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1.0 PURPOSE AND SCOPE

1.1 Purpose

1.1.1 This procedure provides instruction to Health Physics Technicians (HPTs) for performance testing alpha and beta counting instruments.

1.1.2 This procedure applies to all HPTs who operate and test alpha and beta counting instruments.

1.2 Scope

This procedure provides instruction for performing operational and source checks of the alpha and beta counting instruments.

2.0 INFORMATION

2.1 General Information

Specific information for various counting systems regarding theory of operation, calibration, maintenance and instrument specifications and limitations, including environmental and interfering radiation can be found in MA-562, Radiation Protection Instrument Manual.

2.2 Terms and Definitions

2.2.1 Response Limits:

- $\pm 20\%$ of the initial response.
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Equipment Safety

Avoid scratching, writing on, or otherwise handling sources in any way that might affect source activity or integrity.

4.0 PREREQUISITES

4.1 Special Tools, Equipment and Supplies

The following supplies may be needed to perform this procedure:

- Use check sources consisting of the facility isotope of concern (normally $^{239}$Pu for alpha and $^{90}$Sr for beta) and that are traceable to an established calibration standard or have a manufacturer’s certificate to document source activity and radioisotope composition.
- Stainless steel planchet.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- A-6004-335, RC Daily Operational Test Log
- BT-6002-880, Instrument Service Tag.
5.0 PROCEDURE

5.1 Establishing Response Limits

NOTE - When a single instrument has both alpha and beta measuring capabilities, the steps below requiring a radioactive source must be performed twice, once each with alpha and beta sources.

- This section may be repeated to establish response limits for more than one source. It is not necessary to repeat the background count prior to each source. If a second source is used, use a second form as well.

- Perform this section following repairs or calibration

5.1.1 PERFORM a single background count for a minimum of 10 minutes.

NOTE - The source count time must be equal to or less than the background count time. This also applies to the daily source check.

5.1.2 PERFORM a single source count for a minimum of one (1) minute.

5.1.3 RECORD date for which the instrument is being set up, the number of background counts observed (N_b), the background count rate (R_b) in cpm and the net count rate (R_n) measured during source count on form A-6004-335, “RC Daily Operational Test Log. The receipt source check for the instrument gets recorded as the first entry on the log as day one in the log.

5.1.4 MULTIPLY instrument’s response by 0.8 and 1.2 to determine acceptable range for that instrument AND

RECORD acceptable range on the RC Daily Operational Test Log (A-6004-335).

5.1.5 COMPLETE remainder of the RC Daily Operational Test Log (A-6004-335).

5.1.6 IF the instrument fails the initial source check due to unexpected response or other deficiency affecting operation, PERFORM the following:

5.1.6.1 TAG with a completed Instrument Service Tag (BT-6002-880).

5.1.6.2 SEGREGATE the instrument to prevent inadvertent use.

5.1.6.3 NOTIFY RadCon management.

5.1.7 IF additional source testing is desired, REPEAT Steps 5.1.2 through 5.1.7 with additional sources.
5.2 Daily Source Check

**Special Instruction**

Use only a source/counting interval combination for which a receipt test is documented.

Start a new form when previous form is full. Transfer response limits and other data from previous form.

Perform instrument source response checks daily or before use if used less often than daily. For the purposes of this check, source checks are to be performed daily and expire 24 hours plus an eight hour grace-period after date/time performed.

5.2.1 **ENSURE** the location and following information is printed on the Performance Documentation A-6004-335:

- Instrument Serial Number (and detector serial number if detector is removable)
- Location.

5.2.2 **PERFORM** a single background count for a minimum of 10 minutes.

5.2.3 **RECORD** the number of background counts observed \( (N_b) \) and background count rate \( (R_b) \) in cpm.

5.2.4 **PERFORM** a single source count using a source/counting interval combination for which receipt test was performed.

5.2.5 **RECORD** measured net \( (R_n) \) count rate on performance documentation \( (A-6004-335) \).

5.2.6 **CONFIRM** daily value is within corresponding response limits (between control charts +/-20% limits).

5.2.7 **IF** count rate is not within established response limits, **REPEAT** Steps 5.2.4 through 5.2.6 (one time) test with same source/counting interval.
5.2 Daily Source Check (Cont.)

5.2.8 IF count rate from second attempt is not within established limits, **REPEAT** Steps 5.2.4 through 5.2.6 (one time) with another source/counting interval combination from initial test, if available.

    **OR**

    **TAG** instrument with a completed Instrument Service Tag (BT-6002-880) AND

    **REMOVE** instrument from service.

5.2.9 IF the second source’s count rate is not within its established limits, **TAG** instrument with a completed Instrument Service Tag (BT-6002-880) AND

    **REMOVE** instrument from service.
5.3 Records

5.3.1 **PERFORM** the following for records identified within this procedure.

5.3.1.1 On the Records Submittal Checklist, **RECORD** the number of pages that were completed

**OR**

5.3.1.2 **ATTACH** the completed records to the Records Submittal Checklist **AND**

**SIGN** Records Submittal Checklist indicating the package is complete.

5.3.1.3 **SUBMIT** the completed records to an approved RadCon Record Storage Area for retention.

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RID(S)), is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.

<table>
<thead>
<tr>
<th>Records Submittal Checklist</th>
<th>Number of pages completed</th>
<th>N/A (✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Form A-6004-335, RC Daily Operational Test Log</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

_________________ / ____________________ / ________________
Signature                  Print (First and Last Name)     Date
First Line Manager (or designee)