American National Standard

for Nuclear Materials Management -

Measurement Control Program - Nuclear Materials Analytical Chemistry Laboratory

ANSI N15.51-1990 (R2006)

Approved American National Standard

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Secretariat
Institute of Nuclear Materials Management

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American National Standard

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Foreword (This foreword is not part of American National Standard N15.51-1990.)

This standard has been developed under the procedures of the American National Standards Institute by Task Group INMM-5.1 on Analytical Chemistry Laboratory Measurement Control under the cognizance and guidance of Subcommittee INMM-5 on Measurement Controls, of Committee N15 on Methods of Nuclear Material Control. The secretariat of Committee N15 is held by the Institute of Nuclear Materials Management.

In the interest of controlling the quality of measurements for nuclear materials, the Institute of Nuclear Materials Management has long recognized the importance of measurement control programs as a means of managing and safeguarding nuclear materials. This standard provides the principal elements of a measurement control program for an analytical chemistry laboratory supporting nuclear fuel cycle activities.

The scope of measurement control programs is wide and, therefore, this standard is expected to be reviewed on a continuing basis, resulting in periodic revision. It is recognized that, in some cases, the standard may not fulfill the user's requirements as to application and detail; if such cases prove to be numerous, the standard will require expansion.

Committee N15 has the following scope:

Standards for the protection, control, and accounting of special 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 material within a nuclear power plant is not included

Standards Committee N15 has 11 subcommittees

INMM-1, Accountability
INMM-2, Material Classification
INMM-3, Statistics
INMM-5, Measurement Controls
INMM-6, Inventory Techniques
INMM-7, Audit, Records, and Reporting Techniques
INMM-8, Calibration Techniques
INMM-9, Nondestructive Assay
INMM-10, Physical Security
INMM-11, Training and Certification
INMM-14, International Safeguards

The objective of Subcommittee INMM-5 is to propose appropriate standards and guides for the control of measurement processes that measure nuclear materials to ensure that the measurements used are of adequate quality for their intended purpose. To accomplish this objective, four task groups were established: INMM-5.1, Analytical Chemistry Laboratory Measurement Control; INMM-5.2, Mass Measurement Control; INMM-5.3, Mass Spectrometry Measurement Control; INMM-5.4, Nondestructive Assay Measurement Control.

There are 24 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, and Z 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 this standard will be welcome. They should be sent to the Institute of Nuclear Materials Management, 60 Revere Drive, Suite 500, Northbrook, IL 60062.

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Methods of Nuclear Material Control, 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:

Obie P. Amacker, Jr., Chair
(Pacific Northwest Laboratory)
Ken R. Byers, Vice-Chair
(Pacific Northwest Laboratory)
D. James Frank, Secretary
(Rockwell International)

Organization Represented	*Name of Representative*
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American Nuclear Society	J. W. Arendt
American Society of Quality Control	(Representation Vacant)
Association of American Railroads, Bureau of Explosives	(Representation Vacant)
Atomic Industrial Forum, Inc.	Walter Meyer
Electric Light and Power Group	C. B. (Ben) Franklin
Institute of Nuclear Materials Management	John Lemming
National Institute of Standards and Technology	W. P. Reed
Society for Applied Spectroscopy	(Representation Vacant)
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U.S. Nuclear Regulatory Commission	Philip Ting

Subcommittee INMM-5 on Measurement Controls, which coordinated the development of this standard, had the following members:

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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 Order 5633.3.[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 is 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 ANSI N15.41 (see clause 2, Normative References), which provides the general principles of a measurement control program. This 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 Z, Bibliography, for the titles and availability information for these two publications.