

## **Regulatory Guide Periodic Review**

**Regulatory Guide Number:** 5.9

**Revision:** 2

**Title:** **Guidelines for Germanium Spectroscopy Systems for Measurement of Special Nuclear Material (December 1983)**

**Office/Division/Branch:** **NMSS/FCSE/MCAB**

**Technical Lead:** **Tom Pham**

**Recommended Staff Action:** **Reviewed with issues identified for future consideration**

**1. What are the known technical or regulatory issues with the current version of the Regulatory Guide (RG)?**

This RG was revised in December 1983 to provide guidance on acceptable high-resolution gamma ray spectroscopy systems associated with nondestructive assay (NDA) measurements on special nuclear material (SNM). These systems are used to establish and maintain a system of control and accountability to ensure that the standard error of any inventory difference (SEID), ascertained as a result of a measured material balance, met established minimum standards. This was a requirement in 10 CFR 70.51, "Material Balance, Inventory, and Records Requirements."

However, in 2002, the NRC revised 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material," and the requirements in 10 CFR Part 70.51 related to material control and accounting (MC&A) were transferred to 10 CFR Part 74. Specifically, the NRC revised 10 CFR Part 74.31, "Nuclear material control and accounting for special nuclear material of low strategic significance," 10 CFR Part 74.41, "Nuclear material control and accounting for special nuclear material of moderate strategic significance," and 10 CFR Part 74.51, "Nuclear material control and accounting for strategic special nuclear material." As a result, RG 5.9 is not cross-referencing to the correct regulatory citations.

Also, the RG endorsed ANSI and IEEE standards that were issued in the 70s and 80s. These standards included: (1) ANSI N15.20-1975, "Guide to Calibrating Nondestructive Assay Systems." ANSI N15.20-1975 was reaffirmed in 1987 and is currently inactive (withdrawn); (2) ANSI/IEEE 301-1976, "Test Procedures for Amplifiers and Preamplifiers for Semiconductor Radiation Detectors for Ionizing Radiation," was reaffirmed in 2006 and is still active; (3) ANSI/IEEE 325-1971, "Test Procedures for Germanium Gamma-Ray Detectors" was reaffirmed in 2002 and is still active; and (4) ANSI/IEEE 645-1977, "Test Procedures for High-Purity Germanium Detectors for Ionizing Radiation," was withdrawn in 1977 and was replaced by IEEE 325-1996 (R 2002).

Currently, a number of American Society for Testing and Materials (ASTM) standards (i.e., ASTM C1221-10, "Standard Test Method for Nondestructive Assay of Special Nuclear Material in Homogenous Solutions by Gamma Ray Spectrometry") are available and active for Germanium Spectroscopy Systems for Measurement of SNM.

**2. What is the impact on internal and external stakeholders of not updating the RG for the known issues, in terms of anticipated numbers of licensing and inspection activities over the next several years?**

The staff is not expecting any new applications for the next 2-3 years where this RG could be used and therefore, is not affecting the licensing and inspection activities. However, during the next review the staff should review the most current technology and standards available that could be endorsed in the revised guide.

Current licensees routinely implement the measurement systems and measurement methods for all SNM, including the use of different types of NDA measurements on SNM. Additionally, current material control and accounting guidance in NUREG documents (e.g., NUREG-1280, "Acceptable Standard Format and Content for the Material Control and Accounting Plan Required for Strategic Special Nuclear Material," for Category I, "High Enriched Uranium" fuel cycle facilities, and NUREG-1065, "Acceptable Standard Format and Content for the Material Control and Accounting Plan Required for Special Nuclear Material of Low Strategic Significance," for Category III, "Low Enriched Uranium," fuel cycle facilities) include detailed discussions of measurement systems and measurement methods.

**3. What is an estimate of the level of effort needed to address identified issues in terms of full-time equivalent (FTE) and contractor resources?**

An estimate of the effort needed to correct the identified issues is between 0.10 full-time equivalent (FTE) and 0.20 FTE. No contractor support is anticipated.

**4. Based on the answers to the questions above, what is the staff action for this guide (Reviewed with no issues identified, Reviewed with issues identified for future consideration, Revise, or Withdraw)?**

Reviewed with issues identified for future consideration.

**5. Provide a conceptual plan and timeframe to address the issues identified during the review.**

As discussed in Management Directive (MD) 6.6, "Regulatory Guides," the NRC staff reviews RGs approximately every 5 years to ensure that these guides continue to provide useful guidance. The staff will consider the regulatory citation issues and any other technical information that may need to be updated during the next periodic review of the guide.

**NOTE: This review was conducted in July 2016, and reflects the staff's plans as of that date. These plans are tentative and subject to change.**