

October 9, 1990

A. Bill Beach, Director  
Division of Radiation Safety and Safeguards  
Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 1000  
Arlington, TX 76011

Dear Mr. Beach:

This letter is in response to "Notice of Violation" Docket 30-13672/90-01, Re: License 49-17940-01, dated 03 August 1990, in regards to an inspection of July 11, 1990. My re-written response is in accordance to the September 28, 1990, Wes Holley (NRC inspector) phone conversation with Keith Carnahan, Nuclear Medicine Technologist. The responses are numbered according to the reference number of the violations.

1. Regulation 10 CFR 35. Violation:

- a. Reason for violation: We were unaware of the need for a radiation detector survey instrument capable of measuring dose rates over the range 1 millirem per hour to 1000 millirem per hour.
- b. Corrective steps which have been taken and the results which have been achieved:

On September 24, 1990, we received an Eberline Model E-520 meter with hand held probe HP 270 with capabilities of measuring dose rates over the range of 0 millirem per hour to 2000 millirem per hour. Specifications are enclosed with this letter.

- c. Corrective steps which will be taken to avoid further violations:  
No further action indicated.

- d. Date of full compliance: September 24, 1990.

2. Regulation 10 CFR 35.5. Violation:

- a. Reason for violation: Unaware of the regulation requirement.

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REG4 LIC30  
49-17940-01 PNU

MEMORIAL HOSPITAL OF SWEETWATER COUNTY

1200 COLLEGE ROAD • P.O. BOX 1359 • ROCK SPRINGS, WYOMING 82902 • (307) 362-3711

A STEP INTO THE FUTURE WITH EXCELLENCE IN HEALTH CARE

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- b. Corrective steps which have been taken and results achieved: On September 24, 1990, we received a dedicated 5 microcurie Cs137 check source. We will use this source for our daily meter checks and note on each survey meter the apparent exposure reading at a set distance at time of calibration. Also, we will attach the source to the meters for our yearly meter calibrations.
- c. Corrective steps which will be taken to avoid further violations: We will continue to monitor our daily meter checks and keep a log of the results.
- d. Date of full compliance: September 24, 1990.

3. Regulation 10 CFR 35.59 (b) (2). Violation:

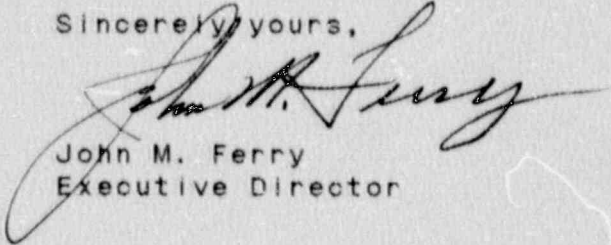
- a. Reason for violation: Cs137 source leak test omissions dated 10/87, 6/88, 2/89 occurred because they were sent in late or inadvertently not sent in. This was due to staff shortages during this time period. The 1-90 Cs137 leak test was sent out late the first week of April, 1990, when the new technologist started employment. Enclosed is a copy of the leak test results.
- b. Corrective steps which have been taken and results achieved: Effective on the next leak test due date, we will send our leak test registered mail. We have also notified Rocky Mountain Physics to date our leak tests upon receipt.
- c. Corrective steps which will be taken to avoid further violations: Effective August 10, 1990, we now have a quality assurance form which lists all of the required QA due dates for the Nuclear Medicine Department. This form is reviewed on a monthly basis by our Radiation Safety Officer. Enclosed is a copy of our quality assurance sheet.
- d. Date of full compliance: August 10, 1990.

4. License condition 13.B Violation:

- a. Reason for violation: There is no written documentation that the 1989 security or housekeeping personnel inservice were completed. There was an inadequate followup on the technologist that was asked to do these inservices. There was also a turnover in technologists in 1989.

- b. Corrective steps which have been taken and the results achieved:  
As of August 10, 1990, we have a quality assurance log to remind us of annual inservice due dates.
- c. Corrective steps to avoid further violations: Our Radiation Safety Officer is now inspecting and initialling our QA log on a monthly basis.
- d. Date of full compliance: August 29, 1990.

