GASTON COUNTY, NC

LUDLUM MODEL 52
PORTAL MONITOR
GUIDANCE

This guidance can be altered and modified when needed for specific conditions and situation

**In support of North Carolina Emergency Response Plans
for Catawba and McGuire Nuclear Sites**

On line edition of guidance is current

for the nuclear plan

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LUDLUM MODEL 52
PORTAL MONITOR OPERATING GUIDANCE

Ludlum Model 52 Portal Monitors are available from the State Division of Emergency Management for use where suspected contamination may have occurred and large numbers of the public or emergency workers may have been affected. These monitors are located in the Western, Central and Eastern Branch areas of the Division of Emergency Management that have responsibilities associated with the utilities having fixed nuclear facilities in North Carolina. When requested by a county emergency management office, the monitors will be deployed from the Area Offices in accordance with policy and procedures of the Division of Emergency Management. Assembly and Operation of the monitors will be responsibility of the monitoring teams at the Radiological Monitoring and Decontamination points assigned this equipment.

RESPONSIBILTIES

A.   The agencies in Figure1 are responsible for assembly for storage.

B.   Assembly and Operation of the monitor(s) will be the responsibility of the monitoring teams at the Radiological Monitoring and Decontamination locations assigned this equipment.

C.   Personnel assigned to monitoring duties will be responsible for assuring that the Portal Monitor Survey Form is **completed for each evacuee found to be contaminated** prior to their release from the monitoring station.

General

The Ludlum Model 52 Portal Monitor is used for Beta/Gamma personnel contamination monitoring and meets FEMA standard for Emergency Response Portal Monitoring (FEMA REP 14). It is designed to be disassembled for ease of transportation and storage, and can be assembled in 5 minutes or less without tools. All parameters are stored in non-volatile memory, which requires no battery back up. The parameters are pre-set at the factory to detect a 1.0 uCiCs $_{137}$ Beta window source in a 10-uR/hr background field in accordance with the FEMA standard. The Model 52 can be powered by 120 VAC or 6 "D" cell batteries.

The instrument has a person counter integrated into the electronics that increments by one every time a count is completed. It also has a RS-232 port that can be used to print out parameter set points, background counts, and counts above background.

The portal frame incorporates an array of 18 Geiger Mueller (G-M) detectors positioned around the frame and base. Individual LED's (light Emitting Diodes) mounted in the frame and also on the electronics front panel indicates the specific alarm location. Audible signals accompany the LED's for additional indication. Detector counts, background, and all parameters may be viewed on the LCD Display.

The Ludlum Model 52 incorporates a summing alarm in addition to the individual channel alarms. This increases the systems sensitivity to widespread contamination. If two or more channels had a noticeable increase in counts but did not exceed their alarm threshold then the sum of their counts could not exceed the summing alarm.

This instrument also has background update and subtract capabilities. The instrument will take a background count and subtract it from the current count. This function helps compensate for fluctuations in background. Background subtract has been activated on the portal monitors. If a background addition is required and directed by North Carolina Radiation Protection, the North Carolina Division of Emergency Management will provide specific instructions to the operator on instrument manipulation to perform this function. The alarm volume is adjustable via the keypad on the front panel.

ASSEMBLY INSTRUCTION

The Ludlum Model 52 comes in a container that can be used for shipping and storage. The pieces and quantities that make up the systems are:

1 – Base	1 – R1 (Right #1) Section
1 – R2 Section	1 – R3 Section
1 – L1 Section	1 – L2 Section
1 – L3 Section	1 – Top Section
1 – Electronics Section	1 – Power Cord

Remove all pieces from the case and make sure that you have all the above pieces.

The Ludlum Model 52 can be assembled without tools. All connections are made with latches. To connect a latch, lift up the bottom tab, hook the top cross bar into the hook on the piece that you are attaching and then push the tab back down until it snaps into place. To unlatch, lift up the tab (**CAUTION!** The latch can spring open violently and could cause some pain or injury) and unhook the top cross bar.

Refer to Figure 1 of this section – Ludlum Model 52 Assembly Drawing for the following assembly.

- Set the Base on the ground with the screens over the foot detectors facing up

- Insert the male end of section **R1** into the female side of the **Base** marked **Right** and attach latches. (**Caution**! When assembling the side and to pieces be careful not to pinch the skin of the hand between parts being assembled). The detector screens must be facing toward the middle (inside) of the portal.

