



Australian Government

MSS025003 Report environmental data

Release: 1

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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.

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|---|---|--|
| 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. |

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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 workplace guidelines. |
| | | 5.5 | Communicate results within the specified time and in accordance with workplace confidentiality and security guidelines. |

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

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Links

MSA Training Package Implementation Guides - <http://mskills.org.au/training-packages/info/>