Sincerely yours,



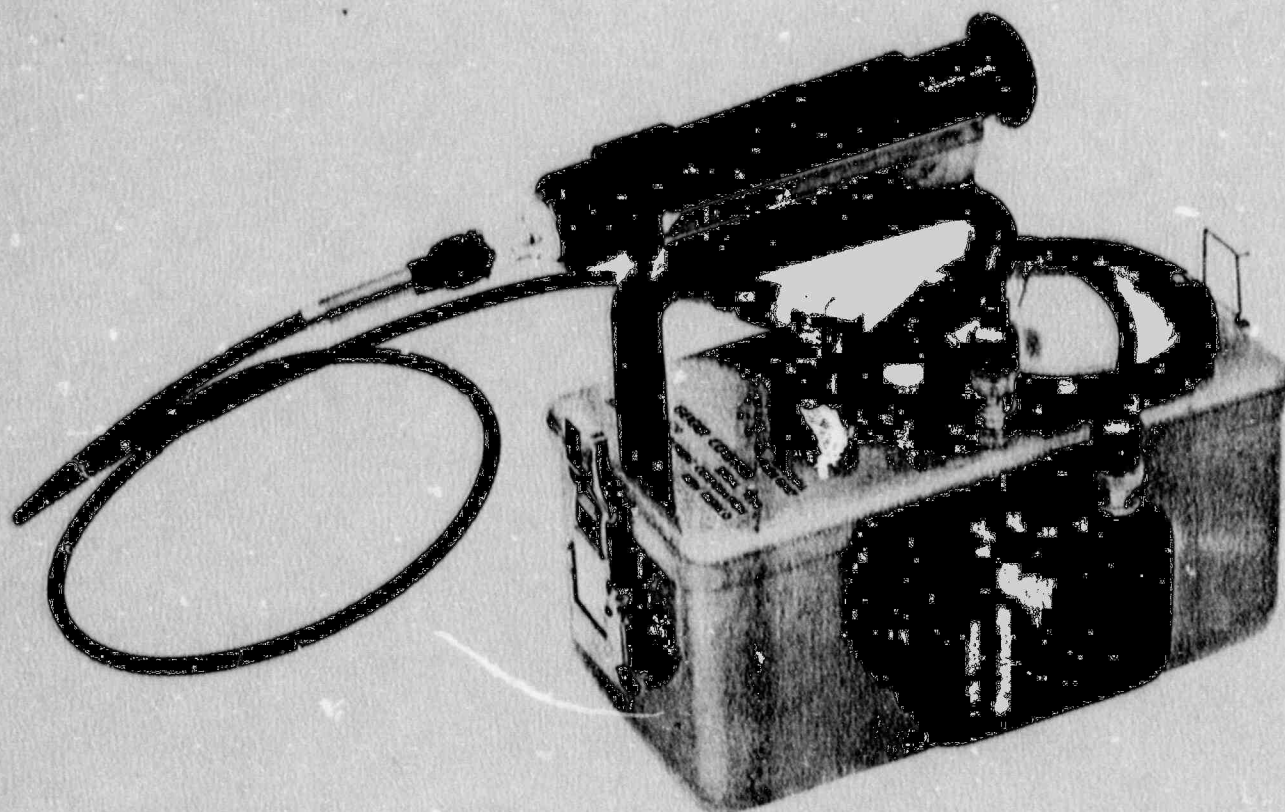
John M. Ferry  
Executive Director

JMF:bt

cc: Brian Holtan, M.D.  
Michael G. Martinchick



MODEL E-520



*Figure 1-1. Model E-520 (Shown with SK-1 Speaker and HP-270 Probe)*

## SECTION I

## GENERAL

## A. PURPOSE AND DESCRIPTION

The Model E-520 Portable Geiger Counter combines the reliability of Geiger detectors with efficient electronic circuits. This provides an instrument with outstanding operational characteristics in a small, lightweight package at an economical price. The large, ruggedized meter provides exceptional readability and linearity with a variable response time. Special circuitry yields detector saturation greater than 1000 k/h. Calibration stability results from temperature compensation and voltage regulation. High efficiency circuits extend the life of the two D-cell batteries. A rotary switch combines the functions of power switch, battery check, and selection of one of the five sensitivity ranges. The amplifier-driven phone output may be used with headset, speaker assembly (SK-1), or external pulse counter.

