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1.0 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this procedure is to provide a means of assuring that a radiological instrument is operating properly and that accurate performance criteria are established for each instrument used for developing quantitative radiological data. These criteria are typically source response and background levels, but may include other parameters depending on the specific instrument type and application. Performance criteria are established by the Radiological Control (RADCON) Instrumentation Group, following the guidance found in CP4-RP-1309, *Setup for Operability Tests of Portable Field Instruments*. After the criteria is established, instrument users or other designated personnel must routinely test the instrument performance, relative to these criteria. On each day, the instrument is to be used for radiological measurement, and at other times when there is question or doubt regarding the instrument's performance. One example of conditions requiring more frequent performance tests is operation of a gas-flow proportional detector that has been disconnected from the gas supply. When operated in this mode, performance tests should be conducted at least hourly. This procedure describes the process for performing and documenting these routine operational response tests for field monitoring instruments.

1.2 Scope

This procedure applies to all Paducah Gaseous Diffusion Plant (PGDP) personnel performing operability tests of portable field instruments at the Paducah Gaseous Diffusion Plant. The PGDP RADCON organization has organizational ownership and maintenance responsibility for this procedure. The approval authority for this document is the Radiation Protection Manager.

2.0 REFERENCES

2.1 Use References

None

2.2 Source References

- American National Standards Institute (ANSI) N323A-1997, *American National Standard Radiation Protection Instrumentation Test and Calibration, Portable Survey Instrument*
- CP3-RP-1302, *Radioactive Source Control*
- CP4-RP-1309, *Setup for Operability Tests of Portable Field Instruments*

3.0 COMMITMENTS

None

4.0 PRECAUTIONS AND LIMITATIONS

4.1 Precautions

4.1.1 **If** a convenient and safe option is **NOT** available, at a minimum, **then** positive instrument response to the radiation of interest is to be confirmed.

4.1.2 Different source configurations may exist depending upon source and instrument availability or deployment. Contact RADCON management for direction when performing field operability tests in these locations.

4.2 Limitations

None

5.0 PREREQUISITES

5.1 Instruments should be response-tested on a minimum of one scale, preferably the one most likely to be used for actual field measurements.

5.2 **If** the Initial Reference Response Test (Part 1 of the daily test form) indicates response tests are required for multiple scales or settings **then** all necessary tests shall be performed. Due to the lack of convenient test sources and to avoid the potential for unnecessary radiation exposures, it may **NOT** be practical or safe to response-test certain types of instruments (e.g., neutron instruments) and/or upper scales on instruments for measuring high radiation levels.

5.3 Field RCTs may change batteries in field instruments, as needed.

5.4 Part 1 of the instrument daily test forms (Initial Reference Response Test) contains the general instrument setup conditions and the acceptable performance information as established by the RADCON Technical Group. Part 2 of the instrument daily test sheet is used to record instrument performance test results.

5.5 Following successful response and operability testing, the instrument may be used for its intended application.

5.6 **If** the response test result does **NOT** fall within the predetermined range specified, **then** the test may be repeated up to a maximum of three (3) times prior to removal from service.

5.7 Document the results of each tested scale on the appropriate daily test sheet.

5.8 An alpha background of zero should be rounded to 0.1 for calculation purposes for Ludlum Models 2224-1, 2929, and 3030E equipped with Ludlum Model 43-10-1 probes.

5.9 An alpha background of zero should be rounded to 0.2 for calculation purposes for Ludlum Models 3, 12, 2221, 2224, and 2224-1 equipped with Ludlum Model 43-5, 43-89, and 43-93 probes.

5.10 Critical level (L_c) and minimum detectable concentration (MDC) values are rounded to whole numbers only. Any calculated values past the decimal point will be rounded up.

5.11 The lowest level of detection (LLD) for ion chamber instruments and telescoping survey meters is 0.2 mR/hr.

5.12 The LLD for microrem instruments is 2 µR/hr.

5.13 The LLD for neutron survey instruments is 0.1 mR/hr.

6.0 INSTRUCTIONS

6.1 Performance Testing of Ludlum Model 3, 12, 177, and 2224

NOTE:
This section applies to Ludlum Models 3, 12, 177, and 2224 equipped with Ludlum Model 43-5, 44-9, 44-10, G-5 (FIDLER), 43-89, 43-93, 44-40, 44-40-2 probes, or Bicron TPGM probes.

Radiological Control Technician (RCT)

6.1.1 Verify the physical integrity of the instrument.

6.1.2 Enter the date and time of the response test in the correct columns of RP-F-0067.

6.1.3 Confirm that the instrument calibration has a current and legible calibration label. **If** it does **NOT** have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.1.4 Verify the calibration due date shown in Part 1 of RP-F-0067, *Contamination Instrument Daily Test Sheet*, and the calibration due date indicated on the instrument calibration sticker are the same. **If** the calibration due dates do NOT match, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.1.5 Confirm that the attached probe matches the instrument, based on the calibration label appearing on the instrument.

6.1.6 **If** the probe does **NOT** match, **then:**

- mark a "U" in the correct box of RP-F-0067,
- tag the instrument out of service using RP-F-0026,
- **and** notify RADCON management.

6.1.7 **If** the probe does match, **then** mark an "S" in the correct box of RP-F-0067 and move on to the next step.

6.1.8 Confirm that the instrument set-up conditions are correct based on guidance provided in the applicable instrumentation operating procedure and/or the manufacturer's operation manual.

6.1.9 **If** discrepancies are observed on the instrument daily test sheet, **then** remove the instrument from service **and** contact the RADCON Technical Group.

6.1.10 Ensure the instrument response switch, if equipped, is set to "Slow".

NOTE:

Ludlum Model 177 instruments require the "BAT" button to be pressed to test the battery.

6.1.11 Turn the selector switch to the "BAT" position **and** ensure a needle response within the "BAT TEST" region of the instrument display.

6.1.12 **If** batteries are unsatisfactory, **then** replace the batteries and repeat the battery check.

6.1.13 **If** batteries are unsatisfactory, **then** mark a "U" in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026.

6.1.14 **If** batteries are satisfactory, **then** mark a "S" in the proper box of RP-F-0067 **and** move to the next step.

NOTE:

Some instrument models are equipped with a switch that must be moved to the high voltage ("HV") position to test the HV.

6.1.15 **If** equipped, **then** press the HV button and compare the displayed voltage to the range listed in Part 1 of RP-F-0067.

