AQR: Measurement Traceability

Introduction

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6.5.2.a
6.5.2.c

Based on the general requirements in ISO/IEC 17025:2017, traceability of a measurement is required for all measurements where measurement uncertainty is estimated and/or when the measurement result has a significant impact on the final test result.[1]

A 'traceable' measurement is one that has an unbroken chain of comparison to national (NIST) or international standards (SI) with each comparison having a stated uncertainty.

Reference materials and reference standards

6.5.2.b

The laboratory employs methods and procedures that rely on comparing a sample to a known reference material or a reference standard. The reliability and accuracy of these comparisons depends on the quality of the reference material or standard upon which the comparison is based.

- The reference standard and the reference material, when possible, must be traceable to national or international standards. See appropriate blocks for additional information.
- The acceptability of reference materials is entirely a matter of professional judgment based on the training and experience of analysts in the applicable discipline or category of testing.

Traceability of reference standards

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The following are some examples of items that shall be traceable to the International System of Units (SI):

- masses used to estimate uncertainty for balances
- measuring devices used for measurements of overall length and barrel length in firearms examinations
- certified reference material used for standards in toxicology analysis

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[1] "ASCLD/LAB Policy on Measurement Traceability," AL-PD-3057-Ver 1.3, Dec 31, 2014

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Classification of reference materials

Reference materials may be classified in the following categories:

- reference materials that contain substances of known composition or known composition and concentration
  - drug standards
  - blood alcohol quality control sample
  - quality control samples for quantitative analyses in Toxicology
- exemplars
  - paint
  - fibers
  - hair
  - firearms
  - ammunition
- Data collections
  - mass spectral libraries
  - infrared spectral libraries
- Certified Reference Material (CRM) (VIM 5.14): Reference material, accompanied by documentation issued by an authoritative body and providing one or more specific property values with associated uncertainties and traceabilities, using valid procedures.
- Reference Material (RM) (VIM 5.13): Material, sufficiently homogenous and stable with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties.

Traceability of reference materials

6.5.2.b
6.5.3
6.5.3.a

The traceability of reference materials may be established by

- comparison to a national or international certified reference material
- certification, traceable to national or international standards, from a reference material producer that is accredited to ISO Guide 34:2009 by an accrediting body that is signatory to a mutual or multilateral recognition
- in-house analysis, such as
  - comparison to another standard from an independent source
  - conducting appropriate assays for purity or identity

The laboratory must maintain records supporting the authentication of reference materials.

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Reference material collections

6.4.3
6.4.3.2 AR

Reference material collections must be documented and appropriately controlled.

Each component of the collection must have a unique identifier. Written or electronic lists or logs are maintained for the drug, alcohol and toxicology quality control, trace exemplar, and firearms collections. This documentation is maintained in the appropriate laboratory.

Collections are stored in the appropriate secured laboratory area and use is restricted to analysts authorized to work in each area.

Good laboratory practices must be followed when storing and sampling reference materials in order to prevent deterioration or contamination. The laboratory's *Safety Manual* contains procedures for the safe handling of biological and chemical substances.

Reference collections are not transported between laboratories.

Individual firearms, ammunition, and trace reference exemplars may be transported between appropriate examination areas.

Drug standards for the Chemistry Unit and some of the solid dose Toxicology standards are stored in the Controlled Substances Laboratory. Toxicology analysts must log-out individual standards for transport to the Toxicology Laboratory.

All other Toxicology standards that are preserved in a solvent are stored in the Toxicology Laboratory.

Drug standards (Chemistry Unit) and firearms exemplars are inventoried annually.

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Equipment
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Equipment itself is not traceable. Only a measurement result has the potential to be metrological traceable. Any equipment used where the measurement has a significant effect on the final result will be calibrated by a supplier that is accredited to ISO/IEC 17025:2017 with a scope of accreditation covering the calibration performed. See specific section procedure manuals for equipment that requires calibration and frequencies.

Records
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6.5.1.2 AR
6.5.2.a
6.5.2.c

All records documenting the above listed traceabilities of the reference material and equipment shall be maintained by the Quality Manager.

Records may be disposed of after one accreditation cycle.

If a supplier that meets standard 6.5.1.1 is not available, the competence, capability, and traceability for the supplier and external product/service shall be confirmed and record of objective evidence of the confirmation shall be maintained by the Quality Manager.