To obtain five ranges (0-0.2, 0-2, 0-20, 0-200, and 0-2000 mR/h), two different detector tubes are utilized. One is located within the case itself for detection of high level gamma radiation in a range of 0 to 2000 mR/h. A tube sensitive to lower level gamma and beta radiation is located in the hand probe used on the four lower ranges. Discrimination between beta and gamma radiation is made by means of a rotary shield on the probe. Both mR/h (closed shield) and counts per minute (cpm) (open shield) are presented on the meter scale.

Design features include pulse amplifier, monolithic integrated circuit trigger, meter driver with variable response time, phone driver, regulated and feedback controlled high voltage supply, and individual calibration controls for each range. A single printed circuit board holds and interconnects most components, resulting in a minimum number of solder joints which enhances reliability. The printed circuit board connects to the die-cast cover, forming a completely operational instrument with controls and test points exposed for ease of calibration or maintenance. The instrument is splashproof and dustproof and, along with its temperature stability, can be used under almost any weather conditions.

## B. SPECIFICATIONS

## 1. Front Panel Controls and Connections

a. Range Switch: Seven positions; *OFF*, *BATT*, *X.01*, *X0.1*, *X1*, *X10* and *X100*.

b. Meter: Ruggedized, waterproof, 0-20  $\mu$ A.

c. *RESPONSE* control

d. *RESET* switch

e. *PHONE* connector

f. *DETECTOR* connector

## 2. Readout

a. Range: There are five linear ranges which are switch controlled: 0.2, 2.0, 20, 200, and 2000 mR/h full scale.

b. Meter Scale: 0-20 mR/h shield closed, and 0-24k cpm shield open. *BATT OK* limits are marked on the meter face.

c. Linearity: The 0-0.2, 0-2, 0-20 mR/h ranges are  $\pm 8$  percent of full scale nominal. The 0-200 mR/h range is  $\pm 15$  percent of full scale nominal. The 0-2000 mR/h is  $\pm 10$  percent of full scale nominal.

d. Response Time: Variable by panel control from 10 seconds to 2 seconds measured to 90 percent of final value.

e. Phone: There is one pulse for each event counted. The negative pulse is approximately 2.5 V in amplitude, the pulse width is determined by the range switch position.

f. Saturation Level: The meter will remain at full scale on all ranges in a field  $> 1000$  R/h.

g. Voltage Coefficient: The reading changes less than 10 percent with battery voltage from 3.0 to 2.0 V (new batteries to end point).

## 3. Detectors

a. The HP-270 is the recommended external probe for use with the E-520. The following Eberline probes are compatible with the E-520: HP-77C, HP-190A, HP-210, HP-260. Each of these probes will have specific limitations. Refer to the applicable catalog sheet for reference.

b. Internal

The Geiger-Mueller (GM) tube is small, rugged,



## MODEL E-520

and halogen quenched. There is a cadmium shield surrounding the tube for low energy compensation. The sensitivity is approximately 100 cpm per mR/h for  $^{137}\text{Cs}$ .

### c. External Probe: (Model HP-270)

(1) GM Tube: Thin wall (30 mg/cm<sup>2</sup>) halogen quenched.

(2) Housing: A sliding beta shield and a body of ABS plastic. It has a tin energy-compensating shield.

(3) Environmental: The temperature range is -55 °C to 75 °C (-67 °F to 167 °F), splashproof.

(4) Sensitivity: Approximately 1200 cpm per mR/h for  $^{137}\text{Cs}$ .

(5) Cable: Approximately 3 feet (0.91 m) long.

c. Energy Response: See Figures 1-2 and 1-3.

