



Measurement of Uncertainty





New Concept to Environmental Labs?

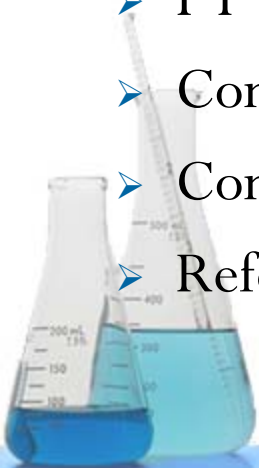
- Although a well established concept in calibration labs where simpler physical measurements are involved, the application of measurement uncertainty is relatively new to testing laboratories where random sources of uncertainty dominate.
- In the Environmental Lab measurement of uncertainty usually pertains to “Analytical Uncertainty”





Analytical Uncertainty

- A subset of Measurement Uncertainty that includes all laboratory activities performed as part of the analysis
- These laboratory activities consist of estimates uncertainties from data derived from routine laboratory QC samples such as:
 - Duplicates – Precision
 - PT Studies
 - Controls (LCS) – Accuracy
 - Control Limits (95% Confidence)
 - Reference Materials (traceable to NIST) - Accuracy



REPORTING: UNCERTAINTY

nelac 5.5.10.3.1

- where applicable, a statement on the estimated uncertainty of measurement; information on uncertainty is needed when a client's instruction so requires;

TNI 5.10.3.1

- where applicable, a statement on the estimated uncertainty of measurement; information on uncertainty is needed in test reports when it is relevant to the validity or application of the test results, when a customer's instruction so requires, or when the uncertainty affects compliance to a specification limit;

ISO 17025 Change



Do we need to report?

- where applicable, a statement on the estimated uncertainty of measurement;
 - Does not say you have to report uncertainty values
 - Statement can be a narrative qualifying results
 - ✦ Usually included with test reports now
 - Most customers would not want to see results with \pm factor



When?

- when it is relevant to the validity or application of the test results,
- when a customer's instruction so requires,
- or when the uncertainty affects compliance to a specification limit;





MODULE 6: RADIOCHEMICAL





MEASUREMENT UNCERTAINTY

- Each result shall be reported with its measurement uncertainty.
 - indicate whether the uncertainty is the combined standard uncertainty (“one sigma”) or an expanded uncertainty; and
 - for expanded uncertainties, indicate the coverage factor (k) and optionally the approximate level of confidence.
- The procedures shall be documented and shall be consistent with
 - ISO Guide 98: 1995, Guide to the Expression of Uncertainty in Measurement (GUM)
 - Chapter 19 of the Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP)



Toxicity

- 1.7.1.4 Test Sensitivity
- a) The PMSD (percent minimum significant difference) shall be calculated according to the formula specified by the method and reported with the test results.
- b) Point estimates: (LCp, ICp, or ECp) – Confidence intervals shall be reported as a measure of the precision around the point estimate value, when the calculation is possible.
- Toxicity statistics computer programs (including one by EPA) provide these calculations