

APPENDIX V

Survey Meter Calibrations

CHECK APPLICABLE ITEMS

- Survey meters will be calibrated by individuals licensed to perform this service by the Florida Bureau of Radiation Control, the U.S. Nuclear Regulatory Commission, an agreement state, or a licensing state.
- This facility performs survey meter calibrations using the procedures described below.

RECORDS

The facility will assure that all survey instruments will be calibrated at least every 12 months and after repair. The calibration record shall include:

1. A description of the source used;
2. The certified dose rates from the source;
3. The rates indicated by the instrument being calibrated;
4. The correction factors deduced from the calibration data;
5. The name of the individual who performed the calibration; and
6. The date of the calibration.

This record will be maintained for 3 years for inspection.

PROCEDURE FOR CALIBRATING SURVEY INSTRUMENTS

Attached is a facility diagram illustrating where survey meter calibrations are performed and how the source, shielding and survey meter is configured during calibration.

1. The source used is approximately a point source.
2. Either the apparent source activity - *or* - the exposure rate at a given distance is traceable by documented measurements, to a standard certified by the National Institute of Standards and Technology, within 5% accuracy.
3. A source having approximately the same photon energy as the environment in which the calibrated device is employed is used for the calibration.
4. The source is of sufficient strength to give an exposure rate of approximately 30 mR/hr at 100 cm. (Typical minimum activities are 85 mCi of Cs-137 and 21 mCi of Co-60).
5. The inverse square law and the radioactive decay law are used to correct for changes in distance or source decay.
6. A record is made of each survey meter calibration.
7. A single point on a survey meter scale is considered satisfactorily calibrated if the indicated exposure rate differs from the calculated exposure rate by less than 10%, - *or* - 20% if a correction chart or graph is attached conspicuously to the instrument.
8. Meters offering a linear scale are calibrated on at least two points on each scale. The points are at approximately 1/3 and 2/3 of full scale.

9. Meters offering a multi-decade logarithmic scale are calibrated at no less than one point on each decade - *and* - no less than two points on one of the decades. Those points are approximately 1/3 and 2/3 of the decade.
10. Meters offering an automatically ranging digital display for indicating rates are calibrated at no less than one point on each decade - *and* - at not less than two points on one of the decades. Those points are at approximately 1/3 and 2/3 of the decade.
11. Meter ranges above 1,000 mR/hr may not be calibrated, but are checked for operation and approximately correct responses.
12. Survey meter calibration reports indicate the procedure used and the data obtained. The reports include:
 - A. The owner or user of the instrument;
 - B. A description of the instrument that includes manufacturer, model number, serial number, and type of detector;
 - C. A description of the calibration source, including exposure rate at a specified distance on a specified date, and the calibration procedure;
 - D. For each calibration point, the calculated exposure rate, the indicated exposure rate, the scale selected on the instrument, and the deduced correction factor (the calculated exposure rate divided by the indicated exposure rate);
 - E. The reading indicated with the instrument in the "battery check" mode (if available on the instrument);
 - F. The angle between the radiation flux field and the detector (for external cylindrical GM or ionization-type detectors, this will usually be "parallel" or "perpendicular" indicating photons traveling either parallel with or perpendicular to the central axis of the detector; for instruments with internal detectors, this should be the angle between the flux field and a specified surface of the instrument);
 - G. For detectors with removable shielding, an indication of whether the shielding was in place or removed during the calibration procedure; and
 - H. The name of the person who performed the calibration and the date the calibration was performed.
13. This information is attached to the instrument as a calibration sticker or tag.
 - A. The source that was used to calibrate the instrument.
 - B. The proper deflection in the battery check mode (unless this is clearly indicated on the instrument).
 - C. For each scale or decade, one of the following as appropriate:
 - (1) The average correction factor;
 - (2) A graph or graphs from which the correction factor for each scale or decade may be deduced; *or*
 - (3) An indication that the scale was checked for function but not calibrated, or an indication that the scale was inoperative.
 - D. The angle between the radiation flux and the detector during the calibration.

(One-word reminders or symbols that are explained on the Survey Meter Calibration Report may be used on the calibration sticker.)