6.1.16 **If** the HV is unsatisfactory, **then** mark a "U" in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026.

6.1.17 **If** the HV is satisfactory, **then** mark an "S" in the proper box of RP-F-0067 **and** move to the next step.

NOTE:

Background and source response tests may be repeated a maximum of three (3) times prior to removal from service. Document the results of each test on the instrument test form.

6.1.18 For analog instruments: Turn the selector switch to the lowest scale setting **and** allow the instrument to stabilize for thirty to forty seconds to establish a background reading.

6.1.19 For scaler-equipped instruments: Press the count button to begin a timed, one minute count.

6.1.20 Document the background reading in counts per minute (CPM) in the proper box of RP-F-0067.

6.1.21 Compare the background reading to ranges shown in Part 1 and Part 2 of RP-F-0067.

6.1.22 **If** the background is out of range, **then** repeat.

6.1.23 **If** the background is out of range, **then** mark a “U” in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026

6.1.24 **If** the instrument is within the acceptable range, **then** mark a "S" in the proper box of RP-F-0067 and move to the next step.

6.1.25 For analog instruments: Place the instrument probe in the correct geometry over the source and allow the instrument to stabilize for thirty to forty seconds to establish a source response reading.

6.1.26 For scaler-equipped instruments: Place the instrument probe in the correct geometry over the source and press the count button to begin a timed, one minute count.

6.1.27 **If** the source response is out of range, **then** repeat.

6.1.28 **If** the source response is out of range, **then** mark a "U" in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026

6.1.29 **If** the source response is within the acceptable range, **then** document the reading in CPM in the proper box of RP-F-0067 **and** mark a "S" in the proper box of RP-F-0067. Move to the next step.

6.1.30 Initial the instrument calendar.

6.1.31 Ensure all boxes on RP-F-0067 are properly filled and sign as performer.

6.1.32 Turn the instrument off **and** place the instrument into service.

6.1.33 Ensure a peer review of the response test sheet daily and as soon as possible for off shift.

6.1.34 Perform a survey of the instrument, when applicable (e.g., high background or unresponsive instrument), and attach RP-F-0026.

6.1.35 **If** damage or malfunction of the instrument is suspected, **then** repeat the performance testing and documentation described above.

6.2 Performance Testing of Ludlum Model 2221

NOTE:
This section applies to Ludlum Models 2221 equipped with Ludlum Model 43-5, 44-9, 43-89, 43-93, 44-40, 44-40-2, 44-10, G-5 (FIDLER) probes or Bicron TPGM probes.

<u>Radiological Control Technician (RCT)</u>

6.2.1 Verify the physical integrity of the instrument.

6.2.2 Enter the date and time of the response test in the correct columns of RP-F-0067.

6.2.3 Confirm that the instrument has a current and legible calibration label.

6.2.4 **If** it does **NOT** have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026.

6.2.5 Verify the calibration due date shown in Part 1 of RP-F-0067, *Contamination Instrument Daily Test Sheet*, and the calibration due date indicated on the instrument calibration sticker are the same. **If** the calibration due dates do **NOT** match, **then** tag the instrument out of service using RP-F-0026.

6.2.6 **If** the instrument is out of calibration, **then** mark a "U" in the correct box of RP-F-0067 **and** tag the instrument of service using RP-F-0026.

6.2.7 **If** the instrument is in calibration, **then** mark an "S" in the correct box of RP-F-0067 **and** move on to the next step.

6.2.8 Press the "BAT" button **and** ensure the reading on the display is ≥ 4.8.

6.2.9 **If** batteries are unsatisfactory (<4.8), **then** replace the batteries and repeat the battery check.

6.2.10 **If** batteries are unsatisfactory, **then** mark a "U" in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026.

6.2.11 **If** batteries are satisfactory (≥ 4.8), **then** mark an "S" in the proper box of RP-F-0067 **and** move to the next step.

6.2.12 Press the HV button **and** compare the displayed voltage to the range listed in Part 1 of RP-F-0067.

6.2.13 **If** the HV is unsatisfactory, **then** mark a "U" in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026.

6.2.14 **If** the HV is satisfactory, **then** mark an "S" in the proper box of RP-F-0067 **and** move to the next step.

NOTE: Threshold is displayed in millivolts. A displayed reading of 356 equals 35.6 mV.

6.2.15 Press the threshold (THR) button (to test threshold) **and** compare the displayed voltage to the range listed in Part 1 of RP-F-0067.

6.2.16 **If** the threshold is unsatisfactory, **then** mark a "U" in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026.

6.2.17 **If** the threshold is satisfactory, **then** mark an "S" in the proper box of RP-F-0067 **and** move to the next step.

6.2.18 Confirm that the attached probe matches the instrument as indicated in Part 1 of RP-F-0067 **and** on the instrument calibration label.

6.2.19 **If** the probe does **NOT** match, **then:**

- mark a "U" in the correct box of RP-F-0067,
- tag the instrument out of service using RP-F-0026,
- **and** notify RADCON management.

6.2.20 **If** the probe does match, **then** mark an "S" in the correct box of RP-F-0067 and move on to the next step.

6.2.21 Confirm that the instrument set-up conditions are correct based on guidance provided in the applicable instrumentation operating procedure and/or the manufacturer's operation manual.

6.2.22 **If** discrepancies are observed on the instrument daily test sheet, **then** remove the instrument from service **and** contact the RADCON Technical Group.

6.2.23 Ensure the instrument response switch, if equipped, is set to "Slow".

6.2.24 Ensure that the WIN switch is set to "OUT", unless otherwise directed by RADCON management.

6.2.25 Ensure the "Digital Control" is set to "Scaler".

6.2.26 Ensure the count time switch is set to 1 minute **and** press the count button to begin a timed, one minute count.

6.2.27 Document the background reading in counts per minute (CPM) in the proper box of RP-F-0067.

6.2.28 Compare the background reading to ranges shown in Part 1 and Part 2 of RP-F-0067.

6.2.29 **If** the background is out of range, **then** repeat.

6.2.30 **If** the background is out of range, **then** mark a "U" in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026.

6.2.31 **If** the background is within the acceptable range, **then** mark an "S" in the proper box of RP-F-0067 and move to the next step.

6.2.32 Place the instrument probe in the correct geometry over the source **and** press the count button to begin a timed, one minute count.

6.2.33 **If** the source response is out of range, **then** repeat.

6.2.34 **If** the source response is out of range, **then** mark a “U” in the proper box of RP-F-0067 **and** tag the instrument out of service using RP-F-0026.

