

U.S. DEPARTMENT OF ENERGY

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YUCCA MOUNTAIN PROJECT

ENVIRONMENTAL RADIOLOGICAL MONITORING TECHNICAL PROCEDURE MANUAL

VOLUME II

UNCONTROLLED

WORK PERFORMED UNDER CONTRACT NO. DE-AC08-87NV10576

Technical & Management Support Services



SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

9907120239

PART 4

ESP-1 SWIPE SAMPLE COUNTING

I. RESPONSIBILITIES

- o Level A qualified Health Physics Technician
- o Level C qualified Health Physicist (as indicated)
- o Senior Health Physicist (as indicated)

II. MATERIALS

- o ESP-1 with model HP-210 detector
- o Sample holder model SH-4A
- o Tweezers
- o Standard forms/tag

III. STEPS

NOTE

Use this procedure only if the Ludlum Model 2929 Dual Channel Scaler is not available or not operational.

1. In the designated location where swipe samples are to be counted, set up ESP-1 for scaler mode operation. Use JPA-ER-037: ESP-1 Scaler Mode Operation.
2. Using tweezers, remove swipe sample from envelope or cup and place it onto the planchet (swiped side up) of the sample holder.
3. Slide planchet with swipe sample underneath probe detector.
4. As instructed, initiate a count by pressing the "RESET" button. The instrument will display "X:XX:XX Left" on the top line and the accumulated count on the bottom line.

NOTE

Once the counting period has been initiated, do not disturb the equipment until the counting interval is completed. Disruption of the equipment could result in inaccurate data and will require a recount of the sample.

5. Observe the display to verify that the counting period is completed. The top line will show "CNT FOR X:XX:XX," and the bottom line will show the total counts recorded.
6. In the Swipe Logbook, record:
 - a. Swipe location - where taken.
 - b. Beta cpm.
 - c. Any additional information given by the SHP.

NOTE

Be sure that you record the counting results from the display prior to pressing the "RESET" button. Pressing "RESET" will clear the results of the previous count.

7. Using tweezers, remove the swipe and return it to its envelope or cup.

NOTE

If the swipe sample has the potential of containing naturally occurring products from the uranium decay series, the sample should be retained for at least four hours, then recounted.

8. If the swipe sample is less than 200 dpm beta-gamma, dispose of the swipe then go to step 15.

NOTE

The amount of removable radioactive material is per 100 cm² of surface area. The activity per unit area should be based on the actual area swiped.

9. If the swipe sample exceeds 20,000 dpm beta-gamma, implement BTP-ER-034 immediately.
10. If the swipe sample is less than the above (step 9) but exceeds 200 dpm beta-gamma, a decon effort of the item/area of concern must be made per JPA-ER-003.
11. If unable to perform the decon, implement BTP-ER-034.

12. Segregate the swipe sample for disposal as appropriate.
13. Without a swipe sample in the sample holder, perform a one-minute count to ensure that the sample holder was not contaminated.
14. If the sample tray count results are greater than the background level, the holder needs to be wiped with alcohol. Use JPA-ER-003; otherwise continue.
15. If another total count is desired, press the "RESET" button.
16. Complete steps 7 through 15 for each swipe to be counted.
17. When all samples are counted, reset the ESP-1 to the rate meter mode by pressing the "MODE" button twice.
18. Record swipe sample results on the Radiation Survey Report per JPA-ER-006.
19. Turn the instrument off and return it to its proper storage location.

IV. REFERENCED JPAs AND BTPs

- o JPA-ER-003, "Area & Material Decon"
- o JPA-ER-006, "Radiation Survey Report Form"
- o JPA-ER-037, "ESP-1 Scaler Mode Operation"
- o BTP-ER-034, "Response to Projected Abnormal Events"

V. APPROVAL

SHP *Stan D...* Date 5/19/89

RFPD *Stan D...* Date 5/19/89
Manager

QA/QC *RA Kettell* Date 5/19/89

LUDLUM MICRO-R METER OPERATION

I. RESPONSIBILITIES

- o Level A Health Physics Technician
- o Level C qualified Health Physicist (as specified)
- o SHP (as specified)

II. MATERIALS

- o Ludlum Micro-R meter
- o 2 D-cell size batteries
- o Designated check source
- o Standard forms/tags

