual handling techniques. The assistant arranges the samples in order of location and reconciles them with the test request and logs. Two samples have been shown on the request but have not been received. The assistant emails the technician who despatched them and subsequently is advised that they were overlooked during despatch and will be forwarded as soon as possible.

The assistant compares the samples with the field descriptions and finds that they match. Samples that are not designated for testing immediately are set aside in the laboratory store. The remainder are placed in trays for drying in the 50ºC oven. The tray numbers are carefully written on the respective worksheets. When the samples have dried and cooled they are split out sufficiently for sieve analysis and plasticity testing, making allowance for the maximum particle size of each sample. The assistant is careful to avoid raising dust during the process.

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

MSL953004 Operate a robotic sample preparation system

Mineral processing
A robot operator checks the nearby whiteboard to identify what jobs are set down for the next shift and reviews the shift handover notes. He/she locates the first rack of samples, checks that the paperwork is complete for each sample and reviews the sample preparation parameters for each. He/she checks that the samples have been dried correctly and that the listed grind times are consistent with typical values. After scanning each barcode, he loads the batch of samples from the oven racks into the input magazine and starts the robot control program. He/she checks for the sample loss indicated on the screen as each sample is prepared to ensure that any loss doesn't exceed ~2%. After 20 minutes operation, the screen displays an error code that indicates that the system has detected an air pressure problem in the pneumatic control lines. He/she promptly notifies the shift supervisor for assistance. While the supervisor is attending to the problem, the operator unloads the output magazine and removes the sample containers that have been correctly prepared according to the set parameters. He/she extracts analytical portions from each one using a standard procedure for obtaining representative samples and then boxes them up using labels generated by the system. He/she arranges for the excess sample material to be stored.

MSL954004 Obtain representative samples in accordance with sampling plan

Manufacturing
A metallurgical laboratory technician is very familiar with preparing representative samples for a range of final products in a steelmaking plant. One day, he/she is asked to sample a 50 tonne small-particle coal delivery which is believed to have a higher than acceptable sulphur content. Having never prepared representative samples for such a large quantity of material, the technician consulted their supervisor and developed an appropriate sampling plan. The technician arranged for the operator of a small front-end loader to take buckets of coal from five equally spaced points around the pile. The resulting material was then combined and mixed in one heap. The technician coned and quartered the heap enough times to

obtain a representative sample of about 5kg. He/she arranged for the unwanted material to be returned to the stockpile. On return to the laboratory, the technician crushed the sample and repeatedly coned and quartered the material to obtain an analytical portion.

Environmental
A field technician trained in sampling natural water systems is asked to sample a bright yellow industrial wastewater discharge into a small creek. The relevant sampling plan specifies that the samples should be collected where the waste water is well mixed near the centre of the creek and at the mid-depth point. The technician also notes that the samples must be collected where turbulence is at a maximum so that the settling of solids is minimal. On arrival at the site, the technician locates where the wastewater is entering the creek. He/she moves downstream to where the waste water and creek water is well mixed and there is little apparent loss of the yellow suspended solids. The technician dons the required personal protective equipment and uses a convenient bridge to collect a set of six samples and duplicates over a half-hour period using the equipment and procedures specified in the sampling plan. Using a field notebook, the technician records all information specified in the laboratory's chain of custody requirements and safety plan for handling potentially hazardous industrial waste.

MSL954005 Prepare mineral samples for analysis

Mineral processing
A mining company provides a drill-core sample to a laboratory to determine its gold content as part of the company's resource estimation. A technician receives the sample and registers the details from the client specification sheet. He/she confirms that a 100g (75 micron) analytical portion is required with the coarse split to be retained for possible future testing. Noting from the sheet that the sample is likely to contain high levels of free gold, the technician carefully segregates it from all other samples. After drying and crushing the sample, the technician splits the coarse material and pulverises a sub-sample to the required particle size. He/she places it in a labelled packet and presents it to the assay section. The technician carefully cleans all the equipment used during processing the sample to prevent cross-contamination of samples.

MSL955002 Supervise a robotic sample preparation system

Mineral processing
An operator observes that the robotic sample preparation system is displaying an 'incorrect weight' error code and informs the shift supervisor. The supervisor notes that although the input weight for the sample being processed was 800g, the indicated output weight is zero. He/she immediately suspects that the sample is stuck in the bowl. He/she switches off the mill and tags it out so that the operator can continue unloading the completed samples. The supervisor checks the mill for a faulty hose but they are all functioning correctly. He/she decides that the problem could be in the grinding vessel and tries to manually discharge the sample with a pendant without success. After opening up the grinding vessel, he/she finds that a 'plastic' sample is stuck in the bowl. He/she replaces the grinding vessel with a new one. As he/she extracts the sample from the bowl, he/she notices a very strong smell of diesel. He/she subsequently finds that the client's other samples are also contaminated and removes them from the input magazine. He/she deletes the client's worksheets from the robot control program, checks and synchronises the system and then restarts the robot. He/she reports the problem to the laboratory manager and asks him/her to notify the client of the diesel contamination and the laboratory's inability to prepare their batch of samples.

4. Glossary

The following terms are taken from the Range Statements in previous versions units from the MSL Laboratory Operations Training Package.

Administrative requirements and approvals	Administrative requirements and approvals include, but are not limited to, one or more of: • travel requisitions • authority for use of vehicles and equipment • insurance • permits
Agents for cleaning	Agents for cleaning include one or more of: • cleaning solutions • decontaminants • organic solvents
Analyses	Analyses include, but are not limited to, one or more of: • non-instrumental methods, such as gravimetric, titrimetric and qualitative tests • spectrometric methods, such as ultraviolet-visible (UV-VIS), infrared (IR) (including Fourier transform infrared (FTIR)), near infrared (NIR), atomic absorption (AA) and fluorescence) • chromatographic methods, such as thin layer, paper, gas chromatography (GC), high performance liquid chromatography (HPLC), ion chromatography (IC) and electrophoresis • electrochemical methods, such as ion-selective electrodes and polarography • assays based on biological properties or cell properties for enzyme antibody activity

Analytical instruments	Analytical instruments include:
	• spectrometric instruments, such as:
	  • ultraviolet-visible (UV-VIS)
	  • infrared, including Fourier transform infrared and near infrared
	  • atomic absorption, including flame and flameless
	  • fluorescence, flame emission, inductively coupled plasma (ICP) optical emission and inductively coupled plasma mass spectrometry (ICP-MS)
	• chromatographic techniques and instruments, such as:
	  • paper, such as ascending and descending
	  • thin layer, such as ascending, high performance, radical and descending
	  • column chromatography
	  • affinity chromatography and gel filtration chromatography
	  • gas liquid and gas solid chromatography

	• high performance liquid chromatography (HPLC), such as liquid-liquid (LLC), liquid-solid (LSC), ion (IC) and size exclusion (SEC)
	• gas chromatography mass spectroscopy (GC-MS)
	• electrophoretic techniques, such as capillary electrophoresis
	• electrometric techniques, such as:
	  • ion-selective electrodes
	  • potentiometric titrations
	  • conductometric titrations
	  • amperemetry
	  • polarography

Analytical techniques	Analytical techniques include, but are not limited to, one or more of: • spectrometric techniques, such as inductively coupled plasma optical emission spectroscopy (ICP-OES) and inductively coupled plasma mass spectroscopy (ICP-MS) • chromatographic techniques, such as gas chromatography mass spectroscopy (GC-MS) and ion chromatography (IC) • electrometric techniques, such as ion selective electrodes, voltammetry (polarography) and anodic stripping voltammetry • electrophoretic techniques, such as capillary electrophoresis
Animal tissues and cells	Animal tissues and cells include, but are not limited to, one or more of: • primary cells from animal tissue, such as heart, liver, kidney and epidermal • secondary cells, such as epithelial, endothelial and fibroblast • continuous cell lines, such as tumour lines, hybidomers and transformed lines (Epstein-Barr virus)
Applications of animal tissue/cell culture	Applications of animal tissue/cell culture include, but are not limited to, one or more of: • establishment and maintenance of animal cell lines, such as liver, epidermal and fibroblastic • maintenance of continuous cell lines • preparation of cell cultures for commercial sale • growth and enumeration of viruses • extraction of DNA • extraction of antigens for use in diagnostic tests • research of cell structure and function, cancer and tumour biology • immunofluorescent techniques • testing of media efficacy • production of monoclonal antibodies • production of genetically modified cell cultures • secondary metabolite production

Applications of plant tissue/cell culture	Applications of plant tissue/cell culture include, but are not limited to, one or more of: • mass propagation of commercial species • production of disease-free plants by meristem tip culture • conservation of rare plants • haploid plant production by anther/pollen culture • 'sports' produced by somaclonal variation • development of resistant plants by directed cell selection • protoplast fusion to produce novel plant hybrids
Appropriate corrective actions for field tests	Appropriate corrective actions include one or more of: • carefully re-reading of procedures and checklists • logically checking equipment set-up • checking calibration, zero error and drift for the measuring instrument • repeating test measurements • checking data entry and transcription for errors • seeking advice
Automated analytical methods	Automated analytical methods include, but are not limited to, one or more of: • thermal gravimetric analysis (TGA) • x-ray fluorescence (XRF)
Automated system elements	Automated system elements include: • sample in-feed station • weigh stations • mould table • furnaces • robotic arms • conveyor belts • acid/ultrasound baths for cleaning crucibles • compressed air system
Basic repairs	Basic repairs include, but are not limited to, one or more of: • replacement of reagents and consumables, such as fuses; lamps; hoses and belts; and replacement or top-up of oils, lubricants or coolants • connecting gas supplies • cleaning and/or replacement of cells, torches and burners • maintaining syringes/injection equipment • basic electrical checks involving simple digital multimeters • changing injection port ferrules, optimising nebulisers and realigning of components