6.2.35 **If** the instrument is within the acceptable range, **then** document the reading in CPM in the proper box of RP-F-0067 **and** mark a "S" in the proper box of RP-F-0067. Move to the next step.

6.2.36 Initial the instrument calendar.

6.2.37 Ensure all boxes on RP-F-0067 are properly filled and sign as performer.

6.2.38 Turn the instrument off **and** place the instrument into service.

6.2.39 Ensure a peer review of the response test sheet daily and as soon as possible for off shift.

6.2.40 Perform a survey of the instrument, when applicable (e.g., high background or unresponsive instrument), and attach RP-F-0026.

6.2.41 **If** damage or malfunction of the instrument is suspected, **then** repeat the performance testing and documentation described above.

6.3 Dual Instrument Performance Testing

NOTE: This section applies to Ludlum Models 2224-1, 2929, and 3030E.

RCT

6.3.1 Verify the physical integrity of the instrument.

6.3.2 Enter the date and time of the response test in the correct columns of RP-F-0065.

6.3.3 Confirm that the instrument has a current and legible calibration label.

6.3.4 **If** it does **NOT** have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026.

6.3.5 Verify the calibration due date shown in Part 1 of RP-F-0065, *Dual Instrument Daily Test* sheet, and the calibration due date indicated on the instrument calibration sticker are the same. **If** the calibration due dates do **NOT** match, **then** tag the instrument out of service using RP-F-0026.

6.3.6 **If** the instrument is out of calibration, **then** mark a "U" in the correct box of RP-F-0065 **and** tag the instrument of service using RP-F-0026.

6.3.7 **If** the instrument is in calibration, **then** mark an "S" in the correct box of RP-F-0065 **and** move on to the next step.

NOTE:

The Ludlum Model 3030E is equipped with an internal battery that can power the unit for approximately eight (8) hours.

The use of the Model 3030E on "battery power" MUST be approved by RADCON management.

To maintain the life of the internal battery, it is recommended that the instrument be constantly connected to line power with the power switch in the ON position, even when the instrument is not in use.

When the instrument is used without line power, adequate charge time must be allowed for the internal battery to recharge. At a minimum, allow one hour of charge time for each hour of use. If the battery is inadvertently allowed to fully discharge, and is left in that state, constant charging for 500 hours (three weeks) may be required for battery recovery.

6.3.8 For Ludlum Model 2224-1 only: turn the selector switch to the "BAT" position and ensure a needle response within the "BAT TEST" region of the instrument display.

6.3.9 For Ludlum Model 2224-1 only: **if** batteries are unsatisfactory, **then** replace the batteries **and** repeat the battery check.

6.3.10 For Ludlum Model 2224-1 only: **if** batteries are unsatisfactory, **then** mark a "U" in the proper box of RP-F-0065 **and** tag the instrument out of service using RP-F-0026.

6.3.11 For Ludlum Model 2224-1 only: **if** batteries are satisfactory, **then** mark as "S" in the proper box of RP-F-0065 **and** move to the next step.

NOTE:

Per the manufacturer, the high voltage on a Ludlum Model 3030E cannot be checked by the user.

6.3.12 Observe the HV displayed and specified Vernier, if equipped, **and** compare to the ranges/specifications listed in Part 1 of RP-F-0065. For Ludlum Model 2224-1 move the selector switch to the HV position to display the HV.

6.3.13 **If** the HV and/or Vernier are unsatisfactory, **then** mark a "U" in the proper box of RP-F-0065 **and** tag the instrument out of service using RP-F-0026.

6.3.14 **If** the HV and/or Vernier are satisfactory, **then** mark an "S" in the proper box of RP-F-0065 **and** move to the next step.

6.3.15 Confirm that the attached probe matches the instrument as indicated in Part 1 of RP-F-0067 **and** on the instrument calibration label.

6.3.16 **If** the probe does **NOT** match, **then:**

- mark a “U” in the correct box of RP-F-0067,
- tag the instrument out of service using RP-F-0026,
- **and** notify RADCON management.

6.3.17 **If** the probe does match, **then** mark an “S” in the correct box of RP-F-0067 and move on to the next step.

6.3.18 Confirm that the instrument set-up conditions are correct based on guidance provided in the applicable instrumentation operating procedure and/or the manufacturer’s operation manual.

6.3.19 **If** discrepancies are observed on the instrument daily test sheet, **then** remove the instrument from service **and** contact the RADCON Technical Group.

NOTE:

For the Ludlum Model 2929 and 3030E, perform a ten (10) minute background count.

For the Ludlum Model 2224-1, perform a one (5) minute background count.

An alpha and beta/gamma background is performed simultaneously.

6.3.20 Perform a background count for the instrument.

6.3.21 Convert the background counts to CPM and document the background reading for alpha and beta/gamma in the proper box of RP-F-0065.

6.3.22 Compare the background reading to ranges shown in Part 1 and Part 2 of RP-F-0065.

6.3.23 **If** either background is out of range, **then** repeat.

6.3.24 **If** either background is out of range, **then** mark a “U” in the proper box of RP-F-0065 **and** tag the instrument out of service using RP-F-0026.

6.3.25 **If** the background readings are within the acceptable range, **then** move to the next step.

NOTE:

A timed, one minute count is used for Ludlum Model 2224-1, 2929, and 3030E source response checks.

Response checks may begin with the alpha source or beta/gamma source.

6.3.26 Place an alpha source in the sample drawer **and** press the count button to begin a timed, one minute count.

6.3.27 **If** the source response is out of range, **then** repeat the source response test.

6.3.28 **If** the source response is out of range, **then** mark a “U” in the proper box of RP-F-0065 **and** tag the instrument out of service using RP-F-0026.

6.3.29 **If** the instrument is within the acceptable range, **then** document the reading in CPM in the proper box of RP-F-0065 **and** move to the next step.

6.3.30 Place a beta/gamma source in the sample drawer **and** press the count button to begin a timed, one minute count.

6.3.31 **If** the source response is out of range, **then** repeat the source response test.

6.3.32 **If** the source response is out of range, **then** mark a "U" in the proper box of RP-F-0065 **and** tag the instrument out of service using RP-F-0026.

6.3.33 **If** the instrument is within the acceptable range, **then** document the reading in CPM in the proper box of RP-F-0065 **and** move to the next step.

6.3.34 **If** all background readings and source response tests are within range, **then** mark an "S" in the appropriate box of RP-F-0065 **and** move to the next step.