- Insert the male end of section **R2** into female end of section **R1** and attach latches.

- Repeat the process for the rest of the side sections (**R3** through **L3**).

- Insert the **Top** into the tops of the side sections and attach the latches. The top can be installed in either direction. It does not matter which end goes to the right.

- Plug the **Electronics** section onto the back of section **R2** with the LEDs facing up. Make sure that the pin in the back of **R2** goes into the hole on the **Electronics** section. Then attach the latches.

- If you have 120-line voltage available, plug the **Power Cord** into the connector on the bottom of the **Electronics** marked **Input**. If not, install **6 "D" Cell Batteries** into the battery compartment. The **Power Cord** and **Batteries** may both be installed at the same time, but the Ludlum Model 52 does not charge the batteries.

- **Turn On** the **Power** switch located on the bottom of the **Electronics** and allows the instrument to finish updating. If the programmed settings are acceptable, it is ready for use.

- Place provided protective covering over foot detectors on base of monitor. This covering should be replaced as needed due to wear or contamination.

- Test the instrument with an approved check source included in the unit case.

OPERATIONS CHECKOUT

To ensure the unit is functioning correctly, an operational check <u>must</u> be performed before starting monitoring activity. This check verifies that the unit is turned on, the settings are appropriate and the system will alarm when the detectors are exposed to radiation above background level.

1. Turn ON the POWER switch located on the bottom of the Electronics and allow the instrument to update the location background count. This mandatory update takes approximately one minute during which the yellow UPDATING status LED will flash and the alarm will sound.

2. The green ENTER/CHECKING status LED will illuminate when the background update is successfully completed. When this LED illuminates **each of the detectors must be tested with an approved check source included in the unit case.**

3. **Activate the monitor by stepping onto the foot pad and hold the check source in proximity to the detectors**. The green ENTER/CHECKING status LED will flash and the alarm will beep once. When the count time is complete, the red RADIATION ALARM status LED will flash and the alarm will sound. The LCD readout will provide the numerical indication of radiation on the appropriate sensors (L1 / 22 / L3 / R1 / R2 / R3 / foot / head).

4.   **The alarm check <u>must be accomplished for all sections</u> to confirm the unit is functioning.**

5   **Once the alarm check is accomplished for each of the sections, the check source <u>must be passed through the CENTER</u> of the portal at waist level and verify that the alarm is triggered.**

6   If the portal monitor fails any of the tests, contact the local Emergency Management agency for further instructions.

7   If the above operational tests are successfully passed then the portal monitor is considered operational for personnel scanning activity.
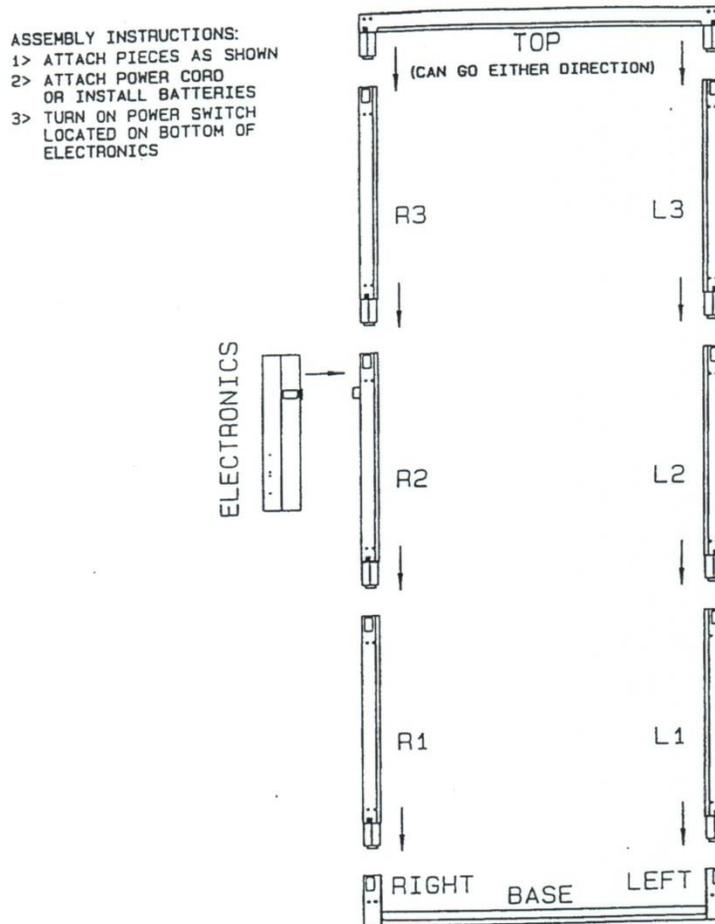
Model 52 Portable Portal Monitor

