Australian Government

Department of Education, Employment and Workplace Relations

MSL935003A Authorise the issue of test results

Revision Number: 1

MSL935003A Authorise the issue of test results

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to critically assess the accuracy of data and validity of test results prior to formally authorising their release to the client. Personnel are expected to investigate and, if necessary, rectify results that are not consistent with expected values.

Application of the Unit

Application of the unit	This unit of competency is applicable to laboratory personnel working in all industry sectors who are approved by their organisation to authorise the results obtained for specific test methods. In many instances these personnel are known as 'signatories' or 'delegates' for the tests involved. The scope of tests authorised in each case will be determined by the specialised knowledge, technical competence and experience of the personnel involved. Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These can be found at the end of this unit of competency under the section 'This competency in practice'.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		
	MSL925001A	*Analyse data and report results*
	MSL924001A	*Process and interpret data*

Employability Skills Information

Employability skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Verify the accuracy of data and technical records	1.1. Access relevant job instructions, data and technical records in laboratory information management system (LIMS) 1.2. Confirm that technical records provide sufficient information to ensure traceability for the tests involved 1.3. Compare data with expected values and identify any outliers 1.4. Inspect data records to check the integrity of data entry, alterations, transfers and calculations 1.5. Correct and initial any incorrect data records 1.6. Sign off data records as correct
2. Determine if results are acceptable and within expectation	2.1. Compare results with expected values and identify any significant differences 2.2. Check the reliability of results by examining data or results from repeat tests or duplicate samples 2.3. Assess the significance of any documented observations of atypical test conditions or environment and/or sample appearance 2.4. Check that all calculations are free from error 2.5. Check that estimations of uncertainty are reasonable and consistent with the test method, client and/or product specification requirements 2.6. Authorise the issue of results that meet the organisation's quality standards and are consistent with expectations
3. Investigate unexpected or unacceptable results	3.1. Examine records of pre-use checks and calibration performance to ensure that the equipment and/or instruments used meet test specifications and enterprise requirements 3.2. Establish whether human and/or environmental factors could have affected the reliability of results 3.3. Check for obvious sources of interferences that may have occurred during measurements 3.4. Retrieve stored samples (if available) and assess whether they are atypical or contaminated 3.5. Perform control tests using the same, or new, samples to check unexpected results 3.6. Authorise the issue of unexpected results that meet the organisation's quality standards 3.7. Identify possible root causes of unacceptable results and appropriate preventative/corrective actions

ELEMENT	PERFORMANCE CRITERIA
	3.8. Report investigation outcomes and recommendations for improvements in accordance with enterprise procedures
4. Liaise with clients about results	4.1. Establish whether sampling procedures used by the client could contribute to unexpected/unacceptable results 4.2. Arrange for new samples and/or re-testing as necessary 4.3. Explain investigation outcomes and confidence level for unexpected test results

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills include:

- verifying the accuracy and completeness of data, results and technical records
- recognising unexpected or unacceptable data and results
- using statistical tests to estimate uncertainties and determine data acceptability
- reviewing records of sampling, sample preparation, testing and/or calibration activities to identify potential causes of unacceptable data/results
- using effective problem solving strategies
- recommending appropriate preventative/corrective actions to control potential/actual non-conforming work
- applying enterprise procedures for authorising test results
- explaining technical details of sampling, test methods and results to clients
- demonstrating a professional approach and positive company/organisation image (including maintaining independence and an ability to resist improper influences)

Required knowledge

Required knowledge includes:

- scientific and technical knowledge of the samples, procedures, equipment, materials and instrumentation used to generate the test results and data
- expected values for data and results and the uncertainty components for specified test methods
- problem solving techniques and cause analysis appropriate to the test methods
- enterprise procedures for authorising the issue of test results
- relevant reporting requirements such as the Guide to the Expression of Uncertainty in Measurement (GUM), National Association of Testing Authorities (NATA)and/or test methods
- working knowledge of health, site safety and environmental management requirements relevant to job role
- working knowledge of confidentiality requirements relevant to job role

Evidence Guide

EVIDENCE GUIDE	
The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors should ensure that candidates can: • verify the accuracy and completeness of data, results and technical records for specified tests • issue specified test results in accordance with authorisation and enterprise procedures • investigate unexpected or unacceptable results in a logical and efficient manner • explain test results to clients.
Context of and specific resources for assessment	This unit of competency is to be assessed in the workplace or simulated workplace environment. This unit of competency may be assessed with: • relevantMSL09 units of competency that cover the ability to perform the tests involved, relevant data analysis and quality assurance procedures. Resources may include: • data sets and records • test methods and description of test setup • computer and relevant software or laboratory information system • relevant workplace procedures.
Method of assessment	The following assessment methods are suggested: • review of records and test results verified and issued by the candidate • feedback from supervisors and clients regarding the candidate's ability to issue authorised test results • review of recommendations and reports prepared by the candidate • questions to assess understanding of procedures governing the authorised issue of test results, acceptability of data/results, sources of uncertainty and preventative/corrective actions. In all cases, practical assessment should be supported by questions to assess underpinning knowledge and