6.3.35 Initial the instrument calendar.

6.3.36 Ensure all boxes on RP-F-0065 are properly filled **and** sign as performer.

6.3.37 Turn the instrument off **and** place the instrument into service.

6.3.38 Ensure a peer review of the response test sheet daily and as soon as possible for off shift.

6.3.39 Perform a survey of the instrument, when applicable (e.g., high background or unresponsive instrument), and attach RP-F-0026.

6.3.40 **If** damage or malfunction of the instrument is suspected, **then** repeat the performance testing and documentation described above.

6.4 Performance Testing of RO-20 Ion Chamber Instruments

RCT

6.4.1 Verify the physical integrity of the instrument.

6.4.2 Confirm the instrument calibration has a current and legible calibration label. **If** it does **NOT** have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.4.3 Obtain the appropriate RP-F-0069, *Dose Rate Instrument Daily Test Sheet* for the instrument.

6.4.4 Ensure the instrument information in Part 1 of RP-F-0069 matches what is shown on the instrument (for example, serial number, location, calibration due date).

6.4.5 Enter the date and time of the response test in the correct columns of RP-F-0069.

NOTE:

A 30-minute adjustment period should be allowed for temperature changes of approximately 20ºF for RO-20 instruments.

6.4.6 Turn the instrument on **and** allow it to warm up properly.

6.4.7 Turn the selector switch to the Battery 1 position **and** ensure a needle response within the green "Battery Check" arc on the display.

6.4.8 Turn the selector switch to the Battery 2 position **and** ensure a needle response within the green "Battery Check" arc on the display.

6.4.9 Turn the selector switch to the Zero position **and** rotate the adjustment knob until the instrument reads "0".

6.4.10 **If** the instrument cannot be zeroed, **then** tag the instrument out of service using RP-F-0026.

6.4.11 Turn the selector switch to its lowest scale setting.

6.4.12 Document a background reading after allowing the instrument to stabilize for approximately twenty (20) seconds.

6.4.13 **If** the background reading is > 0.2 mR/hr, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.4.14 **If** the background reading is < 0.2 mR/hr, **then** proceed to the next step.

6.4.15 Obtain the appropriate source as listed in Part 1 of RP-F-0069 in the Source Radionuclide box and Source Identification Number box.

6.4.16 Open the retractable beta window.

NOTE:

Dose rate instruments are typically setup and response checked with a Sr-90 thumbwheel source, but may be setup with different sources depending upon setup location. The instructions below are written for setup locations equipped with Sr-90 thumbwheel sources.

6.4.17 Ensure the selector switch is on to the "5 mR/hr" position.

6.4.18 Ensure thumbwheel source is in the "0-5 mR/hr" position and expose the source by depressing the slide.

6.4.19 Ensure the source response as indicated on the instrument face is within the range

shown in Part 1 of RP-F-0069.

6.4.20 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.4.21 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.4.22 Rotate the selector switch to the “50 mR/hr” position.

6.4.23 Ensure thumbwheel source is in the “0-50 mR/hr” position and expose the source by depressing the slide.

6.4.24 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.4.25 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.4.26 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.4.27 Rotate the selector switch to the “500 mR/hr” position.

6.4.28 Ensure thumbwheel source is in the “0-500 mR/hr” position and expose the source by depressing the slide.

6.4.29 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.4.30 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.4.31 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.4.32 Rotate the selector switch to the “5R/hr” position.

6.4.33 Ensure thumbwheel source is in the “0-5000 mR/hr” position and expose the source by depressing the slide.

6.4.34 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.4.35 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.4.36 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.4.37 Rotate the selector switch to the “50 R/hr” position.

6.4.38 Ensure thumbwheel source is in the “Offscale” position and expose the source by depressing the slide.

6.4.39 Ensure the source response as indicated on the instrument face is within the range

shown in Part 1 of RP-F-0069.

6.4.40 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.4.41 Close the retractable beta window.

6.4.42 Initial the instrument calendar.

6.4.43 Ensure all boxes on RP-F-0069 are properly filled **and** sign as performer.

6.4.44 Turn the instrument off **and** place the instrument into service.

6.4.45 Obtain a peer review of the daily response test on RP-F-0069.

6.5 Performance Testing of Bicron RSO-50E Ion Chamber Instruments

RCT

6.5.1 Verify the physical integrity of the instrument.

6.5.2 Confirm the instrument calibration has a current and legible calibration label. **If** it does not have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.5.3 Obtain the appropriate RP-F-0069, *Dose Rate Instrument Daily Test Sheet* for the instrument.

6.5.4 Ensure the instrument information in Part 1 of RP-F-0069 matches what is shown on the instrument (for example, serial number, location, calibration due date).

6.5.5 Enter the date and time of the response test in the correct columns of RP-F-0069.

NOTE: A 30-minute adjustment period should be allowed for temperature changes of approximately 20ºF for Bicron RSO-50E instruments.

6.5.6 Turn the instrument on **and** allow it to warm up properly.

6.5.7 Turn the selector switch to the Battery position **and** ensure a needle response within the "Bat. ok" arc on the display.

6.5.8 Turn the selector switch to the Zero position **and** rotate the adjustment knob until the instrument reads "0".

6.5.9 **If** the instrument cannot be zeroed, **then** tag the instrument out of service using

RP-F-0026.

6.5.10 Turn the selector switch to its lowest scale setting.

6.5.11 Document a background reading after allowing the instrument to stabilize for approximately twenty (20) seconds.

6.5.12 **If** the background reading is > 0.2 mR/hr, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.5.13 **If** the background reading is < 0.2 mR/hr, **then** proceed to the next step.

6.5.14 Obtain the appropriate source as listed in Part 1 of RP-F-0069 in the Source Radionuclide box and Source Identification Number box.

6.5.15 Open the retractable beta window.

NOTE:

Dose rate instruments are typically setup and response checked with a Sr-90 thumbwheel source, but may be setup with different sources depending upon setup location. The instructions below are written for setup locations equipped with Sr-90 thumbwheel sources.

6.5.16 Rotate the selector switch to the "5 mR/hr" position.

6.5.17 Ensure thumbwheel source is in the "0-5 mR/hr" position and expose the source by depressing the slide.

6.5.18 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.5.19 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.5.20 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.5.21 Rotate the selector switch to the "50 mR/hr" position.

6.5.22 Ensure thumbwheel source is in the "0-50 mR/hr" position and expose the source by depressing the slide.

6.5.23 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.5.24 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the

instrument out of service using RP-F-0026.