ASSEMBLY INSTRUCTIONS:
1> ATTACH PIECES AS SHOWN
2> ATTACH POWER CORD
   OR INSTALL BATTERIES
3> TURN ON POWER SWITCH
   LOCATED ON BOTTOM OF
   ELECTRONICS

TOP
(CAN GO EITHER DIRECTION)

R3   L3

ELECTRONICS

R2   L2

R1   L1

RIGHT   BASE   LEFT

Figure 1- M52 Assembly Drawing

USER OPERATION

    A. This section gives instructions on how to use the instrument to make a radiation Check. Refer to Figure(s) 3, 4, and 5 of this section for views of the Front Panel and Top and Bottom of the Electronics Section.

    B. Prior to operation, the monitor must be allowed to update the background count. This mandatory update occurs just after power-up and then after expiration of the background update interval timer. New background count data is compared to the low and high background set points that have been programmed into the unit. If set points have been exceeded, a HI BACKGROUND or LO BACKGROUND ALARM is given and the unit returns to updating background. The instrument will continue to update until the alarm condition has been corrected, i.e. the background goes down, failed detectors are repaired, or the parameters have been changed. **Should this condition occur call the Emergency Operations Center and report the problem**

and discontinue use of the portal monitor until corrections can be made.

C. In order to make a radiation check, follow the steps below:

1. The **Green Ready** light must be lit in order to use the instrument. An **Orange Updating** light may be on, indicating that a standby update is taking place. When the **Updating** light is on, the system should not be used and **all people to be checked should remain at least 3 feet away until the ready light comes back on.**

2. Have the person to be monitored step onto the base plate and position feet on the foot detector screens. The **Green Counting** light will come on.

3. The **Yellow Incomplete** light will come on if the person being monitored steps off of the base plate before the count is complete. Should this occur have the subject reenter the portal monitor as described in Step 2 and remain until monitoring is complete.

4 When the count is complete, the **Green Check OK** light or one or more of the **Red Alarm** lights will turn on.

5. If there is a **Red Alarm** light, complete the Portal Monitor Survey Form and have the subject to proceed to the Decontamination Area for decon and re-monitoring.

6. If there is a **Green Check OK** light on, complete the Portal Monitor Survey Form and have the person proceed to the Registration Desk.

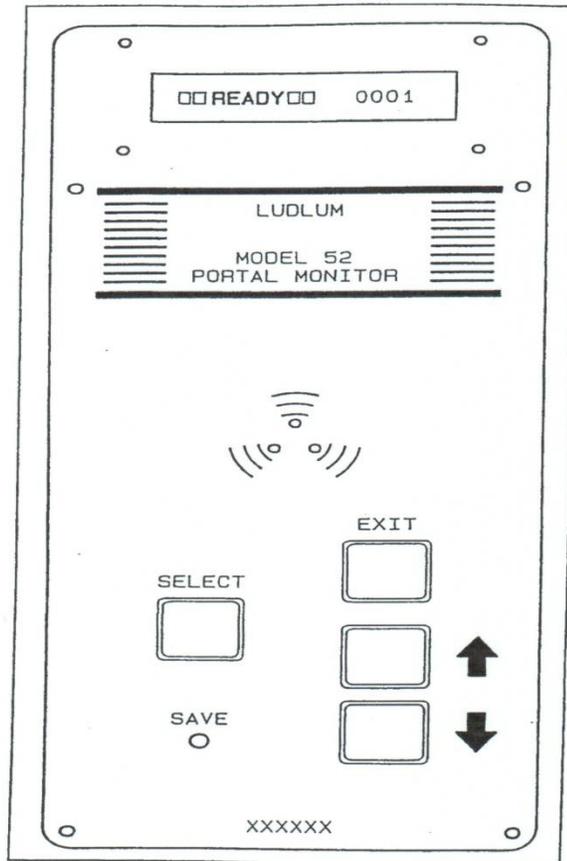**Model 52 Portable Portal Monitor Electronic Panel Views**
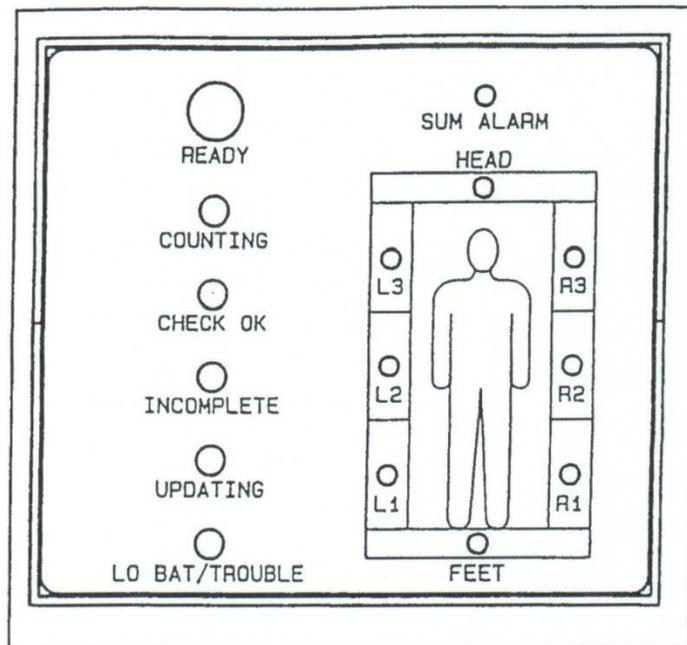