	• cleaning and/or changing detectors (for gas liquid and liquid chromatographs) • installation, conditioning and removal of columns for gas chromatographs (packed and capillary) and liquid chromatographs (columns and guard columns) • appropriate storage of columns and other equipment not currently in use
Biological samples	Biological samples include, but are not limited to, one or more of: • smears, impression smears, sections, squashes, films and whole mounts • a monolayer of cells in smears and films • fixed smears for demonstration of bacteria by the methylene blue and Gram staining techniques • blood films stained by a Romanowsky technique to clearly show differentiation of granulocytes • stained sections of animal tissues using regressive haematoxylin and eosin to differentiate cytoplasmic and nuclear detail • differentially stained monocotyledon and dicotyledon stem sections to demonstrate the structure of vascular bundles (xylem, phloem and cambium) • stained whole mounts of helminths • whole mounts, such as liver flukes, planaria and samples of animal faeces to demonstrate ova, cysts and larvae • pond water organisms • onion root tip squash • midstream sample of urine
Calculations	Calculations are required to adjust properties, such as: • assay/potency • viscosity • application payload • hardness • moisture content • colour
Calibration status/qualification checks	Calibration status/qualification checks include, but are not limited to, one or more of: • matching cells (for dual beam instruments) • checks for monochromator wavelength and photometric accuracy • checks for baseline flatness and stray light • checks on electrode performance • checking sensitivity • injection/use of standard mixtures • comparison with manufacturer specifications/chromatogram • use of standard masses and solutions

	• use of calibrated thermometers and glassware to assess instrument/component performance
Cell and tissue culture media	Cell and tissue culture media include, but are not limited to, one or more of: • agars, broths and solutions • slopes • basic balanced salt solutions, such as Hank's or Kreb-Ringer's • deeps • enriched media, such as blood sugar, chocolate agar, tetrathionate broth and selenite broth • control media • differential media, such as eosin-methylene blue agar and MacConkey's agar • selective media, such as deoxycholate-citrate agar and Lowenstein-Jensen medium • tissue culture media • labile constituents, such as blood, hormones or antibodies
Cells and tissues	Cells and tissues include, but are not limited to, one or more of: • animal cell lines, such as hybridoma, liver, epidermal, lymphoblastic and fibroblastic • plant cell line,s such as tobacco, arabidopsis, soya bean, tomato, roses and meristomatic tissue • yeasts • fungi • sperm, ova and embryos • adherent and suspension cultures
Charts, tables and statistical analysis tools and techniques	Charts, tables and statistical analysis tools and techniques include one or more of: • run charts and control charts • histograms, frequency plots, stem and leaf plots, boxplots and scatter plots • probability and normal probability plots • Pareto diagrams, Shewhart control charts and CuSum control charts • regression methods for calibration, linearity checks and comparing analytical methods • calculations of means, ranges, standard deviations, confidence limits • analysis of variance (ANOVA) • data acceptability tests, such as Q, T and Youden
Checking for contaminants	Checking for contaminants includes, but is not limited to, one or more of: • identification of microbial contaminants • heavy metals • allergens

	• chemical contaminants that constitute:
	  • a public health risk with long-term implications, such as afflotoxin in peanuts
	  • a food poisoning risk
	  • spoiling of food leading to flavour changes and loss of sale

Checking useability of solutions	Checking useability of solutions includes, but is not limited to, one or more of: • examining stained samples for correct staining reactions • performing pH checks • confirming enzyme activity • checking red cell suspensions for haemolysis • ferric chloride for phenolic solutions • isotonicity for saline
Chemical test methods	Chemical test methods include one or more of: • control of starting materials, in-process materials and finished products • environmental monitoring • basic troubleshooting and/or problem solving within the scope of SOPs and workplace processes
Cleaning requirements	Cleaning requirements include one or more of: • decontamination and/or disinfection • hygiene monitoring • minimising environmental impacts • operation of automatic cleaning apparatus, such as pipette washers, ultrasonic cleaners and dishwashers • sterilisation and disposal of wastes using boiling, high pressure air or steam, microwaves, chemicals, gas, filtration, ultraviolet radiation and autoclaving • use of specialised techniques, such as chromic acid baths and soaking in hypochlorite
Clients and stakeholders	Clients and stakeholders include, but are not limited to, one or more of: • fee-for-service clients • Commonwealth, state/territory and local government agencies • workplaces with monitoring and/or survey responsibilities • private companies • regulatory authorities • environment protection agencies • developers
Collection	Collection includes, but is not limited to, one or more of:

	• collecting live specimens from the wild • accessing specimens from existing collections in the base or other institutions • netting, trapping and light traps • use of euthanasia techniques, such as shooting, stunning, anaesthetics, gases and chemicals
Collectors	Collectors include one or more of: • lead (Pb), nickel sulphide (NiS), bismuth (Bi) and tin (Sn)
Common tissue culture media and transport media	Includes: • blood agar, chocolate agar, tetrathionate broth and selenite broth • common enriched quality control of media • common differential media, such as eosin-methylene blue agar and MacConkey's agar • common selective media, such as deoxycholate-citrate agar and Lowenstein-Jensen medium • common tissue culture and transport media includes basic balanced salt solutions, such as Hank's
Communication	Communication includes one or more of: • liaising with supervisors, managers and quality managers, laboratory and production staff, customers and suppliers • providing information, coaching and/or training about quality systems and plans, standards, codes and work practices • recording information and preparing reports • liaising with auditors and reporting to regulating authorities
Communication issues within and between teams	Communication issues within and between teams include, but are not limited to, one or more of: • unexpected changes to work priorities, schedules and rosters; and critical events on shift • urgent or abnormal results that require attention • problems with instruments, reagents, tests and sampling; and equipment and material shortages
Complex projects	Complex projects include one or more of: • development or modification of products and services • acquisition and commissioning of new equipment or laboratory facilities • appraisal of supplies • development of applications for customers • validation of analytical methods and/or equipment • quality improvement or corrective action teams • restructuring of laboratory services

	• reclassification of staff and staffing levels
Complex testing on forensic samples	Complex testing includes, but is not limited to, one or more of the following techniques and methods: • infrared and ultraviolet/visible (UV/Vis) spectrometric techniques, such as inductively coupled plasma optical emission spectroscopy (ICP-OES), inductively coupled plasma mass spectroscopy (ICP-MS), X-ray fluorescence (XRF) and neutron activation analysis (NAA) • chromatographic techniques, such as gas chromatography mass spectroscopy (GC-MS), ion chromatography (IC) and high pressure liquid chromatography (HPLC) • electrometric techniques, such as ion selective electrodes, voltammetry (polarography) and anodic stripping voltammetry • electrophoretic techniques, such as capillary electrophoresis • electrometric methods, such as anodic stripping voltammetry • molecular techniques, such as DNA profiling and polymerase chain reaction • scanning electron microscopy
Conservation	Conservation involves: • minimisation of deterioration which can be caused by pests, light and/or humidity

Construction material tests	Tests include, but are not limited to, one or more of:
	• testing of concrete, such as:
	  • drying shrinkage
	  • chlorides and sulphates
	  • chloride ion penetration
	  • stiffness
	• testing of cement, such as:
	  • air permeability
	  • setting times
	  • normal consistency
	• testing of soils, such as:
	  • moisture-density relationships
	  • California Bearing Ratio (CBR) (1 point)
	  • unconfined compressive strength
	  • quick tri-axial stress (total stress parameters)
	  • permeability (e.g. drainage material)
	  • hydrometer analysis
	  • shrink/swell tests (site classification)
	• testing of asphalt, such as:
	  • Marshall stability/flow
	  • skid tests
	  • testing of bitumen seals, such as:
	  • viscosity

	• penetration • softening point • flash point • testing of aggregates, such as: • 10% fines, wet-dry strength variation • <2 micron test • sodium sulphate soundness • Los Angeles Abrasion • Washington degradation • polished aggregate friction value
Construction sample preparation equipment	Sample preparation equipment includes one or more of: • splitters (e.g. riffles and rotary dividers) • mills (e.g. ball, ring and rod) • bowls (e.g. chrome-steel, tungsten-carbide and zirconia) and tumblers • crushers (e.g. cone, jaw and roll), grinders and disc pulverisers • sieves • ovens • sample containers and labels
Construction sample preparation methods	Sample preparation methods include one or more of: • sorting, boxing and drying • sieving • milling • primary crushing (e.g. 10 mm, 2 mm) • fine pulverising (e.g. 100 micron, 75 micron) • robotic system parameters, such as grind time, crushing time and cleaning cycles to prevent cross-contamination
Construction samples	Samples include, but are not limited to, one or more of: • solids, such as rocks, minerals, soils, sands and stream sediments • core and other drill samples, such as rotary air blast (RAB), reverse circulation (RC) and aircore • slurries, powder concentrates and metallurgical solutions • dump samples and grab samples
Construction site hazards	Site hazards include, but are not limited to, one or more of: • solar radiation, dust and noise • manual handling of heavy materials and equipment • working in/on trenches, confined spaces, wet and uneven surfaces, heights and slopes • vehicular and pedestrian traffic • underground services, such as gas and electricity • working close to earth moving equipment, trucks and overhead loads

Construction site problems	Common site problems include, but are not limited to, one or more of: • caving in of excavation walls • drilling difficulties • not knowing the requirements of the design engineer • not understanding the nature of the item being designed (e.g. retaining wall, piled structure and earthworks) • sample loss during retrieval • knowing when to stop a hole, or what and when to test and sample • misidentification of samples and sampling locations • equipment breakdown and breakage • environmental problems and issues, including site access, inclement weather, traffic, wildlife, vegetation and construction activities
Consultation with the workgroup on WHS and environmental issues	Consultation with the workgroup about WHS and environmental issues include one or more of: • following WHS procedures and environmental risk control measures • information sessions about existing or new issues • meetings between employer and employees or representatives • access to relevant workplace information • use of clear and understandable language and provision for non-English speaking and hearing-impaired personnel • awareness of (online) databases for the inventory, manifest and information retrieval regarding hazardous materials • formal arrangements, such as health and safety committees and health and safety representatives (where appointed) • informal arrangements, such as toolbox meetings and coffee breaks
Contingencies	Contingencies include one or more of: • new information • urgent requests • modified activities • changed situations • late instructions • substitution of materials or equipment
Corrective action	Corrective action includes: • purification • dilution • additional extraction steps
Data	Data includes: • worksheets, spreadsheets or databases linked to information management systems • the results of tests, measurements and analyses

Data for evaluation of the management systems	Data for evaluation of the management systems includes one or more of: • hazard, incident and injury reports • workplace inspections • audit reports • formal and informal input of employee

Data to be recorded	Data to be recorded includes, but is not limited to, one or more of:
	• collection information such as location, time, date, collector, behaviour, environment, depth, altitude, weather and habitat
	• reference photographs of the environment in the field
	• reference drawings to characterise colour and shape
	• identification number, collection access number, collection database and catalogue details
	• characteristics of the specimen, such as:
	  • standard measurements (mass, length and size)
	  • plumage characteristics (age, pattern and colour)
	  • flesh characteristics (skin tone, naked flesh texture and internal organs)
	  • sex
	• X-rays and scans
	• manual or electronic data

