



Standard Guide to Procedures for Calibrating Automatic Pedestrian SNM Monitors¹

This standard is issued under the fixed designation C1189; 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 covers calibrating the energy response of the radiation detectors and setting the discriminator and alarm thresholds used in automatic pedestrian special nuclear material (SNM) monitors.

1.2 Automatic pedestrian SNM Monitors and their application are described in Guide C1112, which suggests that the monitors be calibrated and tested when installed and that, thereafter, the calibration should be checked and the monitor tested with SNM at three-month intervals.

1.3 Dependable operation of SNM monitors rests, in part, on an effective program to test, calibrate, and maintain them. The procedures and methods described in this guide may help both to achieve dependable operation and obtain timely warning of misoperation.

1.4 This guide can be used in conjunction with other ASTM standards. Fig. 1 illustrates the relationship between calibration and other procedures described in standard guides, and it also shows how the guides relate to an SNM monitor user. The guides below the user in the figure deal with routine procedures for operational monitors. Note that Guide C993 is an in-plant performance evaluation that is used to verify acceptable detection of SNM after a monitor is calibrated. The guides shown above the user in Fig. 1 give information on applying SNM monitors (C1112) and on evaluating SNM monitors (C1169) to provide comparative information on monitor performance.

2. Referenced Documents

2.1 ASTM Standards:²

C859 Terminology Relating to Nuclear Materials

C993 Guide for In-Plant Performance Evaluation of Automatic Pedestrian SNM Monitors

C1112 Guide for Application of Radiation Monitors to the Control and Physical Security of Special Nuclear Material (Withdrawn 2014)³

C1169 Guide for Laboratory Evaluation of Automatic Pedestrian SNM Monitor Performance

E876 Practice for Use of Statistics in the Evaluation of Spectrometric Data (Withdrawn 2003)³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *calibration*—a multistep procedure that uniformly adjusts the energy response of a monitor's detector array and sets the operating parameters of its detection circuits for optimum performance. In a few monitors, an additional analog adjustment of a signal detection circuit is required.

3.1.2 *SNM*—special nuclear material: plutonium of any isotopic composition, ²³³U, or enriched uranium as defined in Terminology C859.

3.1.2.1 *Discussion*—This term is used here to describe both SNM and strategic SNM, which is plutonium, uranium-233, and uranium enriched to 20% or more in the ²³⁵U isotope.

3.1.3 *SNM Monitor*—a radiation detection system that measures ambient radiation intensity, determines an alarm threshold from the result, and then when it monitors, sounds an alarm if its measured radiation intensity exceeds the threshold.

3.1.3.1 *Discussion*—The automatic pedestrian SNM monitor discussed here is a walk-through or wait-in portal or monitoring booth.

4. Summary of Guide

4.1 This guide covers various instructions for calibrating SNM pedestrian monitors for optimum performance in normal operation. The order of procedures is as follows.

4.1.1 The energy response of inorganic or organic scintillation detectors or of neutron proportional counters, is calibrated to produce appropriate signal pulse heights for SNM radiation (see Section 10).

¹ This guide is under the jurisdiction of ASTM Committee C26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.12 on Safeguard Applications.

Current edition approved June 1, 2011. Published June 2011. Originally approved in 1991. Last previous edition approved in 2002 as C1189 – 02 which was withdrawn January 2011 and reinstated June 2011. DOI: 10.1520/C1189-11.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.