Designation: ~~C1156 – 03 (Reapproved 2011)~~ C1156 – 18

Standard Guide for Establishing Calibration for a Measurement Method Used to Analyze Nuclear Fuel Cycle Materials[1]

This standard is issued under the fixed designation C1156; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide provides the basis for establishing calibration for a measurement method typically used in an analytical chemistry laboratory analyzing nuclear materials. Guidance is included for such activities as preparing a calibration procedure, selecting a calibration standard, controlling calibrated equipment, and documenting calibration. The guide is generic and any required technical information specific for a given method must be obtained from other sources.

1.2 The guidance information is provided in the following sections:

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1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate ~~safety~~ safety, health, and ~~health~~environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C859 Terminology Relating to Nuclear Materials

C1009 Guide for Establishing and Maintaining a Quality Assurance Program for Analytical Laboratories Within the Nuclear Industry

C1068 Guide for Qualification of Measurement Methods by a Laboratory Within the Nuclear Industry

C1128 Guide for Preparation of Working Reference Materials for Use in Analysis of Nuclear Fuel Cycle Materials

~~C1210 Guide~~C1210 Guide for Establishing a Measurement System Quality Control Program for Analytical Chemistry Laboratories Within the Nuclear Industry

~~C1215 Guide~~C1215 Guide for Preparing and Interpreting Precision and Bias Statements in Test Method Standards Used in the Nuclear Industry

~~C1297 Guide~~C1297 Guide for Qualification of Laboratory Analysts for the Analysis of Nuclear Fuel Cycle Materials

[1] This guide is under the jurisdiction of ASTM Committee C26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.08 on Quality Assurance, Statistical Applications, and Reference Materials

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.2 *ISO Standard:*
~~ISO~~ISO/IEC 17025 General Requirements for the Competence of ~~Calibration~~Testing and ~~Testing~~Calibration Laboratories[3]

3. Terminology

3.1 For definitions of terms used in this guide but not defined herein, refer to Terminology C859.

4. Significance and Use

4.1 Calibration is a fundamental part of making measurements and its effect on the quality of measurement data is significant. Thus, sufficient attention must be given to calibration when it is established for a measurement method so that the data produced will be acceptable. The use of an inappropriate calibration standard, inadequate instructions for calibration, and poor documentation of the calibration process are examples of circumstances that can adversely affect the validity of a calibration. Thus, the calibration process must conform to criteria established to ensure the validity of calibration ~~results.~~ results and any associated measurement data. Such criteria are given in Guide C1009, in which calibration is identified as a component of laboratory quality assurance (see Fig. 1). This guide expands upon those criteria to provide more comprehensive guidance for establishing calibration.

4.2 The manner of calibration and other technical requirements for calibrating a measurement method are usually established when a method is first introduced into a laboratory, which may be through validation and qualification as defined by Guide C1068 (see Fig. 1). However, calibration involves more than the technical aspects of the calibration process. The other dimension of the process is the operational requirements that are necessary to ensure that calibration results are valid and that they are documented and verifiable should their integrity be questioned. The provisions of this guide provide those operational requirements and should be considered whenever calibration is planned and established.

5. General Considerations

5.1 The degree of attention and effort given to calibration should depend on how the measurement data are to be used. In the analysis of nuclear materials, for example, measurement data produced for the control and accountability of nuclear material would normally require more attention than data produced for process control during the processing of that material. The areas in which the level of attention and effort could vary are: the calibration standard, number of calibration points, calibration acceptance criteria, frequency of calibration, and frequency of calibration verification.

5.2 Many of the provisions of this guide would not apply to the calibration of certain instruments when their calibration is an integral part of the analysis procedure involving a simple one- or two-step adjustment of a meter or gage. The pH meter is an example when a buffer is used to ~~adjust~~calibrate the meter just before a pH reading is taken for a sample solution.

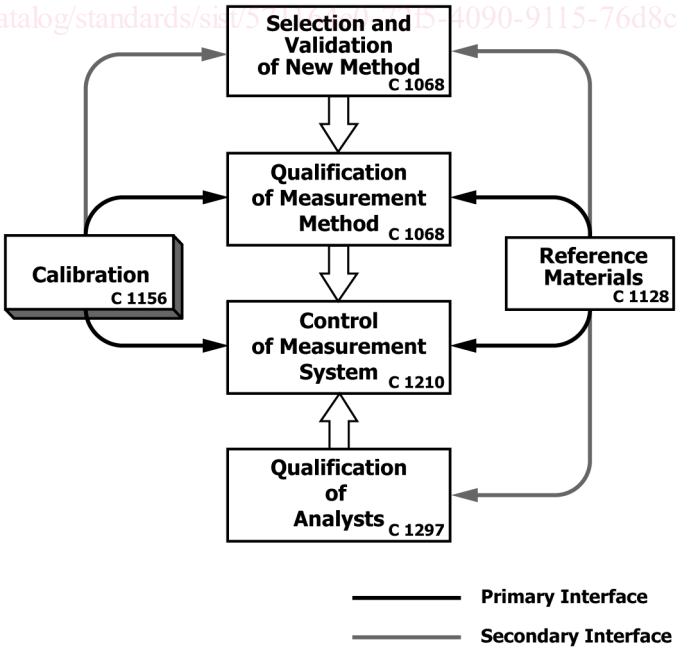

FIG. 1 Quality Assurance of Analytical Laboratory Data

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.