Designated personnel	Designated personnel include: • laboratory manager, supervisor, WHS coordinator and WHS representative
Detailing of specimens	Detailing of specimens includes, but is not limited to, one or more of: • cleaning • touch up • addition of false eyes
Determining uncertainty	Includes: • deciding if the uncertainty is suitable for the accuracy required for the test and establishing whether it is fit for purpose using the tolerance to uncertainty ratio (TUR) • using and interpreting mean, standard deviation, standard deviation of the mean, degrees of freedom, histograms and frequency plots, probability, normal probability plots and control charts • using the student's t-table to get a coverage factor for a particular level of confidence • using and interpreting significance tests, such as t-test, f-test and analysis of variance (ANOVA), variances, standard deviation of prediction and linear regression • using regression methods for calibration, linearity checks and comparing analytical methods

	• using and interpreting normal, rectangular, triangular distributions and the factors used to reduce each to a standard uncertainty • allocating degrees of freedom to each uncertainty component using the Welch-Satterthwaite equation
Display plan	Requirements of a display plan include, but are not limited to, one or more of: • purpose (public display or part of a collection for research purposes) • length of time (permanent or temporary) • accessibility (static or interactive) • type (diorama, live or preserved specimens and additions to existing showcase) • two- or three-dimensional • exclusion of pests • specific features of the specimen to be demonstrated • lighting that is sympathetic to the conservation of the specimen • security (particularly for valuable, vulnerable or irreplaceable specimens) • user-friendliness for both visitors and maintenance staff
Disposal of biohazardous wastes	Disposal of biohazardous wastes includes, but is not limited to, one or more of: • collection for sterilisation by autoclaving (e.g. autoclaving of microbiological plates) • appropriate storage (e.g. of waste containing radioactive isotopes) • use of biohazard waste containers
Documented job requirements	Documented job requirements include one or more of: • job descriptions, job role statements and performance agreements • workplace guidelines covering access and equity principles and practices, industrial awards and workplace bargaining agreements • licensing/registration requirements • workplace procedures covering work health and safety (WHS) and equal opportunity
Drivers for the evaluation and selection of test methods and/or procedures	Drivers for the evaluation and selection of test methods and procedures include, but are not limited to, one or more of: • new or amended legislation, regulation and licensing, accreditation requirements • public, political and commercial pressures • 'one-off' testing of potentially hazardous or contaminated materials following an environmental emergency or incident • introduction of new reference standards, new or modified equipment and instruments • introduction of commercial products that are potentially hazardous • control of new, or changed, starting materials, in-process materials and products

	• troubleshooting of production, environmental and public health issues • environmental monitoring of new sites • investigation of customer's complaints • specialised testing of forensic, medical or veterinary samples • need to meet customer specific or changed requirements • development of new products
Editing or creating automated procedures	Editing or creating automated procedures involves, but is not limited to, using, testing and/or calibrating one or more of the following: • common test equipment, such as anemometers, balances, barometers, callipers, environmental chambers, hygrometers, manometers, masses, micrometers, pressure equipment, spectrophotometers, tape measures, rules, temperature (digital) indicating systems, thermometers, thermocouples, timing devices, vibration analysis equipment and weighing instruments • electrical reference standards, such as air-lines, analogue meters, attenuators, bridges-manual balance, capacitors, DC voltage references, digital instruments (calibrators, DMMs, electronic transfer standards), inductors, instrument and ratio transformers, instrument transformer test sets, potentiometers, resistors, radio frequency (RF) power meters, RF thermistor mounts and thermal converters, shunts, time interval and frequency standards, transfer standards AC-DC, voltage dividers, volt ratio boxes and watt-hour references • working standards, instruments and testing equipment, such as electromagnetic compatibility (EMC) test equipment, field strength meters, flammability test equipment, gauges/test fingers/test pins, hipot testers, impact hammers, impulse testers, instrument calibrators, network analysers, signal generators and spectrum and harmonic analysers
Electrophoretic methods for both analytical and preparative procedures	Electrophoretic methods, for both analytical and preparative procedures, include, but are not limited to, one or more of: • vertical or horizontal apparatus • support materials, such as cellulose acetate • gels, such as agarose and polyacrylamide • buffer solutions • denaturing electrophoresis, such as SDS-PAGE • blot transfer procedures in conjunction with electrophoresis, such as Western and Southern Blot transfers, agarose and polyacrylamide DNA gels • capillary electrophoresis
Elements and components of a quality system	Elements and components of a quality system include, but are not limited to, one or more of: • responsibilities of personnel within quality system

	• contract review • purchasing • design control • process control, control of customer-supplied product, product identification and traceability • inspection and testing, control of inspection, measuring and test equipment, and inspection and test status • statistical analysis, internal quality audits, and corrective and preventative action • control of documents, data and quality records • control of non-conforming product • handling, storage, packaging, preservation and delivery • training • servicing
Environmental field activities	Environmental field activities include, but are not limited to, investigation of one or more of: • meteorology, geology, hydrology and ecology • water quality, industrial waste streams, air quality, noise and vibration • soils, flora, weeds, native fauna, exotic or pest species and threatened species • land use and cultural sites
Estimates of uncertainty	Estimates of uncertainty include, but are not limited to, one or more of: • calibration uncertainty • instability or drift in the calibrated instrument • repeatability of the results • resolution or readability of the instrument • environmental influences, such as temperature, air pressure, humidity, vibration, electrical noise and gravity • reference material uncertainty • factors arising from using an instrument under a different operating environment or procedures (e.g. orientation of a transducer and immersion depth of a temperature probe) • reproducibility of quality control data
Ethical and legal work practices	Ethical and legal work practices include one or more of: • industry codes of practice, contracts, permits, intellectual property (IP), crediting, plagiarism and copyright • moral rights, model release, etiquette, decorum and sensitivity towards the subject, and confidentiality
Factors which may influence method evaluation and selection	Factors which influence method evaluation and selection include, but are not limited to, one or more of: • quantity and nature of sample available for testing

	• levels of detection required • type of matrix, possible contaminants and resulting interference • safety • availability of suitable equipment, instruments and availability of trained staff • cost • selectivity of method, range, accuracy, precision and acceptable uncertainty • whether it is appropriate/ethical to perform the test • balancing customer, workplace and/or regulatory/licensing requirements
Field procedures	Field procedures include, but are not limited to, one or more of: • sampling • field testing (validated and authorised) • animal trapping (and release), tagging and keeping • emergency response, safety and survival aspects • data collection, analysis and reporting • protection of the environment
Field sampling tools and equipment	Sampling tools and equipment include, but are not limited to, one or more of: • shovels, augers, chain saws, front-end loader, backhoe, excavator and drill rig • sampling frames, sampling tubes, dip tubes, spears, flexible bladders and syringes, sample thief, pumps and stainless steel bailers • sample bottles or containers, plastic containers and disposable buckets • access valves • auto samplers • traps and cages • sterile containers, pipettes, inoculating loops and disposable spoons
Field site samples and test pieces	Site samples and test pieces include, but are not limited to, one or more of: • site samples of aggregates, soil, concrete and road pavement • beams and cylinders for subsequent laboratory testing, such as Brazil test and Marshall stability/flow test • asphalt cores and slabs for testing wheel tracking and fatigue
Field survey activities	Field survey activities, but are not limited to, include one or more of: • climate and meteorology • geology, soils and geomorphology • hydrology and water quality • noise • land resources, vegetation, wildlife and conservation

	• land uses, agriculture, forestry, mining and recreation

Field-based acceptance tests	Field-based acceptance tests include, but are not limited to, one or more of:
	• testing of concrete, such as:
	  • consistency (e.g. slump)
	  • making and curing of concrete cylinders
	  • air content
	  • Schmidt hammer
	• testing of soils, such as:
	  • field density (e.g. compaction control)
	  • coarse particle distribution (e.g. rock protection layers and embankments)
	  • dynamic cone penetration (DCP)
	  • Clegg hammer
	  • sample cores from stabilised pavements
	• testing of asphalt and bitumen seals, such as:
	  • temperature of freshly laid asphalt
	  • field density
	  • texture depth
	  • permeability
	  • aggregate spread rate and binder spray rate

Fluxes	Fluxes include, but are not limited to, one or more of:
	• bulk fluxes containing PbO, borax, soda ash, silica, silver nitrate and flour
	• non-standard flux additives such as:
	  • flour (oxidising samples)
	  • nitre (reducing samples, sulphides)
	  • silica (basic ores)
	  • PbO (siliceous ores)
	• exotic additives, such as calcium fluoride (CaF_2) (refractory ores)
	• nickel sulphide (NiS), nickel carbonate ($NiCO_3$), sulphur, borax and soda ash)

Food ingredient composition	Ingredient composition includes, but is not limited to, specification of one or more of: • gluten-free; lactose-free; wheat-free; cholesterol; salicylates, amines; monosodium glutamate (MSG); alcohol; nuts; additives, such as maltodextrose, egg white, wheat varieties, antioxidants, flavins, soy and phytoestrogens; and glycaemic index (GI) • probiotic claims • genetically modified food and irradiation of foods or ingredients

Food ingredient composition involved with the development of new processes, new products, and flavours	Ingredient composition involved with the development of new processes, new products, and flavours includes, but is not limited to, one or more of: • quantitative analysis of oils in condiments and mustards • characterisation of probiotic and prebiotic foods • characterisation of flavins and phytoestrogens • characterisation of starch variants, such as resistant starch • characterisation of tannins and polyphenols in beverages • analysis of ingredients that impart flavour and colour

Food tests and procedures	Food tests and procedures include one or more of:
	• sensory tests, such as appearance, taste, texture, colour and odour of foods, and browning (sugar content)
	• visual tests, such as detection of sediments and scorched particles, foreign matter, damage to packaging and compatibility of packaging
	• physical/mechanical tests, such as:
	  • melting point, boiling point and freezing point
	  • mass, volume, density, specific gravity and particle size, and homogenisation
	  • rheology, viscosity and gel strength
	  • dispersability, 'wetability' and 'whipability'
	  • elasticity, hardness, compressibility and strength
	  • starch quality
	• chemical analysis, such as:
	  • pH, conductivity and moisture content
	  • solids, fats, proteins and carbohydrates
	  • ash analysis and salt analysis
	  • titratable acids, iodine values and peroxide values
	  • enzyme activity
	  • specific ions and active ingredients
	• microbiological tests and procedures, such as:
	  • isolation, detection, classification to genera and some species or microorganisms
	  • enumeration and nomenclature of desirable/non-desirable microorganisms
	  • propagation and maintenance of yeast, bacteria and cultures used in food processing
	  • measurement of spoilage and contamination
	  • sterility, hygiene and sanitation checks
	• optical/spectrometric tests, such as ultraviolet-visible (UV-VIS), refractive index and optical rotation
	• thermal tests, such as calorific values, stability of products and effectiveness of heat treatments