III. STEPS

1. Obtain the Micro-R meter and verify its calibration status. If the calibration sticker is missing, consult the Calibration Document Manual for calibration information.
2. If calibration is due within one month, notify the SHP when time permits.
3. If the unit is due for calibration, it must be tagged "Calibration Due." Use JPA-ER-070, "Equipment Tag-Out." Notify the SHP or Level C qualified HP for further instructions if necessary.
4. Turn the range selector switch to the 25 range.
5. Depress the "BAT TEST" button and check the condition of the battery. The meter should deflect to the battery check portion of the meter scale.
6. If the meter does not respond, proceed. Otherwise go to step 11.
7. Release the clips on the ends of the instrument.
8. Remove the old batteries and replace with two new D-size batteries.

9. Perform the battery check again and record in the instrument log book that the batteries have been replaced.
10. If the unit still fails to respond, tag it per JPA-ER-070, "Equipment Tag-Out." Contact the SHP or a Level C qualified HP if necessary.
11. Turn the audio toggle switch to "ON."
12. Turn the "F/S" toggle switch to "S" (slow).
13. Verify if the instrument has or has not been used that day (if no one can verify use, consult the Micro-R meter log book). If it has not been used, proceed. Otherwise go to step 23.
14. Obtain the beta-gamma source identified on the label on the side of the instrument.
15. If the label is missing, consult the "Calibration Document Manual" for the information.
16. Remove the check source. Be sure to use care and handle the source by the rim only.
17. Place the source in contact with the bottom front portion of the instrument.
18. Move the range selector switch until the meter pointer indicates a reading.
19. Verify the reading obtained with the reading recorded on the side of the instrument. If the reading is not within 20 percent, contact a Level C qualified HP.
20. Depress the "RES" button. Check to see that the meter pointer returns to the zero position. If it fails to reset, contact a Level C qualified HP.
21. Return the check source to its container and proper storage location.
22. In the Micro-R Meter log book, record the following:
 - a. Date.
 - b. Instrument number.
 - c. Calibration due date if due within one month.
 - d. Source I.D. and serial number.
 - e. Readings obtained from source check.
 - f. Physical damage, if any observed.
 - g. Operational failures, if any.
 - h. Sign your name.
23. The instrument is ready for monitoring.
24. Turn the instrument off after use and return it to its proper location when finished.

25. If any problems or unusual characteristics have been experienced during use of the unit, record the problem in the instrument log book and notify the SHP or a Level C qualified HP when time permits.

IV. REFERENCED JPA'S

- o JPA-ER-070, "Equipment Tag Out"

V. APPROVAL

QA/QC R.A. Kettell Date 5/19/89

RFPD Stacy Dwyer Date 5/14/89
Manager

SHP Stacy Dwyer Date 5/14/89

LUDLUM ALPHA COUNTER - GAS (LAC-G)

I. RESPONSIBILITIES

- o Level A Health Physics Technician
- o Level C qualified Health Physicist (as indicated)
- o SHP (as indicated)

II. MATERIALS

- o Ludlum Alpha Counter - Gas (LAC-G)
- o Designated alpha check source
- o Butane refill bottle (Hutton or Zippo cigarette lighter refill bottles will work)
- o 9-volt battery
- o Standard forms/tag

III. STEPS

1. Obtain the LAC-G and verify its calibration status. If the calibration sticker is missing, consult the "Calibration Document Manual" for calibration information.
2. If the calibration is due within one month, notify the SHP when time permits.
3. If the unit is due for calibration, it must be tagged "Calibration Due." Use JPA-ER-070, "Equipment Tag Out." Notify the SHP or Level C qualified HP for further instructions if necessary.
4. Turn the instrument range multiplier switch to X1K. Depress the "TEST" button and check the condition of the battery. The meter should deflect to the battery check portion of the meter scale.
5. If the meter does not respond, proceed. Otherwise go to step 11.
6. Turn the instrument "OFF."
7. Remove the clip underneath and to the front of the instrument.

8. Remove the old battery and replace with a new 9-volt battery.
9. Perform the battery check again and record in the instrument log book that the battery has been replaced.
10. If the instrument still fails to respond, tag it as per JPA-ER-070, "Equipment Tag Out." Contact the SHP or a Level C qualified HP if necessary.
11. If the instrument does not have a butane bottle already installed, continue; otherwise go to step 15.
12. Turn the instrument "OFF."
13. Obtain a butane bottle, place the spout in the mounting bracket (on the side of the instrument), and push in. (If a butane bottle is not available, contact the SHP or a Level C HP).
14. Slide the holding plate behind the neck of the bottle to secure it in place.