6.5.25 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.5.26 Rotate the selector switch to the “500 mR/hr” position.

6.5.27 Ensure thumbwheel source is in the “0-500 mR/hr” position and expose the source by depressing the slide.

6.5.28 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.5.29 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.5.30 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.5.31 Rotate the selector switch to the “5R/hr” position.

6.5.32 Ensure thumbwheel source is in the “0-5000 mR/hr” position and expose the source by depressing the slide.

6.5.33 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.5.34 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.5.35 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.5.36 Rotate the selector switch to the “50 R/hr” position.

6.5.37 Ensure thumbwheel source is in the “Offscale” position and expose the source by depressing the slide.

6.5.38 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.5.39 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.5.40 Close the retractable beta window.

6.5.41 Initial the instrument calendar.

6.5.42 Ensure all boxes on RP-F-0069 are properly filled and sign as performer.

6.5.43 Turn the instrument off **and** place the instrument into service.

6.5.44 Obtain a peer review of the daily response test on RP-F-0069.

6.6 Performance Testing of Bicron RSO-5 Ion Chamber Instruments

RCT

6.6.1 Verify the physical integrity of the instrument.

6.6.2 Confirm the instrument calibration has a current and legible calibration label. **If** it does not have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.6.3 Obtain the appropriate RP-F-0069, *Dose Rate Instrument Daily Test Sheet* for the instrument.

6.6.4 Ensure the instrument information in Part 1 of RP-F-0069 matches what is shown on the instrument (for example, serial number, location, calibration due date).

6.6.5 Enter the date and time of the response test in the correct columns of RP-F-0069.

NOTE: A 30-minute adjustment period should be allowed for temperature changes of approximately 20ºF for Bicron RSO-5 instruments.

6.6.6 Turn instrument on and allow it to warm up properly.

6.6.7 Turn the selector switch to the Battery position **and** ensure a needle response within the "Bat. ok" arc on the display.

6.6.8 Turn the selector switch to the Zero position **and** rotate the adjustment knob until the instrument reads "0".

6.6.9 **If** the instrument cannot be zeroed, **then** tag the instrument out of service using RP-F-0026.

6.6.10 Turn the selector switch to its lowest scale setting.

6.6.11 Document a background reading after allowing the instrument to stabilize for approximately twenty (20) seconds.

6.6.12 **If** the background reading is > 0.2 mR/hr, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.6.13 **If** the background reading is < 0.2 mR/hr, **then** proceed to the next step.

6.6.14 Obtain the appropriate source as listed in Part 1 of RP-F-0069 in the Source Radionuclide box and Source Identification Number box.

6.6.15 Open the retractable beta window.

NOTE:

Dose rate instruments are typically setup and response checked with a Sr-90 thumbwheel source, but may be setup with different sources depending upon setup location. The instructions below are written for setup locations equipped with Sr-90 thumbwheel sources.

6.6.16 Rotate the selector switch to the "5 mR/hr" position.

6.6.17 Ensure thumbwheel source is in the "0-5 mR/hr" position and expose the source by depressing the slide.

6.6.18 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.6.19 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.6.20 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.6.21 Rotate the selector switch to the “50 mR/hr” position.

6.6.22 Ensure thumbwheel source is in the “0-50 mR/hr” position and expose the source by depressing the slide.

6.6.23 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.6.24 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.6.25 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.6.26 Rotate the selector switch to the “500 mR/hr” position.

6.6.27 Ensure thumbwheel source is in the “0-500 mR/hr” position and expose the source by depressing the slide.

6.6.28 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.6.29 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.6.30 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.6.31 Rotate the selector switch to the “5000 mR/hr” position.

6.6.32 Ensure thumbwheel source is in the “0-5000 mR/hr” position and expose the source by depressing the slide.

6.6.33 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.6.34 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.6.35 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the

next step.

6.6.36 Close the retractable beta window.

6.6.37 Initial the instrument calendar.

6.6.38 Ensure all boxes on RP-F-0069 are properly filled and sign as performer.

6.6.39 Turn the instrument off **and** place the instrument into service.

6.6.40 Obtain a peer review of the daily response test on RP-F-0069.

6.7 Performance Testing of Bicron Microrem

NOTE:

Microrem instruments are typically setup and response checked using a Sr-90 thumbwheel source or Cs-137 button source.

Ensure radioactive sources are stored when obtaining a background reading on a microrem instrument.

Ensure the "+" marks on the sides of the instrument properly align with the marks on the source jigs when source checking a microrem instrument

RCT

6.7.1 Verify the physical integrity of the instrument.

6.7.2 Confirm the instrument calibration has a current and legible calibration label. **If** it does **not** have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.7.3 Obtain the appropriate RP-F-0069, *Dose Rate Instrument Daily Test Sheet* for the instrument.

6.7.4 Ensure the instrument information in Part 1 of RP-F-0069 matches what is shown on the instrument (for example, serial number, location, calibration due date).

6.7.5 Enter the date and time of the response test in the correct columns of RP-F-0069.

6.7.6 Turn the instrument on **and** allow it to warm up properly.

6.7.7 Turn the selector switch to the Battery position **and** ensure a needle response within the "Bat. ok" arc on the display.

6.7.8 **If** battery is satisfactory, **then** enter an "S" in the correct column of RP-F-0069. **If** unsatisfactory, **then** enter a "U" on RP-F-0069.

6.7.9 Turn the selector switch to the HV (high voltage) position and ensure a needle response within the "HV ok" arc on the display.

6.7.10 **If** HV is satisfactory, **then** enter an "S" in the "H/V" column of RP-F-0069. **If** unsatisfactory, **then** enter a "U".

6.7.11 Turn the selector switch to its lowest scale setting (i.e., "x0.1")

6.7.12 Document a background reading after allowing the instrument to stabilize for approximately twenty (20) seconds in the "Bkg" box of RP-F-0069.

6.7.13 **If** the background reading is > 5 µR/hr, **then** ensure radioactive sources are properly stored away from the instrument **and** repeat the background reading.

6.7.14 **If** the background reading is > 5 µR/hr, **then** mark a "U" in the "Bkg" column of RP-F-0069 **and** tag the instrument out of service using RP-F-0026.

6.7.15 **If** the background is < 5 µR/hr, **then** mark an "S" in the correct column of RP-F-0069 **and** proceed to the next step.