Figure 3 – M52 Front Panel Drawing

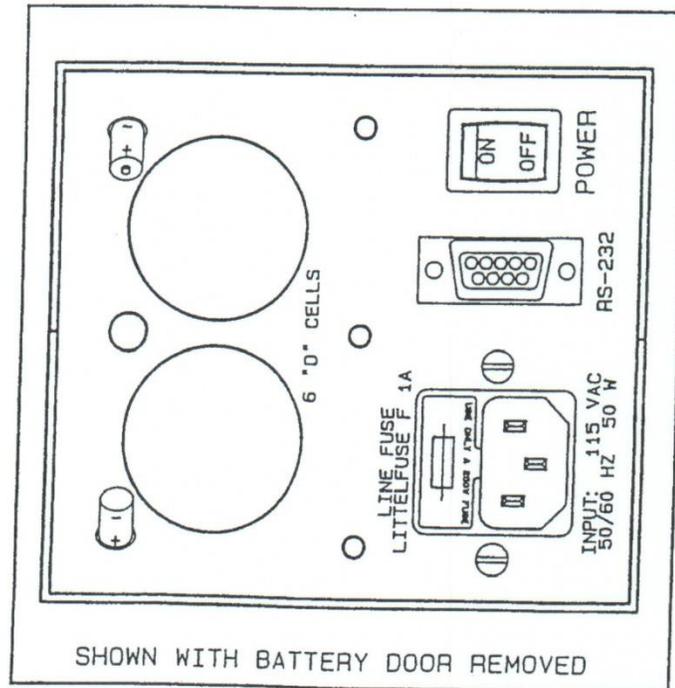**Figure 4 – M52 Electronics Top View**

Figure 5 – Electronics Bottom View

RETURNING THE PORTAL MONITOR TO SERVICE

When monitoring functions have been completed the portal monitor should be repacked according to Figure below. The monitor should be returned to the county emergency management office with notation of any problems that may have occurred with the equipment. The monitor will be picked up by the N. C. Division of Emergency Management and returned to service.