NOTE

Air bubbles may form in the tubing going from the butane port into the LAC if the butane bottle is not held securely. If bubbles form, slowly rotate the instrument until it is upside down. Hold it there for approximately one minute or until the bubbles disappear.

15. Turn the "ON/OFF" toggle valves to the "ON" position.
16. Turn the "FLUSH/FLOW" toggle valve to the "FLUSH" position. Flush the detector for approximately one minute, then turn the "FLUSH/FLOW" toggle to "FLOW."
17. Turn the instrument on to X1K.
18. Turn the audio toggle switch to "ON."
19. Turn the "F/S" button to "S" (slow).
20. Verify if the instrument has or has not been used that day (if no one can verify use, consult the LAC log book). If it has not been used, proceed; otherwise go to step 30.
21. Obtain the designated alpha source identified on the label on the side of the instrument.
22. If the sticker is missing, consult the "Calibration Document Manual" for information.
23. Remove the check source.
24. Place the source in contact with the detector window (middle).

25. Move the range to the lower scales until a meter reading is indicated.
26. Verify the reading obtained with the reading recorded on the side of the instrument. If the reading is not within 20 percent, contact a level C qualified HP.
27. Press the "RES" switch. The meter should zero. If it fails to zero, contact a level C qualified HP.
28. Return the source to its container and proper storage location.
29. In the LAC logbook, record the following:
 - a. Date.
 - b. Instrument number.
 - c. Calibration due date if within one month.
 - d. Source I.D. and serial number.
 - e. Readings obtained from source check.
 - f. Physical damage, if any observed.
 - g. Operational failures, if any observed.
 - h. Sign name.
30. The instrument is ready for monitoring.

NOTE

While surveying, keep the probe approximately 1/8" above the surface being monitored to avoid tearing the mylar covering on the probe.

31. Turn the instrument off after use and turn the gas flow valve "OFF."
32. If the butane gas bottle has been depleted, remove the bottle by pulling it out slowly. Discard it in a trash receptacle.

CAUTION

Take caution when removing the butane bottle, due to pressure in the bottle. Removal should be done outside or in a well-ventilated room, and not near an open flame.

33. If any problems or unusual characteristics have been experienced during use of the unit, record the problem in the instrument log book and notify the SHP or Level C qualified HP when time permits.

V. REFERENCED JPAs

- o JPA-ER-070, "Equipment Tag Out"

VI. APPROVAL

RFPD [Signature] Date 5/19/89
Manager

QA/QC RA Kettell Date 5/19/89

SHP [Signature] Date 5/19/89

ESP-1 OPERATION

I. RESPONSIBILITIES

- o Level A Health Physics Technician
- o Level C Qualified Health Physicist (as indicated)
- o SHP (as indicated)

II. MATERIALS

- o Eberline Model ESP-1 survey meter with designated pancake probes (shielded and unshielded)
- o Designated check source
- o 6 C-Cell Batteries
- o Standard forms/tags

III. STEPS

1. Obtain the ESP and verify it's calibration status. If the calibration sticker is missing, consult the Calibration Document Manual for calibration information.
2. If the calibration is due within one month, notify the SHP when time permits.
3. If the unit is due for calibration, it must be tagged "Calibration Due". Use JPA-ER-070, Equipment Tag-Out. Notify the SHP or Level C qualified HP for further instructions if necessary.
4. If the probe needed is not already attached to the meter, detach the existing probe and attach the probe needed.

NOTE

Each ESP has two probes assigned to it, one shielded and one unshielded. Each probe is clearly marked as to which survey meter it has been calibrated.

