# ANSI N323A and ANSI N323B

## Test and Calibration of Portable Survey Instruments

Presented at AMUG Conference
Las Vegas, NV
April 23 - 27, 2012

This presentation describes the additions, deletions, and modifications that impact the calibration facilities and protocols that determine the calibration factors to be employed in the interpretation of field measurements.

This revision is based on combining the two standards into a single standard.

- ANSI N323A addresses issues associated with radcon measurements (radiation worker protection).
- ANSI N323B addresses issues associated with environmental measurements (unrestricted releases for public disposition).

Note: Radcon measurements for “green tagging” items for unrestricted release have been, in fact, environmental measurements without benefit of proper calibration and use protocols.

The following discussion will follow the organizational structure of the standard, and highlight the major additions and changes in each section.

# Section 1 – Scope

- The range of applicability was modified to incorporate near-background radiation levels (<100μR/hr) requirements from N323B with higher level requirements from N323A.
- Incorporated text and references to include Homeland Security and emergency response instruments.

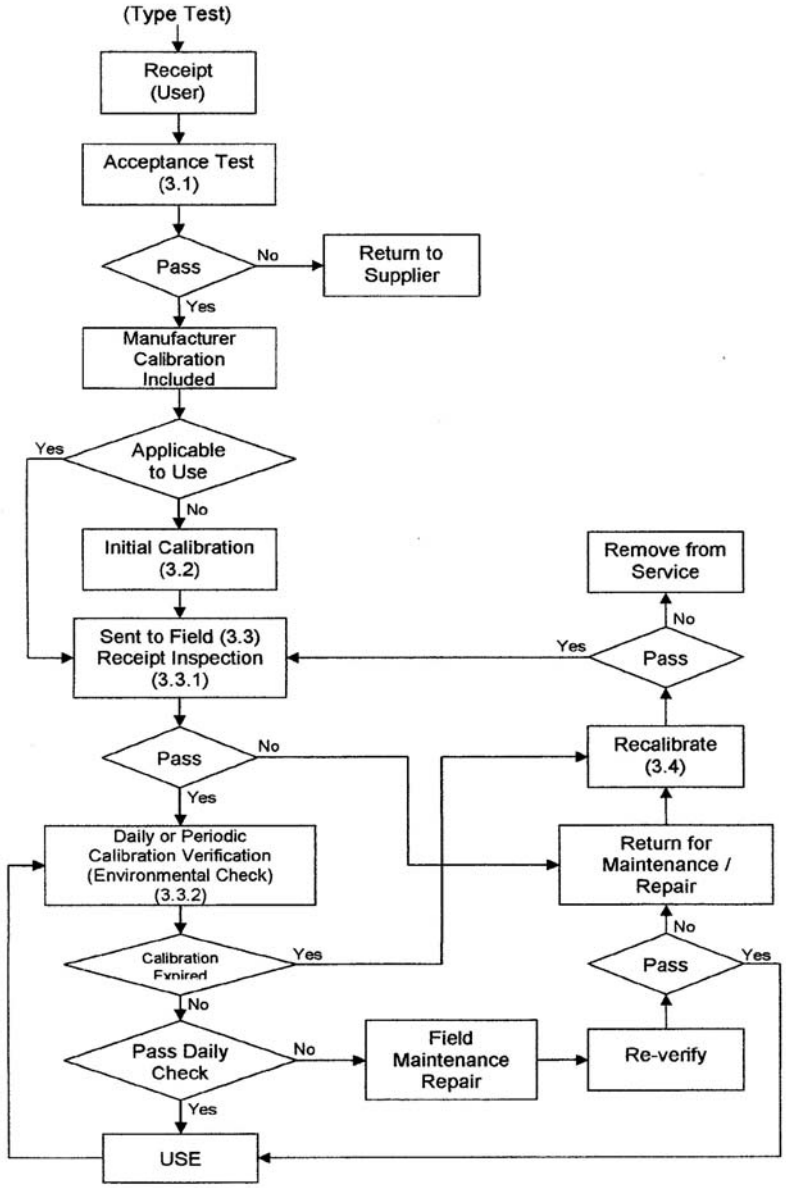
# Section 2 – Definitions

- Updated existing definitions to reflect current terminology.
- Added defintions that illustrate current "state of art"
  - Detector window: active area vs. open area
  - Hot swapping
  - Cross-talk

# Section 3 – General Requirements

- This section has been reorganized to be consistent with Figure 1 logic diagram.
- The diagram is intended to follow the calibration process from initial receipt of an instrument, through initial acceptance and calibration, field use, and recalibration.

Figure 1. Activities for Portable Instrument Calibration and Field Use



# Section 3.2 – Instrument Calibration

- Discusses single-point vs. three-point calibration to determine energy response (major impact on beta measurements).
- Discusses electronic vs. source gamma calibration for dose rates < 100 µR/hr.

# Section 3.4 - Recalibration

- In section 3.4.1, the provision for using “as found” response prior to recalibration as the new calibration factor is provided.

# Section 3.5 – Calibration Frequency

- This section introduces the concept of modifying or extending the calibration frequency, traditionally taken as not to exceed one year.
- The section provides five protocols that may be employed to justify extending the calibration interval.

# Method 1 – Automatic Adjustment or "Staircase" (Calendar Time)

- Each time an instrument is calibrated on a routine basis, the subsequent interval may be extended if it is found to be within 80% of the limiting values in Section 5.

# Method 2 – Control Chart (Calendar Time)

- Control charting is an important tool of Statistical Quality Control and well described in many publications. Essentially, significant calibration points are chosen and the results plotted against time. From these plots, both distribution of results and drift can be calculated. The drift being either the mean drift over one calibration interval, or in the case of very stable instruments, the drift over several intervals. From these figures, the optimum interval can be calculated.

# Method 3 – “In-Use” Time

- This is a variation on the preceding methods. The basic method stays the same but the calibration interval is expressed in hours of use rather than calendar months.

# Method 4 – Source Checking

- This is a variation of methods 1 and 2. Instrument response is checked frequently (e.g., once a quarter or more often) and prior to use by portable sources made up specifically to check the selected parameters. If the instrument is found to be outside the limiting values in Section 5 by this check, it is returned for full calibration.

# Method 5 – Other Statistical Approaches

- Adjustment of calibration intervals based on statistical analysis of an individual instrument or instrument type can also be a possible approach. One acceptable statistical analysis method has been published by National Conference of Standards Laboratories in publication RP-1 (NCSL-1996[A28]). A confidence level of 95% should be used for these calculations.

# Section 4

- In previous revisions of N323A and N323B, this section discussed performance specifications for portable instruments that duplicated similar information in the ANSI N42-17 series.
- Performance requirements have been deleted from this revision.

# Section 4 – Calibration Facility Requirements

- Updated information for calibration reference sources.
- Updated facility design and operating conditions.

# Section 5 – Calibration Protocol Requirements

- Revised accuracy requirements to be consistent with respect to dose rate range for dose/dose rate measuring instruments.
- Updated and revised source-detector conditions for surface contamination measuring instruments.
- Added separate discussion for hot-swapping issues.

# Section 6 - Records

- Edited and expanded the section for records retention for calibration sources employed by the facility, records of calibrations performed, and facility records maintained by the facility for compliance requirements (contractual and regulatory).

# Annex A

- Updated the Bibliography of reference used in the standard.

# Annex B

- Added a brief discussion, a figure, and a table to illustrate a life-cycle approach for instrumentation into which this standard fits.