6.7.16 Obtain the appropriate source as listed in Part 1 of RP-F-0069 in the Source Radionuclide box and Source Identification Number box.

NOTE:

Step 6.7.17 through 6.7.19 are written for setup locations equipped with Sr-90 thumbwheel sources.

6.7.17 Rotate the selector switch to the "x10" position.

6.7.18 Ensure thumbwheel source is in the "0-500 mR/hr" position. Do **NOT** expose the source by depressing the slide.

6.7.19 Ensure the source response as indicated on the instrument face is within the "Scale 3" range shown in Part 1 of RP-F-0069 **and** move to the next step.

NOTE:

Step 6.7.20 through **6.7.22** are written for setup locations equipped with Cs-137 button sources.

6.7.20 Rotate the selector switch to the "x1" position.

6.7.21 Place the instrument in the correct geometry near the source as indicated by the markings on the source jig.

6.7.22 Ensure the source response as indicated on the instrument face is within the "Scale 2" range shown in Part 1 of RP-F-0069 **and** move to the next step.

6.7.23 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.7.24 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.7.25 Initial the instrument calendar.

6.7.26 Ensure all boxes on RP-F-0069 are properly filled and sign as performer.

6.7.27 Turn the instrument off **and** place the instrument into service.

6.7.28 Obtain a peer review of the daily response test on RP-F-0069.

6.8 Performance Testing of Eberline Model 6112B Teletector

NOTE: Response tests must be performed with the instrument cap removed.

RCT

6.8.1 Verify the physical integrity of the instrument.

6.8.2 Confirm the instrument calibration has a current and legible calibration label. **If** it does not have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.8.3 Obtain the appropriate RP-F-0069, *Dose Rate Instrument Daily Test Sheet* for the instrument.

6.8.4 Ensure the instrument information in Part 1 of RP-F-0069 matches what is shown on the instrument (for example, serial number, location, calibration due date).

6.8.5 Enter the date and time of the response test in the correct columns of RP-F-0069.

6.8.6 Turn the instrument on **and** allow it to warm up properly.

6.8.7 Turn the selector switch to the Battery position **and** ensure the needle is in the Battery line on the display.

6.8.8 **If** battery is satisfactory, **then** enter an "S" in the correct column of RP-F-0069. **If** unsatisfactory, **then** enter a "U" on RP-F-0069.

6.8.9 Turn the selector switch to its lowest scale setting (i.e., "2 mR/hr")

6.8.10 Document a background reading after allowing the instrument to stabilize for approximately twenty (20) seconds.

6.8.11 **If** the background reading is > 0.2 mR/hr, **then** mark a "U" in the "Bkg" column of RP-F-0069 **and** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.8.12 **If** the background is < 0.2 mR/hr, **then** mark an "S" in the "Bkg" column of RP-F-0069 **and** proceed to the next step.

6.8.13 Obtain the appropriate source as listed in Part 1 of RP-F-0069 in the Source

Radionuclide box and Source Identification Number box.

NOTE:

The instructions below are written for setup locations equipped with Sr-90 thumbwheel sources utilizing an instrument and source jig.

6.8.14 Turn the selector switch to the 2mR/hr. position.

6.8.15 Ensure thumbwheel source is in the "0-5 mR/hr" position. Do **NOT** expose the source by depressing the slide.

6.8.16 Ensure the source response as indicated on the instrument face is within the "Scale 1" range shown in Part 1 of RP-F-0069.

6.8.17 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.8.18 **If** the instrument is within the range indicated in Part 1 of RP-F-0069, **then** move to the next step.

6.8.19 Initial the instrument calendar.

6.8.20 Ensure all boxes on RP-F-0069 are properly filled and sign as performer.

6.8.21 Turn the instrument off **and** place the instrument into service.

6.8.22 Obtain a peer review of the daily response test on RP-F-0069.

NOTE:

The instructions below are written for setup locations equipped with Cs-137 button sources.

6.8.23 Turn the selector switch to the "2mR/hr." position.

6.8.24 Obtain the appropriate source as listed in Part 1 of RP-F-0069 in the Source Radionuclide box and Source Identification Number box.

6.8.25 Place the end of the instrument probe directly onto the surface of the button source **and** allow the instrument to stabilize.

6.8.26 Ensure the source response as indicated on the instrument face is within the "Scale 1" range shown in Part 1 of RP-F-0069.

6.8.27 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.8.28 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.8.29 Initial the instrument calendar.

6.8.30 Ensure all boxes on RP-F-0069 are properly filled and sign as performer.

6.8.31 Turn the instrument off **and** place the instrument into service.

6.8.32 Obtain a peer review of the daily response test on RP-F-0069.

6.9 Performance Testing of Automess Model 6150AD2 Teletector

NOTE:

Response tests must be performed with the instrument cap removed.

RCT

6.9.1 Verify the physical integrity of the instrument.

6.9.2 Confirm the instrument calibration has a current and legible calibration label. **If** it does not have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.9.3 Obtain the appropriate RP-F-0069, *Dose Rate Instrument Daily Test Sheet* for the instrument.

6.9.4 Ensure the instrument information in Part 1 of RP-F-0069 matches what is shown on the instrument (for example, serial number, location, calibration due date).

6.9.5 Enter the date **and** time of the response test in the correct columns of RP-F-0069.

6.9.6 Turn the instrument on **and** allow it to warm up properly.

NOTE:

Battery voltage will be indicated when the instrument is switched on. Using the arrow button, the "Battery Voltage and Battery Monitoring" function can be selected to view the voltage of the 9-volt battery at any time. Voltages below 5.5 volts produce a battery warning consisting of the flashing battery symbol in the upper right corner of the LCD and a continuous alarm tone.

6.9.7 **If** a low battery alarm is not indicated, **then** enter an "S" in the correct column of RP-F-0069. If unsatisfactory, then enter a "U".

6.9.8 Document a background reading after allowing the instrument to stabilize for approximately two to eight (2-8) seconds.

6.9.9 **If** the background reading is > 0.2 mR/hr, **then** mark a "U" in the "Bkg" column of RP-F-0069 **and** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.9.10 **If** the background is < 0.2 mR/hr, **then** mark an "S" in the "Bkg" column of RP-F-0069 **and** proceed to the next step.

6.9.11 Obtain the appropriate source as listed in Part 1 of RP-F-0069 in the Source Radionuclide box and Source Identification Number box.

NOTE: The instructions below are written for setup locations equipped with Sr-90 thumbwheel sources.