### 4. Power Supply

a. Batteries: Two D-size cells held by internal captive holders.

b. Voltage Requirement: 1.6 V maximum to 1.0 V minimum per cell.

c. Life: Variable depending on cell type, age, temperature, etc. The nominal life with new cells at room temperature for each type is:

C-Zn	300 hours
Alkaline	500 hours
Mercury	700 hours
Ni-Cd	200 hours
(single charge)	

### 5. Environmental

a. Weather: Splashproof by use of O-ring seals throughout.

b. Temperature: The instrument is operational from -40 °F to +130 °F (-40 °C to +60 °C) with a typical temperature coefficient of reading less than 0.1 percent per °F (0.18 percent per °C).

The battery type used limits the low temperature performance because of terminal voltage decrease and internal impedance increase. For prolonged operation at low temperatures the following criteria is suggested.

<u>BATTERY TYPE</u>	<u>USE TO</u>
Mercury	+32 °F (0 °C)
C-Zn	0 °F (-18 °C)
Alkaline	-40 °F (-40 °C)
Ni-Cd	-40 °F (-40 °C)

### 6. Mechanical

a. Dimensions: Approximately 4 inches wide x 8 inches long x 7 1/4 inches high (10.2 cm x 20.3 cm x 18.7 cm), including handle.

b. Weight: Approximately 4 1/4 pounds (2 kg), including batteries and HP-270 probe.