Forensic evidence and samples	Evidence and samples include, but are not limited to, one or more of:
	• any and all objects:
	  • gross or microscopic
	  • living or inanimate

	• solid, liquid or gas • relationships between all such objects • development/enhancement/examination (e.g. use of poly light) • trace evidence examinations • biological samples, such as organs, hair, blood, semen and saliva • blood splatter patterns • clothing • documents • drugs • explosives • fibres • fingerprint development/enhancement/examination • fire debris • firearm and ammunition examinations • impressions • paint • petroleum products • powder residues • serial numbers • shoeprint and tyre marks • soils and minerals • toolmark examination
Forensic packaging samples	Packaging samples takes into account, but is not limited to, one or more of: • physical nature of the evidence/sample • packaging medium • tamper evident seals • exhibit labels • drying of wet exhibits • storage temperature
Forensic samples	Samples include, but are not limited to, one or more of: • fingerprints • firearms and tool marks • ammunition • ballistics • vehicles • documents and handwriting
Goals, contexts and constraints	Team goals, contexts and constraints include: • specific goals and objectives, responsibility and accountability requirements • fixed outputs, timelines and resource limits

Growth requirements of cells	Includes: • microorganisms and tissue cells in terms of their laboratory culture, such as bacteria, fungi, protozoans, viruses and multi-cellular parasites,
Hazard identification processes	Hazard identification processes include one or more of: • review of hazard and incident reports and workplace inspections • pre-purchase risk assessments • review of relevant internal documentation, including material safety data sheets (MSDS), manufacturer manuals and minutes of meetings • review of legislation, codes of practice, standards and guidelines • review of online and printed WHS publications, journals and newsletters produced by WHS regulators, industry bodies
Histological procedures	Histological procedures include, but are not limited to, one or more of: • cutting paraffin sections of organs, such as kidney, liver, small intestine, stomach and tongue • cutting paraffin sections of dicotyledon and monocotyledon stems • staining tissue sections with haematoxylin and eosin (human and animal tissue) and safranine and fast green (plant tissue)
Identification	Identification includes, but is not limited to, one or more of: • collection access number • tags and labels on existing specimens • use of field guides, keys and taxonomic charts • collaboration with experts
Incidents	Incidents include, but are not limited to, one or more of: • workplace accidents and near misses • biological, chemical or radioactive spills • workplace injuries, such as cutting, stabbing, puncturing, crushing, immersion in water, suffocation, hypothermia, burns, heat stress, animal bites, allergic reactions and assaults • emergency situations, such as fire, bomb threat, security threat and explosion
Incidents and emergencies	Incidents and emergencies include one or more of: • workplace injury and accidents • biological and chemical spills • leakage of radioactivity • fire, bomb and security threats
Information and documentation	Information and documentation include, but are not limited to, one or more of:

	• workplace quality manuals • documentation related to the quality elements being audited • data records • customer complaints • training records • certification documentation from clients/suppliers • material/equipment specifications
Instrument calibration/performance records	Instrument calibration/performance records include, but are not limited to, one or more of: • checks that equipment/instrument complies with specifications • dates, results and copies of reports and certificates of calibrations, adjustments, acceptance criteria and due date of next calibration • maintenance plan and maintenance carried out to date • damage, malfunction, modification or repairs • data files and technical records, and laboratory information management system (LIMS)
Instrument sub-systems	Instrument sub-systems include, but are not limited to, one or more of: • sample introduction units and auto sampling equipment • detectors and signal conditioning units • temperature control devices, such as cryostats, ovens and thermostat baths • software control/interface
Instrumental tests	Instrumental tests include: • spectrometry, chromatography and electrochemistry
Instruments that emit ionising radiation	Instruments that emit ionising radiation include, but are not limited to, one or more of: • soil moisture and density gauges • borehole logging probes • fluid density and level detectors

Laboratory instruments and equipment	Laboratory instruments and equipment include, but are not limited to, one or more of: • balances, glassware, plastic ware, glass, plastic and quartz cuvettes, pipettes, burettes and volumetric glassware, and density bottles • blending, mixing and separating equipment, such as sieves and centrifuges • autoclaves, dishwashers, refrigerators, freezers, ovens, hotplates, mantles, burners and muffle furnaces, microwave ovens, ultrasonic cleaners, incubators and water baths, and gas cylinders • fume hoods, biohazard containers and biological safety cabinets • microtomes and tissue processors, staining machines, cell analysers and cell counters • colorimeters/spectrometers and polarimeters, light and fluorescence microscopes, refractometers, chromatographic equipment and electrochemical equipment • thermometers, thermohygrographs, hydrometers, conductivity meters and pH meters and ion-selective electrodes, noise meters, melting point apparatus, viscometers and instrument chart recorders • steel ruler/tapes and spirit levels, shovels, scoops, plates, rods, cylinder moulds and buckets • rifflers and splitters and mixers, compaction rammers and soil classification equipment, disintegration apparatus, penetrometers and hardness testing equipment • pressure gauges, torque testers, load cells, strain gauges and tensiometers • motors, pumps and generators

Laboratory-based acceptance tests	Laboratory-based acceptance tests include, but are not limited to, one or more of:
	• testing of concrete, such as:
	  • compressive and tensile tests
	  • flexural tests
	• testing of soils, such as:
	  • laboratory density and moisture content
	  • classification (consistency, particle distribution, dispersion and particle density)
	  • unconfined compressive strength
	  • pH and conductivity
	  • colour
	• testing of asphalt and bitumen seals, such as:
	  • density and compacted density
	  • particle size distribution
	  • stability/flow
	  • stripping (core samples)
	• testing of aggregates, such as:
	  • particle size distribution and grading
	  • particle shape
	  • particle density, durability and absorption
	  • contamination (silt and organics)

Maintaining integrity of forensic samples	Maintaining the integrity of samples includes, but is not limited to, one or more of: • use of appropriate sample containers (glass, plastic and opaque) • use of appropriate preservatives • wrapping container in foil to exclude light • temperature control, which may involve prevention of direct contact between the sample and coolant • use of appropriate equipment boxes (insulated, shockproof and waterproof) • restraint of containers to prevent movement • checking sample viability during transport while avoiding unnecessary handling
Maintenance issues	Maintenance issues include, but are not limited to, one or more of: • hygiene issues, prevention of contamination, cleaning, recycling and waste disposal • checking materials and equipment are fit for purpose, equipment malfunction, and checking serviceability before storage • potential hazards, incidents and emergencies, spillages, leakages, breakages and contamination • stock requirements and shortages, and storage constraints
Maintenance of integrity of samples	Maintenance of integrity of samples includes one or more of: • use of appropriate containers and lids, sealing of sample containers • purging of sample lines and bores • decontamination of sampling tools between collection of consecutive samples • use of appropriate preservatives • temperature control, which may involve insulation of the container in foil or wet newspaper, cloth, sand or sawdust, and separation of the sample and coolant • transfer of sterile sample into sterile container • handling and transport of samples to avoid disturbance or damage • monitoring of storage conditions • workplace/legal traceability through appropriate sample labelling and records
Materials used to manufacture products/applications	Materials used to manufacture products/applications include, but are not limited to, one or more of: • solvents • emulsifiers • thickeners • surfactants • disintegrants • fillers • moisturising materials • colouring materials

	• flavours • perfumes • opacifiers • propellants • sunscreens
Measurements	Measurements include, but are not limited to, one or more of: • simple ground surveys • meteorological parameters, such as wind direction/strength, rainfall, maximum/minimum temperature, humidity and solar radiation • simple background radiation survey • production/process parameters, such as temperature, flow and pressure • gas levels in a confined space
Mechanical test methods	Test methods include, but are not limited to, one or more of: • control of starting materials, in-process materials and finished products • investigation of sources of construction materials • basic troubleshooting of workplace processes
Mechanical tests and procedures	Mechanical tests and procedures include, but are not limited to, one or more of: • adhesive strength • elastic properties and strength of materials • slip resistance and friction • viscosity and torque • creep and endurance • abrasion, hardness, impact, indent and penetration resistance • pressure and/or vacuum testing using manometers and load cells
Methods for improving team and individual performance	Methods for improving team and individual performance include, but are not limited to, one or more of: • improving team planning processes and utilising individuals' strengths • analysing barriers to team effectiveness and developing appropriate strategies to overcome them • monitoring individuals' outputs and providing constructive feedback • recording individual and team performance • identifying individuals' training needs and providing development opportunities • supporting the team to share knowledge and skills
Methods for promoting team cohesion	Methods for promoting team cohesion include, but are not limited to, one or more of:

	• providing clear information and directions when devolving responsibility and accountability • organising regular team meetings and involving the team in planning and allocation of tasks • encouraging the team to openly propose, discuss and resolve issues • dealing with conflict before it adversely affects team performance • treating people openly and fairly • recognising individual and cultural differences • recognising and rewarding achievement
Methods for recording location of evidence	Methods for recording the position of located evidence include, but are not limited to, one or more of: • photographs • video • diagrams and sketches, hand written notes/documentation • computer data • global positioning system (GPS)
Methods to monitor growth of tissue and cell lines	• identification of normal and abnormal cells viewed using an inverted stereo microscope • recognition of contamination by cytopathic changes to cells, biochemical tests, gene detection and microbiological culture • testing for products, such as insulin • checking growth rates • performing viable cell counts, such as the dye exclusion test, and Trypan Blue viability stain to determine percentage viability and total cell concentration • staining and assessment of morphology (e.g. by Giemsa) • karyotype analysis
Methods to prepare primary cultures	• thawing of cryopreserved cells and monitoring of cell recovery • enzymatic disaggregation from tissue • mechanical disaggregation from tissue • primary explant technique • pre-treatment • selection techniques, such as cloning, micromanipulation, use of selective media, density gradient centrifugation, selective adhesion techniques and selective detachment
Mineral samples	Mineral samples include one or more of: • pulverised solids, such as rocks, minerals, soils, sands and stream sediments • pulverised core and other drill samples
Minimising environmental impacts	Minimising environmental impacts include, but are not limited to, one or more of: • damage from movement of vehicles

