

## SECTION 4.4

### EQUIPMENT AND INSTRUMENTATION

#### 1.0 General

- 1.1 New equipment and instrumentation items are uniquely identified upon receipt with either an ORISE property number or an ESSAP bar code number to allow for independent traceability of each item.
- 1.2 Calibration and operational check-out sources are purchased from manufacturers in accordance with procurement specifications.

#### 2.0 Instrument Calibration

- 2.1 Calibrations of field instrumentation shall be based on standards traceable to the National Institute of Standards and Technology (NIST). In those cases where NIST-traceable standards are not available, the Laboratory Manager may approve use of standards of an industry recognized organization, e.g. the New Brunswick Laboratory for various uranium standards.
- 2.2 Calibration procedures will be performed according to the appropriate subsections within Section 5.0 of this manual. These procedures are in accordance with recommendations of both *International Standard. ISO 7503-1, Evaluation of Surface Contamination - Part 1: Beta-emitters (maximum beta energy greater than 0.15 MeV) and alpha-emitters. August 1, 1988* and *NUREG-1507. Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions. U.S. Nuclear Regulatory Commission. Washington, DC; June 1998.*
- 2.3 Electronic calibrations are performed annually at a minimum or following any substantial repair. Efficiency calibrations are performed prior to initiating surveys at a new site or a special field project or every six months when used at a single site, and following any substantial repair. The PIC is calibrated by the manufacturer every two years and after repairs.
- 2.4 Items sent to manufacturer for calibration will have an operational check performed on return to ensure that no damage occurred during shipment.
- 2.5 Calibration documentation will be reviewed and approved by the responsible manager or supervisor prior to the next use of the item.

### 3.0 Instrument Operational Checks

- 3.1 Counts of check sources shall be performed for field instruments prior to and at the end of each day's use.
- 3.2 The Survey Projects Manager shall establish acceptable performance ranges or criteria for the operational parameters to be monitored. Manufacturers' specifications, contractual requirements, industry standard procedures, or operational experience may be the basis of the performance criteria. Criteria will be established to achieve project goals.
- 3.3 The Survey Projects Manager shall determine the method and frequency of monitoring appropriate for various parameters and the method of documenting the monitoring results. Operational performance data may be recorded, utilizing software inherent in equipment computer systems, or by hand in logbooks or on specially developed forms. In addition to data tabulation, data may also be charted to enable improved visual presentation of trends and comparison with acceptance criteria.
- 3.4 Operational performance data shall be reviewed for completeness, conformance with acceptance criteria, and appropriate resolutions or corrective actions, and to determine if there are trends that could indicate possible deterioration of system performance.
- 3.5 Requirements for monitoring operating parameters are incorporated into the appropriate procedure for the equipment or activity, along with the performance criteria, required actions, and any additional requirements for special statistical evaluations, associated with the review/evaluation process.

### 4.0 Establishment of Background for Calibration

- 4.1 For each instrument, a series of 30 measurements shall be taken in an area representative of background conditions. Site-specific backgrounds are determined in accordance with Section 5 of this manual.
- 4.2 Calculate the average of the 30 measurements and record.
- 4.3 Calculate the standard deviation (sigma [ $\sigma$ ],  $\pm 2\sigma$ , and  $\pm 3\sigma$ ) and record on the electronic spreadsheet, or equivalent data storage location.
- 4.4 The background operational parameters shall be re-established if any of the following occurs:
  - Instrument consistently does not meet parameters that have been established

- Instrument receives extensive repairs
- A new instrument/detector combination is used

## 5.0 Cross-Contamination

### 5.1 Equipment Surveys

- 5.1.1 All equipment and instrumentation used in potentially contaminated areas are to be scanned, and cleaned if necessary, prior to leaving the site to assure that contamination is not inadvertently moved out of controlled areas and does not interfere with accuracy of subsequent measurements. The results of these scans must be documented in the site logbook.
- 5.1.2 When there is a potential for contamination of containers or vehicles during sample transport, suspect surfaces will be surveyed. Should decontamination be necessary, a follow-up survey will be performed to assure that all surfaces maintain activities that are as low as reasonably achievable. Surveys of equipment or other items should be documented in the site logbook.