5. Press the "ON/OFF" button to turn on the instrument.

6. Observe the display. Two lines of information should appear: a horizontal bar scale on the upper line and a numeric value on the lower scale.
7. Verify that the "Count Rate" is in "Counts/Min" (count rate is displayed on the bottom line). If it is not in "Counts/Min," proceed to next step; otherwise go to step 15.
8. Press the "Mode" button.
9. The display will ask "Scaler" mode; press "-" button for "NO."
10. The display will then indicate "Units." Press the "Reset" button.
11. The display will then indicate "Base." Press the "-" button until "Counts" is displayed, then press "+" for YES.
12. The display will then indicate "Suffix." Press the "-" button until "Minutes" is displayed, then press "+" for YES.
13. The display will then indicate "Prefix." Press "+" for "None."
14. Press the "Mode" button. The display should indicate "Counts/Min."
15. If the display is not functioning correctly, tag the instrument per JPA-ER-070. Notify the SHP or Level C qualified HP if necessary.
16. If the character in the upper left corner is blinking, the batteries are low. Proceed to next step; otherwise go to step 22.
17. Turn the unit "OFF."
18. Unscrew the bottom of the unit and remove the bottom of the outer case.

NOTE

Do not disconnect the grounding wire from the instrument case during the battery exchange.

19. Remove the 6 C-cell batteries and replace them with fresh ones.

CAUTION

The internal computer memory will be erased if the unit is without battery power for longer than 20 minutes.

20. Replace the bottom of the outer case, and record in the instrument logbook that the batteries have been exchanged.
21. If the instrument still indicates low batteries, tag the unit per JPA-ER-070 and notify the SHP or Level C qualified HP if necessary; otherwise continue.

22. Observe the bar graph indicator. If it registers off-scale, depress the "RESET" button to clear the display; otherwise go to step 24.
23. If the bar graph remains off-scale, tag it per JPA-ER-070 and notify the SHP or Level C qualified HP if necessary.
24. Press the speaker button "ON."
25. Verify if the instrument has or has not been used that day (if no one can verify this, consult the ESP logbook). If it has not been used, proceed to next step; otherwise go to step 36.
26. Obtain the designated beta source identified on the label affixed to the side of the instrument.
27. If the label is missing, consult the Calibration Document Manual for the information.
28. Remove the check source. Be sure to use care and handle the source by its outer rim only.
29. Place the source in contact with the middle portion of the detector probe.
30. If the alarm sounds, press "SPKR" button to silence alarm (use JPA-ER-036 for alarm level operation).
31. Verify that the reading obtained corresponds to the level recorded on the side of the instrument (for the probe being checked).
32. If the reading is not within 20%, contact Level C qualified HP.
33. If both probes are to be used, detach the probe and attach the other probe. Repeat steps 28-32 before continuing.
34. Return the check source to its container and proper storage location.
35. In the ESP logbook, record the following:
 - a. Date
 - b. Instrument serial number
 - c. Probe(s) serial number
 - d. Calibration due date if within one month
 - e. Source i.d. and serial number
 - f. Readings obtained from source
 - g. Physical damage, if any observed
 - h. Operational failures, if any
 - i. Sign name
36. The instrument is now ready for monitoring.
37. Turn the instrument off after use and return it to its proper location when finished.

38. If any problems or unusual characteristics have been experienced during use of the unit, record the problem in the instrument logbook and notify the SHP or level C qualified HP when time permits.

IV. REFERENCED JPAs

- o JPA-ER-036, "ESP Alarm Level Operation"
- o JPA-ER-070, "Equipment Tag-Out"

V. APPROVAL

QA/QC	<u>RA. Kettell</u>	Date	<u>5/19/89</u>
RFPD Manager	<u>Stan Trojell</u>	Date	<u>5/19/89</u>
SHP	<u>Stan Trojell</u>	Date	<u>5/19/89</u>

ESP-1 ALARM LEVEL SETTING OPERATION

I. RESPONSIBILITIES

- o Level C Health Physics Technician
- o Level C Qualified Health Physicist - (as indicated)
- o SHP (as indicated)

II. MATERIALS

- o ESP-1 Survey Instrument
- o Standard forms/tags

III. STEPS

NOTE

The alarm set point for the ESP-1 will be set at a value designated by the SHP, and shall not be changed without authorization by the SHP. This activity will be completed by Level C qualified personnel.

1. Ready the ESP-1 for use per JPA-ER-035, ESP-1 Operating.
2. Press the "MODE" button to access the alarm set mode.
3. If the display reads "ALM AT," go to step 7.
4. If the display reads "SCALER MODE," press the "-" switch to display the "ALM AT" prompt.
5. When "ALM AT" is displayed, the value indicated can be changed by pressing the "RESET" and "-" buttons simultaneously (to obtain lower values) or the "RESET" and "+" buttons simultaneously (to obtain larger values).

