



Australian Government

MSS025003 Report environmental data

Release: 1

MSS025003 Report environmental data

Modification History

Release 1. Supersedes and is equivalent to MSS025003A Report environmental data

Application

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.

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

While no specific licensing or certification requirements apply to this unit at the time of publication, environmental monitoring and management activities are governed by relevant legislation, regulations and/or external accreditation requirements. Local requirements should be checked.

Pre-requisite Unit

MSS024004 Process and present environmental data

Competency Field

Data

Unit Sector

Environmental

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

- | | | | |
|---|--|-----|---|
| 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 workplace 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. |
| 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 | <p>5.1 Use charts, tables and graphs to present summarised data and analysis results in the required format.</p> <p>5.2 Verify that entry of data and results are correct.</p> <p>5.3 Clearly identify summary information and any significant trends and/or problems with data.</p> <p>5.4 Prepare reports in a format and style consistent with their intended use and workplace guidelines.</p> <p>5.5 Communicate results within the specified time and in accordance with workplace confidentiality and security guidelines.</p> |
|---|---------------------------------|---|

Foundation Skills

This section describes those required skills (language, literacy and numeracy) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Standards, codes, and/or workplace requirements include the latest version of one or more of:

- Australian and international standards covering: environmental management such as AS/NZS ISO 14000 Basic Set;2007 Environmental Management Basic Set; ISO 5725 Accuracy (trueness and precision) of measurement methods and results, ISO/IEC Guide covering uncertainty in measurement, and Eurachem/CITAC Guide CG4 Quantifying uncertainty in analytical measurement
- national measurement regulations and guidelines, registration/licensing and/or accreditation requirements, and National Association of Testing Authorities (NATA) technical notes
- sampling/testing methods, procedures, guidelines provided by workplace or regulator
- validation of equipment and associated software, validation of spreadsheets developed in-house for routine calculations where applicable

	workplace documents, such as standard operating procedures (SOPs), work schedules, quality manual, recording and reporting procedures, equipment manuals, supplier catalogues, handbooks; safety data sheets (SDS) and safety procedures; waste minimisation, containment, processing and safe disposal procedures.
Data records include one or more of:	- worksheets - spreadsheets or databases linked to information management systems - results of tests, measurements, analyses and surveys.
Laboratory computations include one or more of:	- 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 percentage and absolute uncertainties in measurements and test results - use of calculators and/or computer software, such as spreadsheets, databases and statistical packages.
Calculations of scientific quantities include one or more of:	- 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, K_a, pK_a, K_b, pK_b and K_w - solubility constants K_s and pK_s - 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 includes one or more of:	- preparation and interpretation of linear, semi-log and log-log graphs - determination of linear, logarithmic, exponential and power relationships - determination of regression lines and interpretation of correlation coefficients.

Statistical analysis includes one or more of:

- preparing frequency distributions/plots, histograms, stem and leaf plots, box plots and scatter plots
- probability and normal probability plots
- calculation and interpretation of statistical quantities, such as central tendency (mean, median, mode) and dispersion (range, variance and standard deviation)
- 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 include information associated with one or more of:

- purchase of equipment and materials
- service records
- safety procedures
- history of calibration and test results
- management of data sets.

Work health and safety (WHS) and environmental management requirements include:

- compliance with relevant federal/state/territory WHS legislation at all times
- assuming that samples are potentially hazardous and applying standard precautions
- accessing and applying current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and state/territory Departments of Health, where relevant.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSS025003A Report environmental data

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998>

Assessment Requirements for MSS025003 Report environmental data

Modification History

Release 1. Supersedes and is equivalent to MSS025003A Report environmental data

Performance Evidence

- Evidence of competence in this unit must satisfy all of the requirements of the elements and performance criteria, and include demonstration of:
- storing, retrieving and manipulating environmental data in accordance with workplace procedures and traceability requirements
- performing calculations with or without a calculator/computer software and presenting accurate results in the required format and timeframe
- calculating at least four (4) scientific quantities relevant to their work
- 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
- seeking advice when issues/problems are beyond scope of competence/responsibility
- maintaining the security and confidentiality of data in accordance with workplace and regulatory requirements

reporting results in the required formats and expected timeframe.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- characteristics of a valid measurement and valid sample
- sources and estimates of uncertainty in measurements
- 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
- 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 ensuring data traceability
- procedures for verifying data and rectifying mistakes

- procedures for maintaining and filing records, and maintaining security of data.

Assessment Conditions

- Judgement of competence must be based on holistic assessment of the evidence. Assessment methods must confirm consistency of performance over time, rather than a single assessment event.
- This unit of competency is to be assessed in the workplace, or a simulated workplace environment. A simulated workplace environment must reflect realistic operational workplace conditions that cover all aspects of workplace performance, including the environment, task skills, task management skills, contingency management skills and job role environment skills.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process such as workbooks, written assessments or interviews (provided a record is kept in each case).
- Holistic assessment methods include:
 - review of data worksheets, calculations, computer files (such as spreadsheets and databases), statistical analysis, graphs and/or tables prepared by the candidate
 - review of at least one (1) report containing summarised data and analysis results prepared by the candidate
 - feedback from supervisors regarding the candidate's ability to analyse and report data in accordance with workplace procedures and within the agreed timeframe
 - oral and/or written questions to assess the candidate's knowledge of relevant data handling procedures, graphical/statistical methods, trends in data and sources of uncertainty.
- Access is required to all instruments, equipment, materials, workplace documentation, procedures, and specifications associated with this unit including, but not limited to:
 - calculator, computer and relevant software or laboratory information system
 - environmental data sets and records
 - documentation, including user manuals; workplace procedures for recording, processing, storing and reporting environmental data; and test/survey methods.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competency and currency.
- Technical competence can be demonstrated through:
 - relevant VET or other qualification/Statement of Attainment AND/OR
 - relevant workplace experience
- Currency can be demonstrated through:
 - performing the competency being assessed as part of current employment OR

- having consulted with an organisation providing environmental monitoring, management or technology related services about performing the competency being assessed within the last twelve months.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5b04f318-804f-4dc0-9463-c3fb9a3fe998>