6.9.12 Place the source in the instrument and source jig.

6.9.13 Insert the slightly extended instrument into the instrument and source jig.

6.9.14 Ensure thumbwheel source is in the "0-5 mR/hr" position and expose the source by depressing the slide.

6.9.15 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.9.16 **If** the instrument is within the range indicated in Part 1 of RP-F-0069, **then** move to the next step.

6.9.17 Ensure thumbwheel source is in the "0-50 mR/hr" position and expose the source by depressing the slide.

6.9.18 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.9.19 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.9.20 **If** the instrument is within the range indicated in Part 1 of RP-F-0069, **then** move to the next step.

6.9.21 Ensure thumbwheel source is in the "0-500 mR/hr" position and expose the source by depressing the slide.

6.9.22 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.9.23 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the

instrument out of service using RP-F-0026.

6.9.24 **If** the instrument is within the range indicated in Part 1 of RP-F-0069, **then** move to the next step.

6.9.25 Ensure thumbwheel source is in the “0-5000 mR/hr” position and expose the source by depressing the slide.

6.9.26 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.9.27 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.9.28 **If** the instrument is within the range indicated in Part 1 of RP-F-0069, **then** move to the next step.

6.9.29 Ensure thumbwheel source is in the “Offscale” position and expose the source by depressing the slide.

6.9.30 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.9.31 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.9.32 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.9.33 **If** the instrument is within the range indicated in Part 1 of RP-F-0069, **then** move to the next step.

6.9.34 Initial the instrument calendar.

6.9.35 Ensure all boxes on RP-F-0069 are properly filled and sign as performer.

6.9.36 Turn the instrument off **and** place the instrument into service.

6.9.37 Obtain a peer review of the daily response test on RP-F-0069.

NOTE: The instructions below are written for setup locations equipped with Cs-137 button sources.

6.9.38 Obtain the appropriate source as listed in Part 1 of RP-F-0069 in the Source Radionuclide box and Source Identification Number box.

6.9.39 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.9.40 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.9.41 **If** the instrument is within the range indicated in Part 1 of RP-F-0069, **then** move to the next step.

6.9.42 Initial the instrument calendar.

6.9.43 Ensure all boxes on RP-F-0069 are properly filled and sign as performer.

6.9.44 Turn the instrument off **and** place the instrument into service.

6.9.45 Obtain a peer review of the daily response test on RP-F-0069.

6.10 Performance Testing of Eberline ASP-2E Neutron Instruments

RCT

6.10.1 Verify the physical integrity of the instrument.

6.10.2 Confirm the instrument calibration has a current and legible calibration label. **If** it does not have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

6.10.3 Obtain the appropriate RP-F-0069, *Dose Rate Instrument Daily Test Sheet* for the instrument.

6.10.4 Ensure the instrument information in Part 1 of RP-F-0069 matches what is shown on the instrument (for example, instrument serial number, probe serial number, location, calibration due date).

6.10.5 Enter the date and time of the response test in the correct columns of RP-F-0069.

6.10.6 Turn the selector switch from the "Off" position to the "Check" position **and** allow the instrument to warm up.

6.10.7 Ensure the correct probe serial number scrolls across the display screen of the ASP2E.

6.10.8 **If** the correct probe serial number does **NOT** scroll across the display screen, **then** tag the instrument out of service using RP-F-0026.

6.10.9 **If** battery is unsatisfactory, **then** enter an "U" in the correct column of RP-F-0069 and tag the instrument out of service using RP-F-0026.

6.10.10 **If** battery is satisfactory, **then** enter an "S" in the correct column on RP-F-0069 **and** move to the next step.

NOTE: A one minute count is started by pressing the Star Key.

6.10.11 Perform a timed one-minute background reading in an area **NOT** affected by the check source by rotating the selector switch to the "Scaler" position.

6.10.12 **If** the background is acceptable, **then** mark an "S" in the "Bkg" column of RP-F-0069 **and** proceed to the next step.

6.10.13 Take the instrument to the source listed in Part 1 of RP-F-0069 in the Source Radionuclide box and Source Identification Number box.

6.10.14 Place the instrument in the indicated location near the source **and** perform a timed one minute count.

6.10.15 Ensure the source response as indicated on the instrument face is within the range shown in Part 1 of RP-F-0069.

6.10.16 **If** the instrument is out of the range indicated in Part 1 of RP-F-0069, **then** tag the instrument out of service using RP-F-0026.

6.10.17 **If** the instrument is within the range indicate in Part 1 of RP-F-0069, **then** move to the next step.

6.10.18 Initial the instrument calendar.

6.10.19 Ensure all boxes on RP-F-0069 are properly filled and sign as performer.

6.10.20 Turn the instrument off **and** place the instrument into service.

6.10.21 Obtain a peer review of the daily response test on RP-F-0069.

6.11 Performance Checks of Lapel Air Samplers

6.11.1 Verify the physical integrity of the instrument.

6.11.2 Ensure the Defender 510 is turned on.

6.11.3 **If** not already turned on, **then** turn on Defender 510 BIOS calibrator by pressing the power button.

NOTE:

Use the ▲▼▶and ◀buttons to toggle between options on the Defender 510 menu.

The Defender setup steps mentioned in **Steps 6.11.4** through **6.11.12** are NOT required **when** multiple lapel air samplers are being flow checked consecutively.

Refer to the back of RP-F-0046 for supplemental instructions.

6.11.4 Press ▶to highlight “Setup” and press “Enter”.

6.11.5 Ensure “Readings” is highlighted **and** press “Enter”.

6.11.6 Ensure “Number in Average” indicates “010”.

6.11.7 **If** "010" is not indicated, **then** use ◄or ►to change the number to "010".

6.11.8 Press ▼until "Confirm" is highlighted **and** press "Enter".

6.11.9 Press ▼until "Measure" is highlighted **and** press "Enter".

6.11.10 Ensure units shown on Defender display are in "L/min".

6.11.11 **If** "L/min" is not shown on the Defender display, **then** notify RADCON management for direction.

6.11.12 **If** required, **then** press ◄or ►until "Burst" is highlighted **and** press "Enter". The Defender 510 is now ready to collect the flow data from the pump.

6.11.13 Obtain the appropriate RP-F-0046, *Lapel Air Sampler Daily Instrument Performance Check Sheet*.

6.11.14 Ensure the instrument information in Part 1 of RP-F-0046 matches what is shown on the instrument (for example, serial number, location, calibration due date).

