



Australian Government

Department of Education, Employment and Workplace Relations

MSS025003A Report environmental data

Release: 1

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Modification History

Not applicable.

Unit Descriptor

This unit of competency covers the ability to perform scientific calculations, process and interrogate environmental data sets, analyse trends and uncertainty in data, and report results within the required timeframe. The unit requires personnel to solve problems where alternatives are not obvious and where investigations and trials may be required and the implications of various solutions considered.

Application of the Unit

This unit of competency is applicable to environmental technicians working in all industry sectors.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MSS024004A Process and present environmental data

Employability Skills Information

Not applicable.

Elements and Performance Criteria Pre-Content

Not applicable.

Elements and Performance Criteria

1	Perform scientific calculations	1.1	Ensure raw data are consistent with expectations and reasonable ranges
		1.2	Calculate scientific quantities involving algebraic, power, exponential and/or logarithmic functions
		1.3	Ensure calculated quantities are consistent with estimations
		1.4	Present results using the appropriate units, uncertainties and number of significant figures
2	Determine variation and/or uncertainty in data distributions	2.1	Organise raw data into appropriate frequency distributions
		2.2	Calculate means, medians, modes, ranges and standard deviations for ungrouped and grouped data
		2.3	Interpret frequency distributions to determine the characteristics of the sample or population
		2.4	Calculate standard deviations and confidence limits for means and replicates
		2.5	Estimate the sampling error and/or uncertainty in data using statistical analysis
		2.6	Determine data acceptability using statistical tests and enterprise procedures
3	Interpret data and related statistics	3.1	Recognise significant trends in data
		3.2	Use standard statistical methods to test for an association or correlation between variables
		3.3	Use standard statistical methods to test hypotheses involving the same variable between samples, samples with more than one variable and for paired samples
		3.4	Verify data interpretation with supervisor, as necessary

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| 4 | Check for aberrant data sets | 4.1 | Identify data that cannot be reconciled with sample, data set and/or documentation, monitoring procedures and/or expected outcomes |
| | | 4.2 | Determine appropriate actions in consultation with supervisor, as necessary |
| 5 | Report data and analysis | 5.1 | Use charts, tables and graphs to present summarised data and analysis results in the required format |
| | | 5.2 | Verify that entry of data and results are correct |
| | | 5.3 | Clearly identify summary information and any significant trends and/or problems with data |
| | | 5.4 | Prepare reports in a format and style consistent with their intended use and enterprise guidelines |
| | | 5.5 | Communicate results within the specified time and in accordance with enterprise confidentiality and security guidelines. |

Required Skills and Knowledge

Required skills

Required skills include:

- interpreting data handling procedures, guidelines and manuals
- performing laboratory computations
- calculating scientific quantities
- performing basic statistical analysis
- performing graphical analysis
- reporting results in the required formats and expected timeframe
- storing, retrieving and manipulating data following document traceability procedures
- maintaining the security and confidentiality of data in accordance with workplace and regulatory requirements
- seeking advice when issues/problems are beyond scope of competence/responsibility

Required knowledge

Required knowledge includes:

- role of statistics in the interpretation/analysis of environmental data
- relevant terminology, such as variables, dispersion, central tendency, normal distribution, confidence level and replication, inference, causation, association, correlation and hypothesis
- characteristics of a valid measurement and valid sample
- sources and estimates of uncertainty in measurements
- calculations involving evaluation of formulae containing algebraic, power, exponential and/or logarithmic functions, measures of central tendency, sum of squares, variance and standard deviation
- preparation and interpretation on linear and non-linear graphs, and frequency distribution plots
- determination of regression line equations and correlation coefficients
- statistical analysis and significance tests, such as t-test, analysis of variance (ANOVA), chi squared test and data acceptability tests, such as Q, T and Youden
- procedures for data traceability
- procedures for verifying data and rectifying mistakes
- procedures for maintaining and filing records, and maintaining security of data