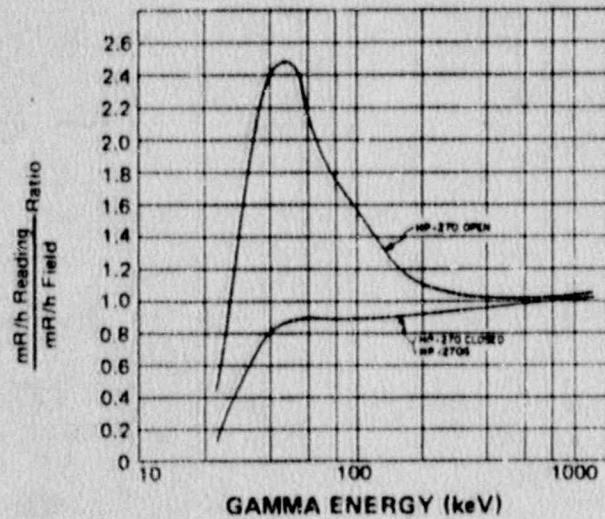


Figure 1-2. Typical Energy Response of HP-270 Hand Probe

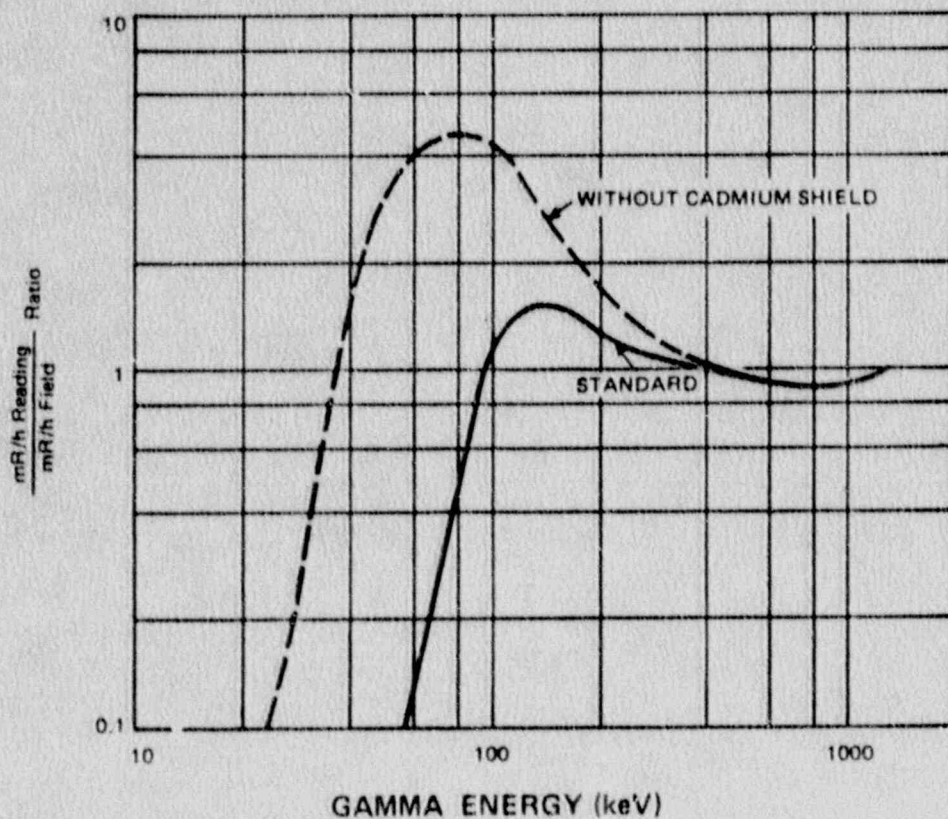


Figure 1-3. Typical Energy Response of Internal Geiger Tube



Nuclear Medicine QC Checklist to Dec. 1990

Floods & BARRS 8-90 OK ✓  
9-26 de ✓

Stria discolora Egerso 2-1-52  
NRC discolora Egerso 2-25-54



# CERTIFICATE OF RADIOACTIVITY LEAK TEST

LOCATION: Memorial Hospital of  
Sweetwater County,  
1200 College Road  
Rock Springs, WY 82901

DATE: 07-31-90  
LICENSE NUMBER: \_\_\_\_\_  
FILE: FORM 27, R03  
DIRK: MHSC NUC MED

## TEST SOURCE

Manufacturer : NEN	Isotope : Cs-137
Model Number : NES-356	Activity : 211 uCi
Serial Number: 3560381A-32	Calibration Date: 03/05/81

## STANDARD SOURCE

Manufacturer : EPA	Isotope : Cs-137
Model Number : -	Activity : 0.061 uCi
Serial Number: 2096-9	Calibration Date: 02-04-86

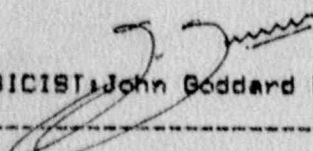
## ANALYSIS OF LEAK TEST

	Standard Source	Test Source
Source cpm	12,281	1,490
Background cpm	1,497	1,497
Net cpm	10,784	0
Activity (uCi)	0.055	Less than 0.005 uCi
Net cpm/uCi	196,072	-

Test Conditions: LL=10 keV, window out

## COMMENTS:

Leakage less than 0.005 uCi

PHYSICIST:  John Goddard Ph.D. DATE: 7-31-90 NEXT CALIBRATION DUE: 1-91

FORM 27, REV 04/86

ROCKY MOUNTAIN MEDICAL PHYSICS, INC  
Linpro Center II, Suite 2150  
7175 West Jefferson Avenue  
Lakewood, CO 80235

(303) 980-7070

CERTIFICATE OF RADIOACTIVITY LEAK TEST

LOCATION: Memorial Hospital of  
Sweetwater County  
1200 College Road  
Rock Springs, WY 82701

DATE: 05-05-90  
LICENSE NUMBER: \_\_\_\_\_  
FILE: FORM27.R03  
DIR: MHSC NUC MED

TEST SOURCE

Manufacturer: NEN  
Model Number: NES-356  
Serial Number: 3560381A-32  
Isotope: Cs-137  
Activity: 211 uCi  
Calibration Date: 03/05/81

STANDARD SOURCE

Manufacturer: EPA  
Model Number: -  
Serial Number: 2096-9  
Isotope: Cs-137  
Activity: 0.065 uCi  
Calibration Date: 11-24-86

ANALYSIS OF LEAK TEST

	Standard Source	Test Source
Source cpm	28,260	190
Background cpm	209	209
Net cpm	28,051	0
Activity (uCi)	0.060	0
Net cpm/uCi	476,516	-

Test Conditions: LL=10 keV, window out

COMMENTS:

No leakage was detected: X

PHYSICIST: John Goddard Ph.D. DATE: 05-05-90 NEXT CALIBRATION DUE: 11/90

FORM 27: REV 04/86

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