	• disposal of surplus or spent or materials • containing run-off of water • recycling of wastes • compliance with quarantine requirements, including cleaning of vehicles to prevent transfer of pests (e.g. fire ants and seeds) and contaminants • compliance with environmental, cultural and heritage protection requirements
Modifiers	Modifiers include, but are not limited to, one or more of: • ionisation suppressants, such as Caesium for calcium (Ca), sodium (Na), and potassium (K) in atomic absorption spectroscopy (AAS) • ionic strength and pH buffers, such as total ionic strength adjustment buffer (TISAB) for fluoride in ion-selective electrode (ISE) • releasing agents, such as Lanthanum and Strontium for Ca in AAS • volatility suppressants, such as phosphate for lead (Pb) in electrothermal AAS

Molecular biology tests and procedures	Molecular biology tests and procedures include, but are not limited to, one or more of:
	• generic techniques, such as:
	  • sample digestion, extraction, filtration, separation, dialysis, precipitation and centrifugation
	  • accurate and reliable use of micropipettes
	  • application of aseptic techniques
	  • labelling (e.g. digoxin, fluorescence, enzymes, radioactivity and antibodies)
	  • production, labelling and use of DNA probes
	• preparation of competent bacterial cells
	• preservation and storage of samples (e.g. freezing)
	• extraction of nucleic acids, such as:
	  • isolation of genomic and plasmid DNA and RNA from samples, such as plants, bacterial suspensions, white blood cells, cheek cells, animal and plant tissue, cultured cells and forensic specimens
	  • mini-prep and rapid method isolation of plasmid DNA
	  • purification of nucleic acids and proteins:
	  • purification of DNA using cesium gradients, commercial purification buffer kits and columns
	  • purification of recombinant protein by chromatography
	• production of nucleic acids, such as:
	  • amplification of DNA by polymerase chain reaction
	  • transformation with recombinant DNA
	  • identification of transformed organisms with appropriate selection and analytical techniques, such as selective media and insertional inactivation
	• use of enzymes, such as:

	• storage and handling of enzymes taking into account segregation, temperature, buffers and labelling to avoid wastage, denaturation and contamination • ligation • analysis of nucleic acids and proteins, such as: • sequencing DNA • assaying of DNA purity and concentration using spectrometric analysis • electrophoresis of restriction enzyme digests of plasmid and genomic DNA using agarose gel • DNA sequencing by Sanger method • testing using restriction fragment length polymorphism (RFLP), probes and microsatellites • detection of protein products by measuring activity, including a range of immunological assays • hybridisations, such as: • hybridisation to screen cDNA libraries • blotting (southern blots for DNA and Western blots for protein) • cloning such as: • cloning and sub-cloning of genes and fragments of DNA • applications of techniques: • polymerase chain reaction (PCR) • methods to detect gene expression, such as RNA hybridisation, immunological techniques and radioactive labelling • testing DNA for sequence variation that is either causative of, or associated with, human disease • testing blood for the presence of viruses using the PCR • identification of species, such as bacterial contaminants • generating data for taxonomic and ecological investigations
Monitoring activities	Monitoring activities include, but is not limited to, measuring one or more of: • displacement and vibration • pressure and force • temperature • setting time • strain • cracking (visual assessment of road condition) • defect mapping • moisture • water levels • movement of chemical ions through structures
Monitoring growth of tissue and cell lines	Monitoring growth of tissue and cell lines includes, but is not limited to, one or more of: • identification of normal and abnormal cells viewed using an inverted stereo microscope

	• recognition of contamination by cytopathic changes to cells, biochemical tests, gene detection and microbiological culture • testing for products, such as insulin • checking growth rates • performing viable cell counts, such as the dye exclusion test, and Trypan Blue viability stain to determine percentage viability and total cell concentration • staining and assessment of morphology (e.g. by Giemsa) • karyotype analysis
Non-instrumental tests or procedures	Non-instrumental tests or procedures include one or more of: • gravimetric analysis • titrimetric analysis • filtration, separation and solvent extraction techniques • corrosion testing, cement content and accelerated weathering
Nutrient analysis	Nutrient analysis includes, but is not limited to, one or more of: • percentage composition of foods for major macro-nutrients, such as starch, sugars, fats, protein and fibre • percentage composition of foods for saturated, unsaturated (mono, poly and omega3) fats and trans fatty acids • soluble and insoluble fibre • micro-nutrients with positive or negative health implications • micro-nutrients that figure in Recommended Daily Intake (RDI) lists • enzymic and immunological assays
Participative processes with employees and their representatives	Participative processes with employees and their representatives include one or more of: • consultations with workers and committees (such as WHS and planning) • employee and supervisor involvement in WHS activities, such as inspections, audits and risk assessments • procedures for reporting hazards and raising and addressing WHS issues • identification of hazards, assessment of level of risk, implementation of risk control measures and review of their effectiveness • review of WHS records and statistics, injury and incident investigations • job safety analysis (JSA), development/revision of policies and procedures • audits and workplace inspections, and review of registers of hazardous substances and dangerous goods
Physical samples	Physical samples include, but are not limited to, one or more of: • sand • asbestos fibres

	• coal samples • construction materials for testing • geological specimens
Physical tests and examination	Physical tests and examinations include, but are not limited to, one or more of: • precise measurement of position, orientation and dimensions (e.g. particle size) • mass, density and specific gravity (e.g. compaction) • thermal tests (e.g. combustion properties) • optical tests (e.g. colour matching) • acoustic tests (e.g. loudness) • electrical tests (e.g. insulation) • magnetic tests (e.g. intrinsic induction)
Physical tests and procedures	Physical tests and procedures include one or more of: • precise measurement of position, orientation and dimensions, such as: • 3-D set-up of manufacturing tools using inclinometers, verniers and laser • thickness using vernier, X-ray and gamma ray • particle size using sieving and laser • dimensional stability involving expansion, contraction and weathering • movement using strain gauge and accelerometer • mass, density and specific gravity and related tests, such as: • moisture/density relationship, loose and compacted density • reactivity to moisture, Atterberg limits, and shrink/swell index • thermal tests, such as: • thermal conductivity and coefficients of expansion (e.g. linear and volume) • calorimetry, (e.g. specific heat and latent heat), and combustion properties (e.g. enthalpy and energy content) • viscosity and melt flow index • drying times • thermal stability of products • optical tests, such as: • flatness and surface finish • refractive index and optical rotation • transmission/absorption of filters and colour matching of products • acoustic measurements, such as: • amplitude and frequency, absorption, reflection and transmission, intensity, attenuation and loudness (dB) • electrical tests, such as:

	• conductance, resistance and insulation, and temperature dependence of dielectrics • magnetic tests, such as: • permeability, retentivity, hysteresis loss and coercivity, and intrinsic induction
Plant tissues and cells	Plant tissues and cells include, but are not limited to, one or more of: • plant tissue, such as petioles, leaves, stems and petals • meristem tissue • special tissue, such as fern stolon, seed embryos and somatic embryoids • tissue for callus development to initiate cell suspension cultures
PPE	PPE includes, but is not limited to, one or more of: • gloves, safety glasses, goggles, face guards, coveralls, gowns, body suits and respirators • biohazard containers and laminar flow cabinets
Preparation areas	Preparation areas include one or more of: • benches • fume cupboards • sheds • sinks •
Preparation for preservation	Preparation for preservation includes, but is not limited to, one or more of: • treatment of the specimen (dissection, mounting, pinning, use of backing boards, fixing, staining, colour retention, latex injection and vascular preservation) • preparation of the display (painting, making of wet boxes, choice of vessel and storage fluid, planning of mould sections and lay up) • maceration of tissue from skeletons by sand, invertebrates, cold or warm water, enzymes, physical removal or chemical treatment
Preparation of histological samples	Preparation of samples includes, but is not limited to, one or more of: • drying and cooling • physical separation, centrifugation, filtration and chemical separation • sub-sampling • labelling • aseptic transfer of specimen • thin film or smear on a slide • fixing of films to minimise cell damage and the production of artefacts • staining of fixed material to illustrate required characteristics

	• mounting of stained films, sections and whole mounts to ensure long-term preservation • permanent labels for smears, films and sections for presentation, storage and retrieval • selection of diluent to preserve or enhance visibility of the cells to be counted • serial dilution to enable individual cells to be reliably counted • filling a counting chamber in one continuous flow without bubbles or overflow • selection, filling and cover slipping of a clean, dry counting chamber to ensure even distribution of cells during filling
Preparation of samples	Preparation of samples includes, but is not limited to, one or more of: • moisture conditioning and compaction of soil • trimming to required size and shape • orientation of test pieces • polishing • curing concrete test pieces
Preparing primary cultures	Preparing primary cultures includes, but is not limited to, one or more of: • thawing of cryopreserved cells and monitoring of cell recovery • enzymatic disaggregation from tissue • mechanical disaggregation from tissue • primary explant technique • pre-treatment • selection techniques, such as cloning, micromanipulation, use of selective media, density gradient centrifugation, selective adhesion techniques and selective detachment
Preservation	Preservation includes, but is not limited to, one or more of: • temporary (freezing) • wet (whole mounts in formalin and tissue staining) • dry (freeze and air drying), pressing, taxidermy, including exhibition quality mounts, study skins, tanning and plastination techniques, such as dry mounting of seeds, bird skins, pin mounted invertebrates and pressing of plants • skeletal involving maceration, degreasing, bleaching, articulation and mounting or sectioning (e.g. whale skeletons) • mould and cast (alignate, plaster, stone plaster, polyester, latex, silicone, Vinamould, gelatine, urethane elastomers, glass and carbon fibre), such as for fish, amphibians and reptiles • embedding by encapsulation in clear plastic or resin using wet or dry techniques
Problem solving	Problem solving includes: • troubleshooting and fault-finding

	• risk analysis, root cause analysis and/or aspect/impact analysis • non-routine operational, technical, administrative and/or personnel-related problems
Problem-solving strategies	Problem-solving strategies include one or more of: • accessing relevant documentation • identifying inputs and outputs and sequencing a process • identifying and rectifying a problem step • obtaining timely help • implementing preventative strategies wherever possible
Product properties, process stages and unit operations involved in the trial	Product properties, process stages and unit operations involved in trials include, but are not limited to, one or more of: • classification of samples (screening and sieving) • milling • mixing • separation (distillation, sieves, filtration, solvent extraction and chromatography) • drying • concentrating • diluting • depositing (injecting, forming and extrusion) • retorting • cooling, freezing, refrigeration and heat transfer • closure (vacuum sealing) • weighing and packaging • materials handling and transport, and warehousing
Product/application briefs	Product/application briefs are provided by, but are not limited to, one or more of: • internal or external customers • marketing • production
Purpose of field monitoring activities	Purposes of field monitoring activities include, but are not limited to, one or more of: • single or multiple site monitoring • component of workplace environmental management plan • remote-sensing monitoring of physical/chemical and mechanical/geotechnical parameters • monitoring of consolidation of soils and foundations • monitoring the durability of structures (e.g. roads) • requirement to comply with statutory requirements • requirement to comply with industry sampling/monitoring protocols/codes of practice