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	those aspects of competency which are difficult to assess directly. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability. Access must be provided to appropriate learning and/or assessment support when required. The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work like environment.
This competency in practice	Industry representatives have provided the case studies below to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. **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%

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	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

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	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.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
Codes of practice	Where reference is made to industry codes of practice and Australian/international standards, it is expected the latest version will be used
Standards, **codes**, **procedures and/or enterprise requirements**	Standards, codes, procedures and/or enterprise requirements may include: • Australian and international standards, such as: • AS ISO 1000-1998 The international system of units (SI) and its application • AS ISO 17025-2005 General requirements for the competence of testing and calibration laboratories • AS/NZS ISO 10005:2006 Quality management systems - Guidelines for quality plans • AS/NZS ISO 10012:2004 Measurement management systems - Requirements for measurement processes and measuring equipment • AS/NZS ISO 9000 Set:2008 Quality management systems set • ISO 5725 Accuracy (trueness and precision) of measurement methods and results • ISO/IEC Guide 98-3:2008 Uncertainty of measurement - Part 3 Guide to the expression of uncertainty in measurement (GUM) • Eurachem/CITAC Guide CG4 Quantifying uncertainty in analytical measurement • Australian code of good manufacturing practice for medicinal products (GMP) • enterprise quality manual and customer quality plan • equipment manuals and warranty, supplier catalogues and handbooks

RANGE STATEMENT	
	• Eurolab technical report • inspection test plans, sampling plans for sites • NATA supplementary requirements for the relevant field of testing (e.g. field application document) • NATA Accreditation programs requirements • NATA Technical notes, policy circulars and guides • national measurement regulations and guidelines • Nordtest guide • principles of good laboratory practice (GLP) • sampling and test procedures and standard operating procedures (SOPs)
Data and results	Data and results may include: • entries in worksheets, spreadsheets or databases that may be linked to information management systems • observations, measurements, derived data and calculations • results of tests and analyses
Technical records	Technical records may include: • request forms, service agreements and contracts • worksheets, work books, check sheets and work notes • data and information generated during sampling, testing and/or calibrations that indicate whether quality or process parameters have been achieved • control graphs • external, internal test reports and calibration certificates • clients notes, papers and feedback • listing of data, personnel responsible for sampling, performance of each test/calibration and checking of results
Calculations	Calculations may be performed: • with or without a calculator or computer software, such as spreadsheets, databases and

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	statistical packages
Statistical analysis	Statistical analysis may include the use 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
Estimates of uncertainty	Estimates of uncertainty may include components such as: • 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, immersion depth of a temperature probe) • reproducibility of quality control data
Human and environmental factors	Human and environmental factors may include: • technician preparing the sample and/or performing the test did not apply the test method correctly • inadequate attention to detail, fatigue, stress • inadequate hygiene or sterility • unacceptable dust, radiation, humidity, temperature and illumination levels • electromagnetic disturbances • unacceptable variations to gas, electricity and water supply • unacceptable sound and vibration levels
Sample preparation problems	Sample preparation problems could result from:

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	• use of incorrect sample containers • incorrect particle size • contamination • incorrect sample handling, storage or conditioning (filtered/non-filtered, temperature control, moisture content and preservation) • incorrect matrix • incomplete digest
Sources of interference	Sources of interference may include: • presence of contaminants • spectral interference (e.g. in Inductively Coupled Plasma Spectroscopy) • physical interference (e.g. in Atomic Absorption Spectroscopy) • matrix effects • masking of analytes
Preventative/corrective actions	Preventative/corrective actions may include: • more regular use of certified reference materials • internal quality controls using secondary reference materials • participation in inter-laboratory comparison or proficiency testing programs • replicate tests or calibrations using the same or different methods • retesting or recalibration of retained items • correlation of results for different characteristics of an item • additional audits and management reviews • more regular quality checks on consumables • increased staff observation, supervision and/or training • more detailed sample specifications, test methods and procedures
Confidence level	• The most common confidence level is 95% in accordance with the National Measurement Act, 1960. However, some applications require a higher level of confidence
Occupational health and safety	OHS and environmental management

RANGE STATEMENT	
(**OHS**) **and environmental management requirements**	requirements: • all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time • all operations assume the potentially hazardous nature of samples and require standard precautions to be applied • where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health

Unit Sector(s)

Unit sector	Maintenance

Competency field

Competency field	

Co-requisite units

Co-requisite units		