1. LAY THE 3/8" THICK FOAM AGAINST THE INNER SIDES OF THE CASE.
2. LAY TOP INTO CASE ON ITS SIDE AS SHOWN.
3. PLACE A SECTION BESIDE THE TOP WITH 1/4" FOAM IN BETWEEN.
4. PLACE OTHER SECTIONS IN PLACE WITH FOAM IN BETWEEN.
5. LEAVE ELECTRONICS ATTACHED TO SECTION R2 AND PLACE INTO CASE.
6. LAY 1" THICK PIECE OF FOAM WITH NOTCHES IN END ON TOP
   OF SECTIONS.
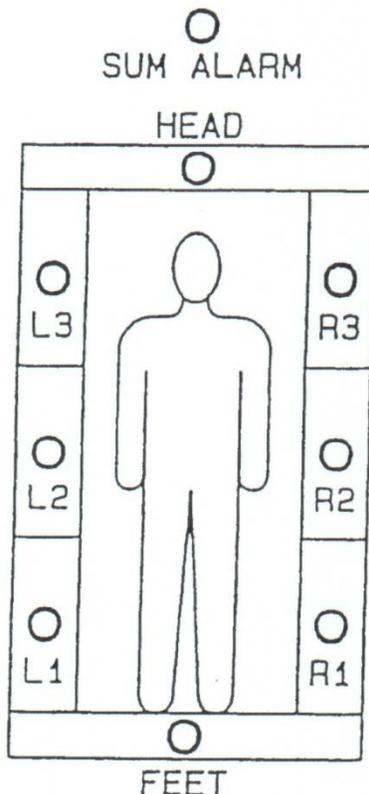7. TURN BASE ASSEMBLY UPSIDE DOWN AND PLACE IN CASE.
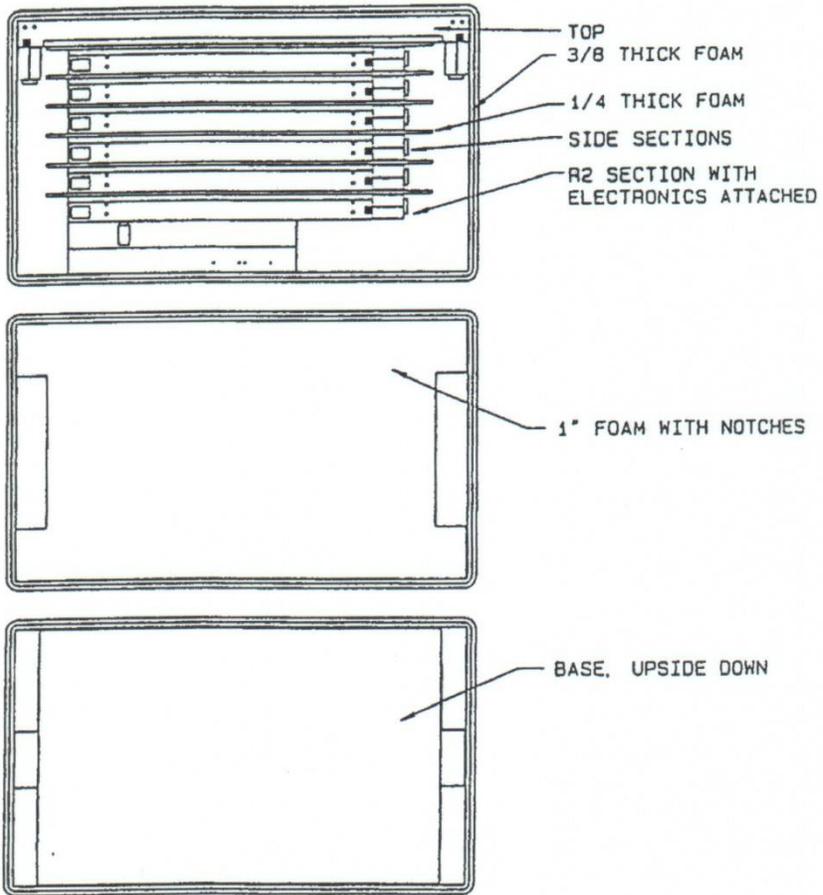
M52 packing Instructions

PORTAL MONITOR SURVEY FORM

NAME:_____ **DOB:**____-____-____

Address:_____

O
SUM ALARM

HEAD
O

L3   O   O   R3

L2   O   O   R2

L1   O   O   R1

O
FEET

Note: Background Subtract has been activated on the portal monitor. If a background addition is required and directed by North Carolina Radiation Protection, the Division of Emergency Management will provide specific instructions to the operator on instrument manipulation to perform this function.

Directions: 1) With the Green Ready light illuminated have the person to be monitored enter the portal monitor with corresponding L1 to the left side and R1 to the right side. The monitors Green Counting light will illuminate. When the count is complete the monitor's Check OK light will illuminate. NOTE: If the monitor's Incomplete Yellow Light is illuminated the person being monitored must reenter the monitor until the count is complete.

2)   If no channels are alarming ask the person being monitored to proceed to the registration desk with this completed form.

3) If any channels are alarming. Place an "X" in the corresponding circle for all alarming monitor channels on the diagram above and direct them to the decontamination area with this completed form.

Monitors Name:_____ **Date of Survey:** _____

Portal Monitor Serial Number_____

Type of Hand Held Instrument_____ **Serial Number**_____

Hand Held Instrument Background reading_____CPM