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ANSI N15.41-1984 ◀

# American National Standard

*for Nuclear Facilities –  
Derivation of Measurement  
Control Programs –  
General Principles*

 **ANSI** American National Standards Institute  
11 West 42nd Street  
New York, New York  
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Secretariat

**Institute of Nuclear Materials Management**

Approved October 1, 1984

**American National Standards Institute, Inc**

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This standard has been developed under the procedures of the American National Standards Institute by Subcommittee INMM-5 on Measurement Controls, part of American National Standards 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 generic principles from which specific measurement control programs can be derived.

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 12 subcommittees:

- INMM-1, Accounting
- 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-12, Site Response Planning
- INMM-13, Transportation
- 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.

Suggestions for improvement of this standard will be welcome. They should be sent to the Institute of Nuclear Materials Management, Sperry-Univac Plaza, Suite 720-South, 8600 West Bryn Mawr Avenue, Chicago, IL 60631.

This standard was processed and approved for submittal to ANSI by American National Standards Committee on Methods of Nuclear Material Control, N15. Committee approval of the standard does not necessarily imply that all committee members voted for it approval. At the time it approved this standard, the N15 Committee had the following members:

- George Huff, Chair  
(Allied General Nuclear Services)
- Robert Kramer, Secretary  
(Northern Indiana Public Service Company)

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Association of American Railroads, Bureau of Explosives . . . . .	W. S. Chang
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Society for Applied Spectroscopy . . . . .	Louis Basile
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Subcommittee INMM-5 on Measurement Controls, which prepared this standard, had the following members:

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# Derivation of Measurement Control Programs – General Principles

## 1. Scope and Purpose

**1.1 Scope.** This standard is limited to presenting the generic principles from which specific measurement control programs can be derived. Specific measurement control programs for individual measurement processes will be issued in separate standards. Although the principles presented in this standard are intended primarily to be applied to the measurement processes used in the nuclear industry, the principles are general enough for application to many other measurement processes as well.

**1.2 Purpose.** The purpose of this standard is to present general principles for deriving a sound measurement control program for any measurement process used to manage or to safeguard nuclear materials. These principles address both the technical and the administrative aspects of the measurement control programs. Although not a part of the standard, there are also several appendixes that contain examples illustrating the general principles presented in the body of the standard.

## 2. Introduction

The ability to manage and safeguard nuclear material depends on measurements of various physical and chemical properties such as the compositions of the mass and the isotopes. Because measurements of poor quality may lead to incorrect decisions involving the nuclear material, special effort should be spent on the task of ensuring that the measurements used in the nuclear industry are of adequate quality for their intended use. The activities devoted to this task constitute a measurement control program.

A measurement control program should address all aspects of a measurement process that can affect the quality of the measurements. This means that, in addition to addressing the scientific or technical aspects of the measurement process, the measurement control program should also address the nontechnical or administrative aspects of the measurement process such as

documentation, personnel qualification procedures, and the like. These administrative aspects and certain technical aspects are elements of quality assurance and their implementation establishes quality assurance practices in the measurement control program. These quality assurance practices are described in American National Standard Quality Assurance Program Requirements for Nuclear Power Plants, ANSI/ASME NQA-1-1983.

Although the goal of a generic measurement control program can be generally described as the attainment of a measurement process that generates measurements of adequate quality, the goal of any particular measurement control program must be described more specifically. For a particular measurement control program, a technical, operational meaning must be given to the idea of "adequate quality" by specifying the operating criteria the measurement process must satisfy. In general, the operating criteria are determined by identifying the consequences of data on the mission for which the data are gathered, then deciding what physical and probabilistic characteristics the measurement process must possess so that the probability of generating measurements that lead to undesirable consequences is reduced to a level consistent with the importance of the mission.

## 3. Referenced Publications

**3.1 American National Standards.** This standard is intended for use with the following American National Standards. When these standards are superseded by a revision approved by the American National Standards Institute, Inc, the revision shall apply.

ANSI N15.5-1972, Statistical Terminology and Notation for Nuclear Materials Management

ANSI N15.38-1982, Generic Requirements for Auditing Nuclear Materials Safeguards Systems

ANSI/ASME NQA-1-1983, Quality Assurance Program Requirements for Nuclear Facilities