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American National Standard

ANSI N15.51-2007

for Methods of Nuclear Material Control – Measurement Control Program – Nuclear Materials Analytical Chemistry Laboratory

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Revision of
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American National Standard
for Methods of
Nuclear Material Control –

Measurement Control Program – Nuclear Materials Analytical Chemistry Laboratory

Secretariat

Institute of Nuclear Materials Management

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American National Standards Institute, Inc.

American National Standard

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Foreword (This foreword is not part of American National Standard ANSI N15.51-2007.)

This standard was revised under the procedures of the American National Standards Institute by Accredited Standards Committee N15 on Methods of Nuclear Material Control. The secretariat of N15 is held by the Institute of Nuclear Materials Management (INMM). Committee N15 has the following scope:

> Standards for the protection, control, and accounting of special nuclear materials in all phases of the nuclear fuel cycle, including analytical procedures where necessary and special to this purpose, except that physical protection of special nuclear materials within a nuclear power plant is not included.

The Institute of Nuclear Materials Management has long recognized the importance of measurement quality for maintaining adequate protection, control, and accountability (MPC&A) for nuclear materials. Because of this commitment to quality, Writing Group INMM-5 on Measurement Control was established. The Writing Group issued a generic standard covering the general principles of good and acceptable measurement control, N15.41 "Derivation of Measurement Control Programs - General Principles." Additional standards were prepared to provide guidance for determining and monitoring the quality of various types of measurements made by the MPC&A community. This standard provides the principal elements of a measurement control program for an analytical chemistry laboratory supporting nuclear fuel cycle activities.

There are 25 annexes in this standard. Annexes A, F, G, H, K, P, R, S, T, U, W, and Y are normative and form part of the requirements of this standard. Annexes B, C, D, E, J, L, M, N, Q, V, X, Z, and AA are informative and are included for information only. (In accordance with the ISO Directives Part 3, there are no annexes designated with the letters 'I' or 'O'.)

Suggestions for improvement of the standard will be welcome. They should be sent to the Institute of Nuclear Materials Management, 60 Revere Drive, Suite 500, Northbrook, IL 60062. (Additional information about the INMM may be found at http://www.inmm.org.)

This standard was prepared by Committee N15 following ANSI requirements for due process and for obtaining consensus. N15 Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the N15 Committee had the following members:

Carrie Mathews, Chair
(Pacific Northwest National Laboratory)
Melanie Miller, Vice-Chair
(U.S. Department of Energy)
Lynne Preston, Secretary
(U.S. Department of Energy)

Organization Represented	*Name of Representative*
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Writing Group INMM 5.1 on Measurement Control for the Analytical Laboratory, which developed this standard, had the following members:

Charles Pietri, Chair
(HITECH Consultants)
Kenneth Lewis, Secretary
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(United States Enrichment Corporation, Paducah Gaseous Diffusion Plant)
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(Japan Atomic Energy Agency)

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Measurement Control Program – Nuclear Materials Analytical Chemistry Laboratory

0. Introduction

The ability to manage nuclear materials through the principles of material accounting depends on the knowledge of the chemical composition, the concentrations of components, and the associated uncertainty of each measurement of those materials as they are produced, used, shipped, stored, and inventoried. When making the required measurements, the measurement data must be reliable. A comprehensive measurement control program demonstrates the reliability of the measurement data, quantifies the performance of the measurement system, assures that the measurements used in the nuclear industry are suitable for their intended use, and provides for detection and correction of adverse changes.

A laboratory measurement control program should address both the technical and the administrative aspects of measurement processes. The administrative aspects correspond to quality assurance elements, and their implementation establishes quality assurance practices in the measurement control program. Such practices should be traceable to the measurement control requirements of 10 CFR Part 74 and DOE O 470.4, DOE M 470.4-1 and DOE M 470.4-6 (See Annex AA).[1]

The goal of any measurement control program is to document and quantify the performance of each analytical measurement system and to provide for detection and correction of adverse changes. The specific needs of each system are determined by identifying the level of performance required and the consequences of using faulty data from that system as part of the material control and accountability program. Additionally, for those facilities that must conduct physical inventories, the measurement control program provides data for establishing the uncertainty (or limit of error) associated with a given inventory difference value. The provisions of this standard provide the basis for evaluating existing practices and modifying those practices, if necessary.

1. Scope and purpose

1.1 Scope. This standard is based on N15.41 (see clause 2, Normative References), which provides the general principles of a measurement control program. This N15.51 standard, although limited to the principal elements of a measurement control program for an analytical chemistry laboratory supporting nuclear fuel cycle activities, has elements that are also applicable to other analytical laboratories.

Measurement control elements specific for bulk measurements (mass and volume) from processes and specific process sampling techniques are not addressed in detail in this standard nor are special analytical techniques such as mass spectrometry and calorimetry. These subjects are treated in other standards of this series.

[1] See annex AA, Bibliography, for the titles and availability information for these publications.