Evidence Guide

Overview of assessment	Competency must be demonstrated in the ability to perform consistently at the required standard.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently apply the skills covered in this unit of competency in new and different situations and contexts. Critical aspects of assessment and evidence include: • storing, retrieving and manipulating environmental data in accordance with enterprise procedures and traceability requirements • calculating scientific quantities relevant to the work and presenting accurate results in the required format • choosing appropriate graphical/statistical methods to analyse given data sets • preparing frequency distributions for given data, and calculating and interpreting measures of central tendency and dispersion • analysing data to determine relationships between variables and samples • maintaining the security and confidentiality of data in accordance with workplace and regulatory requirements • reporting results in the required formats and expected timeframe.
Context of and specific resources for assessment	This unit of competency is to be assessed in the workplace or a simulated workplace environment. Assessment should emphasise a workplace context and procedures found in the candidate's workplace. This unit of competency may be assessed with: • <i>MSL924002A Use laboratory application software</i> • environmental monitoring units, such as the <i>MSS024000A and MSS025000A series units of competency</i>. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. Resources may include: • data sets and records • computer and relevant software or enterprise information system

	relevant workplace procedures.
Method of assessment	The following assessment methods are suggested: - review of data worksheets, calculations, computer files (such as spreadsheets and databases), statistical analysis, graphs and/or tables prepared by the candidate - questions to assess understanding of relevant data handling procedures, graphical/statistical methods, trends in data and sources of uncertainty - review of reports prepared by the candidate - feedback from supervisors and peers regarding the candidate's ability to analyse and report data in accordance with enterprise procedures. In all cases, practical assessment should be supported by questions to assess underpinning knowledge and 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. 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.
Guidance information for assessment	

Range Statement

Codes of practice	Where reference is made to industry codes of practice, and/or 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/NZS ISO 14000 Set:2005 Environmental management standards set - AS ISO 1000:1998 The international system of units (SI) and its application

	• Eurachem/CITAC Guide CG4 Quantifying uncertainty in analytical measurement • 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) • national measurement regulations and guidelines • National Association of Testing Authorities (NATA) technical notes • material safety data sheets (MSDS) • equipment manuals and warranty, supplier catalogues and handbooks • sampling and test procedures and standard operating procedures • enterprise quality manual • validation of the equipment and associated software, where applicable • validation of spreadsheets developed in-house for assay and process calculations
Data records	Data records may include: • worksheets • spreadsheets or databases linked to information management systems • the results of tests, measurements, analyses and surveys
Laboratory computations	Laboratory computations may include: • algebraic, logarithmic, exponential and power functions • calculations involving fractions, decimals, ratios, proportions and percentages • evaluation of formulae containing powers, exponents and logarithms functions • use of scientific notation, correct units and correct number of significant figures • calculation of uncertainties • preparation and interpretation of linear, semi-log and log-log graphs • calculation and interpretation of statistical quantities, such as mean, median, mode, range, variance and standard deviation • determination of regression line equations and correlation coefficients

Calculations of scientific quantities	Calculations of scientific quantities may include: - percentage and absolute uncertainties in measurements and test results - density and salinity - noise (dB and dBA) - dose (mg), dilution(1:10), concentration (molarity, g/mL, mg/L, ppm and ppb) - pH, [H⁺], [OH⁻], buffer calculations, Ka, pKa, Kb, pKb and Kw - solubility constants Ks and pKs - radioactive half life, dose, activity and exposure - optical properties, such as absorbance, transmittance, path length, extinction coefficient, concentration (Beers law) and detection limits - electrical properties, such as conductivity and resistivity
Graphical analysis	Graphical analysis may include: - determination of linear, logarithmic, exponential and power relationships - regression lines and interpretation of correlation coefficients - preparing frequency distributions for given data - calculating and interpreting measures of central tendency and dispersion
Calculations	Calculations may be performed: - with or without a calculator - with computer software, such as: - spreadsheets - databases - statistical packages
Statistical analysis	Statistical analysis may include the use of: - histograms, frequency plots, stem and leaf plots, box plots and scatter plots - probability and normal probability plots - regression methods for calibration, linearity checks and comparing analytical methods - Pearson's product moment correlation coefficient - chi squared tests - ANOVA - data acceptability tests, such as Q, t and Youden

Records	Records may include information associated with: • purchase of equipment and materials • service records • safety procedures • history of calibration and test results • management of data sets
Occupational health and safety (OHS) and environmental management requirements	OHS and environmental management 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)

Environmental

Custom Content Section

Not applicable.