Purpose of scientific image	Purpose of the image includes, but is not limited to, one or more of: • publication as a thesis • presentation on the web • temporal serial recording of changes over time • display as a poster, diorama, print or projection • preview, snapshot or proof of an image for production at a later stage • records of data for inclusion in databases • use in forensic investigation or court proceedings
Purpose or objective of the field survey	The purpose or objective of field surveys include, but are not limited to, one or more of: • part of workplace environmental management plan • statutory requirements • environmental impact assessment for major development • environment audit • pollution control activity • general environmental and ecological surveys • research studies
Quality audits	Quality audits include one or more of: • regular checks of laboratory procedures • daily and weekly checks of specimen reception, instrumentation and results for control and standard samples to identify non-conformance and problem areas • maintenance of appropriate certified reference materials • participation in external quality assurance programs
Quality control procedures	Quality control procedures include one or more of: • standards imposed by regulatory and licensing bodies • working to a customer brief or batch card and associated quality procedures • checklists to monitor job progress against agreed time, costs and quality standards • preparation of sampling plans • the use of hold points to evaluate conformance • the use of inspection and test plans to check compliance
Quality improvement tools and techniques	Quality improvement tools and techniques include using one or more of: • plan, do, check, act (PDCA) • Ishikawa fishbone diagrams and cause and effect diagrams, logic tree, similarity/difference analysis, Pareto charts and analysis, force field/strength, weakness, opportunities, threats (SWOT) analysis • run charts, control charts, histograms and scattergrams to present routine quality control data

	• statistical analysis of quality control data, mean, median, mode, ranges and standard deviations
Quantification techniques	Quantification techniques include, but are not limited to, one or more of: • matrix matched standards • standard additions • international standards
Records	Records include, but are not limited to, one or more of: • lists of potential costs, invoices and payment records • project and/or workplace files and records • reports to clients, personnel and senior management • risk management plans and log books • diaries, scheduling charts and other project management charts • purchase of equipment and materials and service records • manufacturer datasheets • calibration reports • history of calibration and test results
Reference materials	Reference materials include, but are not limited to, one or more of: Process manufacturing and construction industry sector: • drill (core) samples for mineral identification • concrete samples for analysis of composition and/or strength and suitability for application Biomedical and environmental industry sector: • specimens, including cells, tissues and samples of aqueous or proteinaceous standards • bacterial cultures related to colony and microscopic morphology, specificity and reliability of staining reaction, biochemical characteristics and immunological characteristics • cell suspensions and cell and tissue preparations that can act as quantitative or qualitative controls in tests and procedures • plasma and other body fluids with known attributes or quanta that can act as standards and controls in quantitative and qualitative tests and procedures Food and beverage processing industry sector: • aggregates, grains and powders • materials for testing viability of enzymes used in process • bacterial or yeast cultures relating to colony and microscopic morphology for culturing purpose • grain samples used in identification of cereal specimens (e.g. barley varieties, such as Proctor, Franklin and Stirling) • food samples used in allergy testing (e.g. nuts, wheat, milk and fish)

Remote-sensing monitoring activities	Remote-sensing monitoring activities include, but are not limited to, one or more of: • meteorology (e.g. temperature, humidity and wind) • geology/mining (e.g. movement of structures, vibration and blast shock waves) • hydrology (e.g. water flow and water depth in catchment) • environmental (e.g. air quality, water quality and noise) • civil engineering (e.g. temperature, displacement and/or hydrostatic pressure on structures and movement of ions in structures)
Remote-sensing monitoring instruments and equipment	Instruments and equipment include, but are not limited to, one or more of: • navigation and communication equipment, such as compass, maps, global positioning system (GPS), two-way radio and mobile phone • sampling and autosampling equipment for air, water, stormwater, wastewater and sewage • instruments that measure air pollutants, such as oxides of carbon, oxides of sulphur, oxides of nitrogen, hydrocarbons and particulates (PM10, PM2.5 total suspended), and ozone • instruments that measure water quantity and/or hydrological parameters, such as flow, dissolved oxygen (DO), electrical conductivity, pH, turbidity, nitrates, phosphates and temperature • instruments that measure meteorological parameters, such as pressure, minimum and maximum temperature, wet and dry bulb temperatures, humidity, rainfall, and wind speed and direction • instruments that measure sound pressure levels, such as noise or sound pressure meter • instruments that measure displacement or durability of civil engineering structures and consolidation, such as load cells, inclinometers, pieziometers, strain gauges and accelerometers
Reviewing laboratory methodology and test results	Reviewing laboratory methodology and test results includes, but is not limited to, one or more of: • assessing the methodology for appropriate application to evidence • assessing the chain of custody and sample handling to ensure integrity • assessing testing procedures for compliance with quality system and judicial requirements • evaluating interpretation of test results for validity
Risk assessment	Risk assessment includes: • analysing the risk to identify factors influencing the risk and the range of potential consequences • assessing the effectiveness of existing controls, the likelihood of each consequence and combining these to obtain a level of risk

	• comparing the determined risk with pre-established criteria for tolerance (or as low as reasonably achievable) and ranking risks requiring control
Routine chromatographic techniques	Routine chromatographic techniques include one or more of the following analytical and preparative procedures: • standard sample introduction systems • paper, such as ascending and descending • thin-layer such as ascending, high performance, radical and descending • column chromatography • affinity chromatography and gel filtration chromatography • gas liquid and gas solid chromatography • high performance liquid chromatography, such as liquid-liquid (LLC), liquid-solid (LSC), ion (IC) and size exclusion (SEC)
Routine electrometric techniques	Routine electrometric techniques include, but are not limited to, one or more of: • ion-selective electrodes • potentiometric titrations and conductometric titrations • amperometry • polarography
Routine spectrometric techniques	Routine spectrometric techniques include one or more of: • ultraviolet-visible (UV-VIS) • infrared, including Fourier transform infrared and near infrared • atomic absorption spectroscopy (AAS) • fluorescence • flame emission spectroscopy
Safe work procedures	Safe work procedures include, but are not limited to, one or more of: • ensuring access to service shut-off points • recognising and observing hazard warnings and safety signs/barriers • using machinery guards • labelling of samples, reagents and hazardous materials • cleaning equipment and work areas regularly using recommended procedures • handling and storing hazardous material and equipment in accordance with labels, MSDS, manufacturer instructions, and workplace procedures and regulations • following established manual handling procedures for tasks involving manual handling • use of PPE, such as hard hats, hearing protection, gloves, goggles, safety glasses, coveralls, respirators and safety boots

	• reporting abnormal emissions, discharges and airborne contaminants, such as noise, light, solids, liquids, water/wastewater, gases, smoke, vapour, fumes, odour and particulates, to appropriate personnel
Safety and survival procedures	Safety and survival procedures include, but are not limited to, one or more of: • using personal protective equipment (PPE), including sunscreen, hats, safety glasses, gloves, safety boots and hearing protection • handling, labelling and storing hazardous material and equipment in accordance with labels, MSDS, manufacturer instructions and workplace procedures and regulations • regular cleaning and/or decontamination of equipment • using two-way radio and satellite phone and a regular communication schedule • map reading, use of compass and global positioning system (GPS) • 'stay with vehicle' in the event of accident or emergency
Sample characteristics	Sample characteristics are restricted to what can be viewed by bright light microscopy and include, but are not limited to, one or more of: • shape and size of particles • presence of contamination • colour • consistency and variability • number of cells (e.g. cells in blood or other particulate samples, such as a yeast suspension or pollen grains) • type of cells, percentage of atypical cells, presence/absence of cells, size of cells, viable and non-viable cells and trajectory • presence of stained material, such as starch • colour/staining and morphology • motility
Sample collection and preparation problems	Sample collection and preparation problems include, but are not limited to, one or more of: • use of incorrect sample containers • incorrect sample handling, storage or conditioning (filtered/non-filtered, temperature control and preservation), sample disturbance and sample segregation • incomplete sample preparation • incorrect particle size • incorrect matrix • incomplete digest

Sample collection and preparation problems	Sample collection and preparation problems include, but are not limited to, one or more of: • incorrect sample containers • incorrect sample handling (filtered/non-filtered, temperature control and preservation), sample disturbance and sample segregation • incomplete sample preparation • incorrect particle size • incorrect matrix • incomplete digest
Sample collection methods	Sample collection methods include, but are not limited to, one or more of: • hand picking (including use of forceps and gloves) • tape lifting • sweeping and vacuuming • swabbing • liquid and solid sampling procedures
Sample pot and transfer media and the subculturing and/or passaging of culture	Sample pot and transfer media and the subculturing and/or passaging of culture to include, but are not limited to, one or more of: • sterile broth • media for isolation of colony • tissue culture media • media for continuous culture systems
Sample preparation	Sample preparation processes include one or more of: • sub-sampling or splitting using procedures, such as riffling, coning and quartering, manual and mechanical splitters • diluting samples • physical treatments, such as ashing, dissolving, filtration, sieving, centrifugation and comminution • moulding, casting or cutting specimens
Sample preparation processes	Sample preparation processes include one or more of: • grinding and milling • preparation of discs • digestion, dissolving, extracting, refluxing and degassing • washing, drying, ashing and temperature equilibration • precipitation and centrifugation, filtration, flocculation and evaporation • culturing of selected microorganisms

Sample preparation processes	Sample preparation processes include one or more of: • grinding • preparation of discs • digestion, dissolving, refluxing and mulling • precipitation, filtration, flocculation, evaporation and centrifugation • washing, drying, tracting and ashing
Sample preparation:	Sample preparation includes, but is not limited to, one or more of: • identification of any hazards associated with the samples and/or analytical chemicals • grinding to required particle size, milling, preparation of disks, digestion, dissolving, ashing, refluxing, extraction, filtration, evaporation, flocculation, precipitation, washing, drying, centrifugation, degassing and temperature equilibration • culturing of microorganisms • determination of, and if appropriate, removal of any contaminants or impurities • ultra-trace procedures requiring high purity solvents, clean rooms, ultra clean glassware and specialised glassware
Samples	Samples include, but are not limited to, one or more of: • body fluids and liquids • water and soil • sterile pharmaceuticals • yeasts and moulds • milk and yoghurt • swabs and smears • propagation tissue • plant material • fermented foods and beverages
Samples and test pieces	Samples and test pieces include, but are not limited to, one or more of: • samples of aggregates, soil, rock, concrete and road pavement • beams and cylinders for laboratory testing, such as Brazil test • pats for Marshall stability/flow test