NOTE

The longer you hold the buttons down, the faster the numbers change. As the new alarm value approaches, release and depress the buttons to slow down the changing values.

6. When the designated alarm value is displayed (ALM AT X.XX + XX), press the "MODE" button to return to the "Count Rate" mode.

7. Record the new alarm level in the ESP Logbook, and notify the SHP.
8. Turn the instrument off and return it to the SHP for disposition.

IV. REFERENCED JPA'S

- o JPA-ER-035, "ESP-1 Operation"

V. APPROVAL

QA/QC RAKottel Date: 5/19/89

RFPD Steve D. Wood Date: 5/19/89
Manager

SHP Steve D. Wood Date: 5/19/89

ESP-1 SCALER MODE OPERATION

I. RESPONSIBILITIES

- o Level A Health Physics Technician
- o Level C Qualified Health Physicist (as indicated)
- o SHP (as indicated)

II. MATERIALS

- o ESP-1 with model HP-210 detector probe
- o Sample holder Model SH-4A
- o Standard forms/tags

III. STEPS

NOTE

Use this procedure only if the Ludlum Model 2929 Dual Channel Scaler is not available or operational.

1. Ready the ESP-1 per JPA-ER-035, ESP-1 Operation.
2. Press the "MODE" button to display "SCALER MODE."
3. Press the "+" button to display "UNITS= cnt" in the top line of the window. If "UNITS= EVENTS" is displayed, press the "-" button to display the "UNITS= cnt."
4. With "UNITS= cnt" in the display, press the "+" button to accept the "cnt" unit and display the "ALM AT X.XX + XX" in the bottom line of the display.
5. Press the "RESET" and "+" or "-" buttons simultaneously to either increase ("+") or decrease ("-") the total at which the audible alarm will sound for the scaler mode. Set the alarm value per SHP guidance or use 1.00+06 as a default value.

NOTE

This set alarm value is not the same as the rate meter alarm value. It is a set point for indicating that a total number of counts is exceeded.

6. Press "+" to obtain "CNT FOR X.XX+XX" on the second line of the display.
7. Press the "RESET" and the "+" or "-" buttons simultaneously to set the length of the counting period. The counting interval can be set for a period from one second to four hours. Set the interval per SHP guidance (usually one minute count).
8. Press the "+" button to initialize the ESP-1 prior to starting the actual count. The display will show the counting period on the top line, and the "RESET TO START" on the bottom line.

HOLD POINT

Do not initiate count until the instrument is set up as per SHP instructions (i.e. sample holder distance, efficiency factor established, etc.).

9. The ESP-1 is now ready to initiate a count.
10. Turn the instrument off and return it to its proper location when finish.

IV. REFERENCED JPAS

- o JPA-ER-006, "Radiation Survey Report"
- o JPA-ER-035, "ESP-1 Operations"

V. APPROVAL

QA/QC	<u>RA Kellel</u>	Date:	<u>5/19/89</u>
RFPD Manager	<u>[Signature]</u>	Date:	<u>5/19/89</u>
SHP	<u>[Signature]</u>	Date:	<u>5/19/89</u>

INSTRUCTIONS

1. Enter Datasheet No. with your initials - Date and seq. number.
2. Enter models and serial numbers of all instruments used to perform survey.
3. Enter if instrument calibration is valid.
4. Enter time of day survey was performed.
5. Enter location, identification or description of item surveyed (ex. bldg. 2, rm. 5).
6. Enter readings obtained while performing survey.
7. Enter measurement type obtained (see codes):
8. Enter measurement distance used (see codes).
9. Enter any pertinent remarks (ex. as per JPA..., see diagram on reverse, etc...)
10. If possible, make a diagram of the locations that were surveyed.

DIAGRAMS

CODES

* MEASUREMENT TYPE

- 01 ALPHA (cpm)
 02 BETA (cpm)
 03 GAMMA (mR/hr)
 04 BETA+GAMMA
 (mR/hr)
 05 ALPHA (dpm)
 06 BETA+GAMMA (dpm)
 07 BETA+GAMMA (μ R)

** MEASUREMENT DISTANCE

- 11 CONTACT
 12 ONE METER
 13 AVERAGE E/R
 14 MAXIMUM E/R
 15 SWIPE SAMPLE

DISPOSITION: *(complete only as necessary)*

SHP _____ Date _____

Signature