6.11.15 Enter the date and time in the appropriate boxes of RP-F-0046.

6.11.16 **If** the instrument is out of calibration, **then** mark a "U" in the correct box of RP-F-0046 **and** tag the instrument out of service using RP-F-0026.

6.11.17 **If** the instrument is in calibration, **then** mark a "S" in the correct box of RP-F-0046 **and** move on to the next step.

6.11.18 Press the power button to turn on the lapel air sampler.

6.11.19 Connect Defender hose to lapel air sampler.

6.11.20 For Buck LP-7 and LP-12 samplers: Press ▼("Exit") to access the next menu and press ▲("Run") to begin sample flow.

6.11.21 For Buck Basic-12 and VSS-12 samplers: Press "Enter/Off" to begin sample flow.

6.11.22 Document the average flow rate reading, after ten (10) readings, in the correct box of RP-F-0046.

6.11.23 Compare the obtained average flow rate reading to the "Acceptable Range" shown in Part 1 of RP-F-0046. **If** unsatisfactory, **then** mark a "U" in the correct box of RP-F-0046 **and** tag the instrument out of service using RP-F-0026.

6.11.24 **If** the obtained average flow rate reading is within the "Acceptable Range" shown in Part 1 of RP-F-0046, **then** mark an "S" in the correct box of RP-F-0046 **and** move to

the next step.

6.11.25 For Buck Basic-12 and/or VSS-12, **if** the battery is <80%, **then** mark a "U" in the correct box of RP-F-0046 **and** tag the instrument out of service using RP-F-0026.

6.11.26 For Buck 12 and/or VSS-12, **if** the battery is ≥80%, **then** mark an "S" in the correct box of RP-F-0046 **and** move to the next step.

6.11.27 For Buck LP-7 and/or LP-12, **if** the battery indicator shows less than three bars, **then** mark a "U" in the correct box of RP-F-0046 **and** tag the instrument out of service using RP-F-0026.

6.11.28 For Buck LP-7 and/or LP-12, **if** the battery indicator shows three or more bars, **then** mark an "S" in the correct box of RP-F-0046 **and** move to the next step.

6.11.29 Turn the lapel air sampler off.

6.11.30 Initial the instrument calendar.

6.11.31 Ensure all boxes on RP-F-0046 are properly filled **and** sign as performer.

6.11.32 Obtain a peer review of the daily response test.

6.12 Setup and Reset of Siemens Electronic Personal Dosimeters (EPDs)

NOTE:

Typically, a Sr-90 thumbwheel source is used to conduct the source response of Siemens EPDs. The source jig must be put in the "offscale" position with the source exposed during the response check.

EPDs should be reset monthly, when possible.

6.12.1 Verify the physical integrity of the instrument.

6.12.2 Confirm the instrument has a current and legible calibration label. **If** it does **NOT** have a current and legible calibration label, **then** tag the instrument out of service using RP-F-0026.

6.12.3 Obtain a check source of the appropriate radiation type.

6.12.4 Enter the Source Radionuclide and Source Identification Number in the appropriate block of RP-F-0141, *Electronic Personal Dosimeter Setup Sheet*.

6.12.5 Document the EPD serial number on RP-F-0141.

6.12.6 Document the calibration due date on RP-F-0141.

NOTE:

Lithium batteries should be replaced quarterly. Alkaline batteries may require more frequent replacement. Battery change-outs should be noted in the comment block or at the bottom of RP-F-0141 in the "Comments" section.

6.12.7 **If** required, **then** change the battery.

6.12.8 Open the *EasyEPD* software application.

6.12.9 Choose File from the menu bar **and** select "Batch Write".

6.12.10 Click on "Open".

6.12.11 Choose "greyepd.epd" or "yellowepd.epd" from the folder as appropriate, **and** click "Open".

NOTE:

Once the setup and reset protocols of *EasyEPD* are activated, they will remain activated until the end of the batch.

6.12.12 Place an EPD in or near the EPD reader, depending upon configuration, to initiate setup protocols.

6.12.13 Place EPD over the source to prompt an alarm condition.

6.12.14 **If** the EPD does NOT alarm, **then** repeat the test.

6.12.15 **If** the EPD does NOT alarm, **then** mark a "U" in the correct box of RP-F-0141 **and** tag the EPD out of service using RP-F-0026.

6.12.16 **If** the EPD does alarm, **then** mark an "S" in the correct box of RP-F-0141 and move to the next step.

6.12.17 Place the alarming EPD in or near the EPD reader, depending upon configuration, to reset the EPD to "0.0 mrem".

6.12.18 Ensure all boxes on RP-F-0141 are properly filled.

6.12.19 Click Finish to "End Write Batches" **and** close *EasyEPD*.

6.12.20 Sign and date the form.

6.13 Removing Instruments from Service

6.13.1 **When** instruments have been determined to be unsatisfactory for use, (e.g., out of calibration, failed performance tests, beyond economical repair, etc.) remove the instrument from service by appropriately completing RP-F-0026, "*DO **NOT** USE Equipment Out of Service*" tag.

7.0 ACCEPTANCE CRITERIA

7.1 Acceptance criteria is provided in the action steps.

8.0 POST PERFORMANCE WORK ACTIVITIES

8.1 Return the response check sources to the appropriate radioactive source storage location.

9.0 RECORDS

9.1 Records Generated

The following records may be generated by this procedure:

- RP-F-0026, *DO **NOT** USE Equipment Out of Service tag*
- RP-F-0046, *Lapel Air Sampler Daily Instrument Performance Check Log*
- RP-F-0065, *Dual Instrument Daily Test*
- RP-F-0067, *Contamination Instrument Daily Test*
- RP-F-0069, *Dose Rate Instrument Daily Test*
- RP-F-0141, *Electronic Personal Dosimeter Setup Sheet*

Forms are to be completed in accordance with CP3-OP-0024, *Forms Contro*l.

9.2 Records Disposition

The records are to be maintained in accordance with CP3-RP-1401, *Radiation Protection Program Records* and CP3-RD-0010, *Records Management Process.*

Appendix A – Acronyms/Definitions

ACRONYMS

ANSI – American National Standards Institute
CPM – Counts Per Minute
EPD – Electronic Personal Dosimeter
HV – High voltage
LLD – Lowest level of detection
MDC – minimum detectable concentration
PGDP –Paducah Gaseous Diffusion Plant
RADCON – Radiological Control
RCT – Radiological Control Technician
THR – Threshold

DEFINITIONS

None