Scheduling for a small team	Scheduling for a small team includes:
	• identification of resources to maintain work flow, such as:
	  • monitoring and interpreting information about production, orders, stocks and deliveries
	  • analysing and prioritising job tasks
	  • determining appropriate human resource, material and equipment requirements
	• monitoring of work outputs

	• adjustment of work schedules as agreed with senior personnel to accommodate unexpected events, such as:
	  • processing abnormal and urgent results
	  • delays in arrival of samples
	  • seasonal variations and bad weather
	  • analysing and solving operational problems resulting in unacceptable test results
	  • unexpected events, such as equipment failure and sudden personnel absences
	• communication with senior personnel, such as:
	  • determining and organising work priorities and schedules
	  • analysing and solving problems affecting work schedules and shift handover
	• adjusting work schedules as necessary
	• appropriate communication with team members, such as:
	  • explaining and distributing work schedules, priorities and sequences
	  • maintaining required outputs
	• documentation of outputs and resource usage, such as:
	  • quality and quantity of outputs
	  • supplies of stock materials
	  • maintenance and servicing of equipment

Scientific imaging techniques	Scientific imaging techniques include one or more of: • photographic (digital, transparencies and prints) • video • other non-visible light sources, such as ultraviolet (UV) light, fluorescence and phosphorescence • direct transformation from images to data, such as reading of DNA sequencing gels • X-ray and auto-radiations • micrographs and electron micrographs
Scientific subjects	Scientific subjects include, but are not limited to, one or more of: • building sites, environmental survey and monitoring sites • accident or incident sites and injuries • forensic evidence • biological specimens • histological sections • live animals • chromatography gels
Selecting appropriate testing procedures	Selecting appropriate testing procedures includes, but is not limited to, consideration of one or more of: • range, reliability and validity of available techniques and methods • physical characteristics of the evidence

	• availability of further samples • available resources • time and cost constraints • selection of non-destructive techniques where possible or appropriate • minimisation of sample size for destructive techniques • sequence of forensic techniques • need for possible further analysis by other forensic disciplines
Separation of collectors	Separation of collectors include one or more of: • cupellation • digestion • parting, annealing and weighing for a gravimetric finish
Sequencing of pots in a rack	Sequencing of pots in a rack includes, but is not limited to, or more of: • addition of silver wire or silver nitrate ($AGNO_3$) mix • addition of coloured salts (e.g. copper sulphate $CuSO_4$)
Site problems	Site problems include, but are not limited to, one or more of: • uncooperative site personnel • non-conformances leading to confrontation with other personnel • delays in obtaining test results • damage to services, materials and site conditions • displaced, missing and inaccurate survey markers • misidentification of samples and sampling locations • equipment breakdown and breakage • environmental problems and issues, including site access, inclement weather, traffic, wildlife, vegetation and construction activities
Solutions	Solutions may include, but are not limited to, one or more of: • solutions of strong/weak acids and bases • oxidising/reducing agents • solutions used for complexometric or precipitation titrations • stains for cells and tissues, enzymes, buffers and antibodies • diluents for maintaining isotonicity • organic solutions and histological fixatives
Sources of interference	Sources of interference include, but are not limited to, one or more of: • spectral interference • physical interference • matrix effects • presence of contaminants • masking of analytes

Specialised analytical instruments	Specialised analytical instruments include one or more of, but are not limited to:
	• spectrometric instruments:
	  • electrothermal atomic absorption spectroscopy (AAS)
	  • vapour generation AAS
	  • X-ray fluorescence (XRF) and diffraction (XRD)
	  • nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI)
	  • mass spectrometry (MS)
	  • neutron activation analysis (NAA)
	  • inductively coupled plasma mass spectrometry (ICP-MS)
	• chromatographic instruments:
	  • gas chromatography mass spectroscopy (GC-MS)
	  • GC sampling devices (e.g. headspace and thermal desorption)
	  • specialised GC detection devices (e.g. electron capture detector (ECD), flame photometric detector (FPD) and nitrogen phosphorous detection (NPD))
	  • specialised GC detection devices (e.g. fluorescent, diode array and electrochemical)
	  • liquid chromatography mass spectroscopy (LC-MS), electro-spray MS
	  • gas chromatography Fourier transform infrared (GC-FTIR)
	• electrometric instruments, such as anodic stripping voltammetry
	• flow injection analytical equipment

Spillages	Spillages include one or more of: • chemicals • radioactive materials • biologically active materials
Staff field tasks and roles	Staff field tasks and roles include, but are not limited to, one or more of: • team or project leader and survey coordinator • field sampling officer, field monitoring officer and data management officer • safety and/or environmental officer • field camp supervisor, field assistant or field-hand • driver • any combination of the above
Standard calibrations	Standard calibrations include, but are not limited to, testing and/or calibrating the following equipment and reference materials using standard methods and procedures:

	• test equipment, such as anemometers, balances, barometers, callipers, environmental chambers, hygrometers, manometers, masses, micrometers, pressure equipment, spectrophotometers, tape measures, rules, temperature (digital) indicating systems, thermometers, thermocouples, timing devices, vibration analysis equipment and weighing instruments • electrical reference standards, such as air-lines, analogue meters, attenuators, bridges-manual balance, capacitors, DC voltage references, digital instruments (calibrators, DMMs, electronic transfer standards), inductors, instrument and ratio transformers, instrument transformer test sets, potentiometers, resistors, radio frequency (RF) power meters, RF thermistor mounts and thermal converters, shunts, time interval and frequency standards, transfer standards AC-DC, voltage dividers, volt ratio boxes and watt-hour references • working standards, instruments and testing equipment, such as electromagnetic compatibility (EMC) test equipment, field strength meters, flammability test equipment, gauges/test fingers/test pins, hipot testers, impact hammers, impulse testers, instrument calibrators, network analysers, signal generators and spectrum and harmonic analysers
Standards, codes, procedures and/or workplace requirements	Standards, codes, procedures and/or workplace requirements include the latest version of one or more of: • Australian and international standards covering the requirements for the competence of testing and calibration laboratories, laboratory safety, quality and environmental management systems, and measurement management systems • national WHS standards and codes of practice, and national measurement regulations and guidelines • Australian and international standards and guidelines covering specialised analysis, accuracy of measurement methods and results, expression of uncertainty, quantifying uncertainty, and Association of Analytical Communities International (AOAC International) Official Methods of Analysis • specific codes, guidelines, procedures and methods, such as National Association of Testing Authorities (NATA) accreditation programs requirements, Australian code of good manufacturing practice for medicinal products (GMP), principles of good laboratory practice (GLP), Food Standards Australia New Zealand (FSANZ) Code, Australian Dangerous Goods Code, gene technology regulations, National Health and Medical Research Council (NHMRC) Guidelines, and Therapeutic Goods Regulations • workplace documents, such as methods and procedures; quality and equipment manuals; calibration and maintenance schedules; material safety data sheets (MSDS) and safety procedures; material, production and product specifications; production and laboratory schedules; workplace recording and reporting procedures; waste minimisation and safe disposal procedures; cleaning, hygiene and personal hygiene requirements; stock records and inventory

Statistical tests	Statistical tests include, but are not limited to, one or more of: • standard deviation, standard deviation of the mean, histograms and frequency plots • probability and normal probability plots • run charts and control charts, such as Shewhart and CuSum • regression methods for calibration, linearity checks and comparing analytical methods • analysis of variance (ANOVA) • data acceptability tests, such as T and F
Sterilisation and disposal of biohazardous wastes	Sterilisation and disposal of biohazardous wastes includes, but is not limited to, one or more of: • steam and high pressure air or steam • boiling, microwaving and autoclaving • filtration • gas, chemical and radiation
Sterilisation techniques	Sterilisation techniques include, but are not limited to, one or more of: • flaming • high temperature, high pressure steam, boiling and autoclaving • steam and membrane filtration • microwave, radiation, gas and/or chemical treatments
Stock records	Stock records include one or more of: • calibration and maintenance history • data sheets • handbooks, warranty documents, catalogues, manuals and material safety data sheets (MSDS) • records of usage, loans and breakages
Strategies to maintain work flow	Strategies to maintain work flow include, but are not limited to, one or more of: • communicating critical events on shift • recognising shortages in reagents and problems with equipment • communicating quality breakdowns • recognising urgent and abnormal results to be processed • communicating and behaving in a courteous manner • being punctual
Subculture	Subculture includes, but is not limited to, one or more of: • treatment of callus to multiply or regenerate shoots • treatment to encourage adventitious bud • treatment to encourage rooting • subculture of embryoids • cell suspensions • preparation of protoplasts

Suitability of specimen	Suitability of specimen includes, but is not limited to, one or more of: • whole or part • sex, age and breeding condition • type and characteristics • level of preservation • whether dead or alive • inclusion of features for identification, such as flowers, fruit, roots and leaves
Suitable culture conditions	Suitable culture conditions include, but are not limited to, one or more of: • specified temperature and light intensity • appropriate atmosphere, such as carbon dioxide • shaking of cell suspensions or roller bottles • conditions for establishment, multiplication or planting out • special conditions for protoplast culture
Sustainable work practices	Sustainable work practices include, but are not limited to, one or more of: • examining work practices that use excessive electricity • switching off equipment when not in use • regularly cleaning filters • insulating rooms and buildings to reduce energy use • recycling and reusing materials wherever practicable • minimising process waste
Team operation	Team operation occurs within one or more of: • small, medium and large contexts • internal and external environments • workplace guidelines covering access and equity principles and practices, licensing requirements, industrial awards, workplace bargaining agreements and codes of practice • agreed responsibility and accountability requirements • appropriate goals, objectives and allocated resources
Teams	Teams include one or more groups: • with ongoing responsibility for particular services or functions • who are project based • who have a mixture of full and part-time employees and contractors, laboratory, construction and production personnel • who are separated by distance and work at sites outside laboratory facilities
Technical records	Technical records include, but are not limited to, one or more of:

	• request forms, service agreements and contracts, clients notes, papers and feedback • worksheets, work books, check sheets and work notes, original observations, derived data and calculations, and control graphs • external and internal test reports, and calibration certificates • listing of data and the personnel responsible for sampling, performance of each test/calibration and checking of results

Techniques for preparation of samples	Techniques for preparation of samples include, but are not limited to, one or more of:
	• dissection, such as preparation of thymus extracts from mice
	• extraction (e.g. solvent extraction)
	• filtration (e.g. filter water samples and plate the sediment onto agar plates for incubation and growth of E. coli)
	• separation (e.g. dialysis)
	• precipitation and flocculation
	• centrifugation (excluding ultra centrifugation)
	• chromatography, such as:
	  • gel filtration chromatography (e.g. crude purification of proteins)
	  • affinity chromatography (e.g. purification of immunoglobulins)
	• electrophoresis, such as:
	  • polyacrylamide gel electrophoresis for separation of DNA segments
	  • agarose gel electrophoresis
	  • capillary electrophoresis
	  • gradient gel electrophoresis

Techniques to analyse chemical and biological characteristics	Techniques to analyse chemical and biological characteristics include, but are not limited to, one or more of:
	• staining, such as:
	  • Gram stain for gram negative and positive bacteria
	  • Romanowsky stain for blood films
	  • Haematoxylin and Eosin for tissue sections
	  • Oil red O for fatty cellular inclusions
	  • spore staining
	  • flagella staining
	• microscopic examination, such as:
	  • light
	  • phase contrast
	  • bright field
	  • dark ground
	  • enumeration
	• colorimetry and spectrophotometry, such as:
	  • UV-VIS
	  • fluorimetric
	  • infrared
	  • flame emission
	  • atomic absorption spectrometry

	• electrochemistry, such as:
	  • pH
	  • ion selective electrodes and polarography (e.g. concentration of chloride ions)
	• chromatography, such as:
	  • column and thin layer analytical and preparative chromatography
	  • gas and liquid chromatography for purity, raw material and formulation checks

Techniques to classify cells or species	Techniques to classify cells or species include, but are not limited to, one or more of:
	• classification of species according to taxa
	• classification of cells according to microscopic or staining characteristics
	• characteristics of bacterial colonies:
	  • growth on differential media
	  • colony morphology (size and shape)
	• biochemical reactions, such as miniaturised test strips, redox reactions and sugar tests
	•

Test methods and procedures	Test methods and procedures include, but are not limited to, one or more of: • consolidation of soil (e.g. one-dimensional and triaxial) • shear testing of soil and rock (e.g. total stress, effective stress, direct stress and triaxial stress) • permeability of soil, rock and concrete (e.g. falling head and constant head) • California Bearing Ratio (CBR) (4 point) • fatigue and creep of metals, polymers and concrete • wheel tracking in asphalt • stiffness and creep of asphalt
Tests and procedures	Tests and procedures include, but are not limited to, one or more of: • routine • infrequent and 'one-off' • quantitative or qualitative • identification or quantification of biological, chemical or physical activity • gross characteristics of a sample, including in vitro and in vivo • detection of chemical, physical or biological characteristics, features, markers or responses
Tests requiring specialised analytical instruments	Tests requiring specialised analytical instruments include, but are not limited to, one or more of: • trace analysis • non-destructive testing

	• multi-analyte determination • analysis involving high sample throughput
Tests used to identify soil properties	Tests used to identify soil properties include, but are not limited to, one or more of: • visual examination • soil/water properties, such as moisture content; liquid, plastic and shrinkage limits; plasticity and liquidity indices, linear shrinkage, dispersion and permeability • material density tests • particle size and shape tests • soil deformation characteristics • soil strength tests, such as unconfined and triaxial compression, direct shear and California Bearing Ratio • chemical tests, such as pH and organic matter
Trial specifications	Trial specifications include, but are not limited to, one or more of: • product specifications • recipe/formulations • processing parameters • trial size, production target and timeline • trial schedule and resources required • required product samples and tests • analysis of relevant WHS, food safety and environmental hazards and controls • storage requirements
Types of instrumentation and instrumental techniques	Types of instrumentation and instrumental techniques include one or more of: • colorimetric techniques, such as enzyme activity, chlorine in water, specific cations and anions • infrared and ultraviolet-visible (UV-VIS) spectrophotometry • other spectrometric techniques, such as fluorimetric analysis, flame atomic emission and flame atomic absorption spectrometry, and fourier transform infrared • chromatographic techniques, such as column and thin layer analytical and preparative chromatography, gas or liquid chromatography, ion chromatography and gel filtration chromatography • electrochemical techniques, such as pH, eH, conductivity and ion-selective electrodes • electrophoretic techniques, such as for DNA patterns and determination of protein purity • soil testing techniques, such as moisture content, organic matter content, specific anions and cations, auto-analysers for determination of total P, total Kjeldahl N, orthophosphate, nitrite/nitrate and ammonia

Typical analytes and samples requiring complex tests	Typical analytes and samples requiring complex tests include, but are not limited to, one or more of: • contaminants in food, such as heavy metals and afflotoxins • trace level (microgram and nanogram/litre) analytes • forensic testing, and drug testing in body tissues and fluids • multiple analytes, such as organochlorins and polyaromatic hydrocarbons • environmental contaminants in water, soil and air (such as pesticides) • sludge, wastewater and sewage • samples with matrix interferences

Typical basic tests carried out by laboratory/field assistants	Typical basic tests carried out by laboratory/field assistants include, but are not limited to, one or more of:
	• visual/optical tests of appearance, such as colour, texture, identity, turbidity and refractive index (alcohol content and Baume/Brix)
	• physical tests, such as:
	  • density, specific gravity and compacted density
	  • moisture content and water activity
	  • particle size, particle shape and size distribution
	• chemical tests, such as:
	  • gravimetric, colorimetric, electrical conductivity (EC) and pH
	  • specific ions using dipsticks and kits
	  • nutrients (e.g. nitrates and orthophosphates) using kits
	  • ashes, including sulphated ashes
	• biological/environmental tests, such as:
	  • pH, oxygen reduction potential (ORP), dissolved oxygen (DO) and EC
	  • E coli using test kits, and surface hygiene/presence of microbes
	• packaging tests, such as:
	  • tearing resistance, bursting strength and impact resistance
	  • permeability and/or leakage
	• mechanical tests, such as:
	  • Emerson class
	  • concrete slump

Validation	Validation includes one or more of the following: • identification and impartial resolution of ethical issues, such as conflict of interest • ethical decision making • provision of products and services which match the operational and financial needs of stakeholders, including realistic quotes for work • accurate representation of skills, services, knowledge and qualifications of individuals and the organisation • acknowledgment of services and products developed by others, intellectual property (IP) and copyright

	• provision of unbiased, accurate and appropriately qualified information results
Validation checks and/or calibration standards	Validation checks and/or calibration standards include, but are not limited to, one or more of: • positive and known positive controls • negative controls (e.g. substrate blanks) • recovery check controls • certified reference materials

Validation protocols include:	Validation protocols include one or more of the following:
	• checks that are considered to ensure performance characteristics of test method are scientifically sound
	• checks, such as:
	  • selectivity
	  • linearity
	  • range
	  • sensitivity
	  • limit of detection
	  • limit of quantitation
	  • accuracy
	  • precision
	  • recovery
	  • ruggedness
	• assessment of the clarity and completeness of the description of the method

Waste	Waste includes, but is not limited to, one or more of: • broken glass and sharps • disposable PPE • spent reagents, spent or excess samples and test pieces, solvents and batteries • used containers, boxes, bags and palettes, plastic and metals • microorganisms
WHS and environmental management requirements	WHS and environmental management requirements include: □ complying with WHS and environmental management requirements at all times, which may be imposed through state/territory or federal legislation. These requirements must not be compromised at any time □ applying standard precautions relating to the potentially hazardous nature of samples • accessing and applying current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health, where relevant

WHS and environmental workplace policies, procedures and programs	WHS and environmental workplace policies, procedures and programs include, but are not limited to, one or more of: • procedures for handling, storage and disposal of hazardous materials, hazardous goods manifest and substance register • waste minimisation, recycling, by-product collection and waste disposal • purchase and maintenance of safety-related supplies and equipment • minimisation of environmental threats • emergency, fire and environmental incident response procedures • selection and use of personal protective equipment (PPE) • standard operating procedures (SOPs), safe work instructions, laboratory manuals, operator's manuals and manufacturers' operating manuals, maintenance schedules, formulas and batch sheets, and contractor and employee handbooks • immunisation registers for employees at risk, monitoring and appropriate tasking of personnel with possible infections • consultation and issue resolution procedures
Working solutions	Working solutions include, but are not limited to, one or more of: • solutions required for diagnostic/analytical and limit tests in food and chemical laboratories, such as sulphates, chlorides and heavy metals • staining solutions for standard diagnostic/analytical procedures in biomedical/environmental laboratories, such as cell staining, fixation of cells and tissues, suspension of cells and titrimetric indicators • solutions required for laboratory maintenance and disinfection, such as 70% ethanol and hypochlorite
Workplace documentation	Workplace documentation includes one or more of: • instructions to comply with new legislation, standards, guidelines, codes and permits • plans covering management of laboratory services, quality, environment, training and maintenance • workplace procedures; standard operating procedures (SOPs) and operating manuals; instructions for equipment installation, commissioning, calibration and maintenance; and waste minimisation and disposal • safety requirements for equipment, materials or products; risk evaluation, monitoring or control procedures; and incident and accident/injury reports • test procedures, sampling procedures (sampling, preparation, labelling, storage, transport and disposal), methods for extraction or manufacture of a product, and procedures for evaluation of materials or products • compliance/non-compliance reports, quality system and continued improvement processes • cleaning, hygiene and personal hygiene requirements • schematics/workflows/laboratory layouts • stock records/inventory

	• training program contents
Workplace policies and procedures	Workplace policies and procedures refer to one or more of the following: • WHS specific procedures, such as hazard and incident reporting, communication, consultation and issue resolution, and risk management • controlling known hazards • minimising environmental threats • minimising and disposing of waste • responding to safety, emergency, fire and incidents • selecting/using PPE
Workplace procedures for field activities	Workplace procedures for field activities include, but are not limited to: • SOPs covering fieldwork, sampling and testing, and recording of data • equipment operating manuals, calibration procedures, instrument fault-finding procedures, and general maintenance and repair procedures • field camp procedures for cleaning, cooking, safety, security, hygiene, work management and set-up/take down • requirements related to protection of the environment • emergency, first aid and survival procedures, and incident/accident/injury report forms