

St.
Luke's



medical center

2720 STONE PARK BLVD. • SIOUX CITY, IOWA 51104 • (712) 279-3500

United States
Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Attn:D.G Wiedeman, Acting Chief
Materials Radiation Protection
Section 1

Gentlemen:

This letter is in reference to an inspection conducted by Mr. John Madera on June 1, 1981.

Areas of non-compliance:

ITEM # 1 Contrary to the requirement, quarterly linearity checks and daily constancy checks of the dose calibrator were not performed and records of the annual assuracy checks of the dose calibrator were not maintained.

- A) Daily constancy tests are now being performed. Effective date 6-10-81. Enclosed you will find copies of tests as they have been performed to date.
- B) Radioactive sealed sources, Co-57; Serial No. 3510481A-02 and Cs-137; Serial No. 3560481A-40, have been purchased to perform the required tests on the dose calibrator.
- C) Copies of the Certificate of Radioactivity Calibration are enclosed.

8108180260 810807
NMS LIC30
14-18721-01 PDR

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Page #2

cont. Item #1

- D.) Arrangements are being made with Picker Corporation to have our isotope calibrator checked. As soon as we get their loaner machine ours will be sent to be checked.
As the records of accuracy are received a copy will be sent to the NRC to show these tests have been performed.

Item #2 States that specific areas of the laboratory will be surveyed daily for contamination and other specific areas wipe tested monthly.

- A.) Enclosed find copies of weekly surveys of Nuclear Medicine Rooms #1 and #2, Hot Lab, Office and the east wall of Ultrasound Room #2. These monitorings date back to March 1978. Enclosed also find diagrams of the Nuclear Medicine area.
- B.) Effective 6-10-81 wipe tests will be performed daily in the hot lab. Areas checked will be the work counter and the floor. These monitorings will be performed at the end of each day.

1. Enclosed also find copies of wipe tests performed to date.

Item #3 States that incoming packages containing radioactive material will be surveyed at the surface and at three feet.

- A.) Effective 6-10-81 all incoming packages will be monitored. Enclosed find a copy of the format that will be used.

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Page #3

ITEM #4 States that the room for patients receiving radioisotope therapy will be monitored for contamination after the patient has left the room and the patients linen and dressings will be monitored for contamination prior to disposal.


- A.) Enclosed find a copy of the form that will be used effective 6-10-81.
A copy of this form will be implemented into the patients chart and a copy will be kept in the Nuclear Medicine Department.

ITEM #5 States that eating, drinking, smoking or the application of cosmetics will be prohibited in any area where radioactive material is stored or used.

- A.) Signs have been posted on the refrigerator door and the personnel have been instructed that food or beverages can not be kept in this area.

Stan A. Huber Consultants, Inc., Nuclear Medicine Consultants, have been contacted. They will make their first visit on or about July 28, 1981. This service will provide insight into all the major phases of the Nuclear Medicine department with the purpose of recommending potential refinements, assisting in problem solution. Objectives include optimum patient care, quality controls, maintenance and updating, radiation safety, organization and complete record systems, and maintaining licensure and regulatory compliance

I, certify that all information contained is true and correct to the best of my knowledge


James J. Gosnell, M.D.
Director of Radiology
St. Luke's Medical Center
2720 Stone Park Blvd.
Sioux City, Iowa 51104

NUCLEAR MEDICINE DEPARTMENT TO BE MONITORED AT LEAST (1) ONCE WEEKLY

NEW NUCLEAR MEDICINE DEPARTMENT

DATE	INITIAL	NUCLEAR MEDICINE RM #1	NUCLEAR MEDICINE RM #2	HOT LAB AT DOOR	ULTRASOUND EAST WALL	OFFICE
3-2-78	Bkg	-0-	-0-	1	-0-	-0-
3-10-78	Rkg	-0-	-0-	1	-0-	-0-
3-14-78	Rkg	-0-	-0-	1	-0-	-0-
3-21-78	Lkg	-0-	-0-	1	-0-	-0-
3-28-78	Rkg	-0-	-0-	1	-0-	-0-
4-5-78	Rkg	-0-	-0-	1	-0-	-0-
4-12-78	Rkg	-0-	-0-	1	-0-	-0-
4-18-78	Rkg	-0-	-0-	1	-0-	-0-
4-25-78	Rkg	-0-	-0-	1	-0-	-0-
5-3-78	Rkg	-0-	-0-	1	-0-	-0-
5-10-78	Rkg	-0-	-0-	1	-0-	-0-
5-16-78	Rkg	-0-	-0-	1	-0-	-0-
5-23-78	1	-0-	-0-	1	-0-	-0-
5-30-78	1	-0-	-0-	1	-0-	-0-
6-6-78	1	-0-	-0-	1	-0-	-0-
6-13-78	1	-0-	-0-	1	-0-	-0-
6-20-78	1	-0-	-0-	1	-0-	-0-
6-27-78	-0-	-0-	-0-	1	-0-	-0-
7-4-78	-0-	-0-	-0-	1	-0-	-0-
7-10-78	-0-	-0-	-0-	1	-0-	-0-
7-17-78	-0-	-0-	-0-	1	-0-	-0-
7-24-78	-0-	-0-	-0-	1	-0-	-0-
8-2-78	-0-	-0-	-0-	1	-0-	-0-
8-8-78	-0-	-0-	-0-	1	-0-	-0-
8-15-78	-0-	-0-	-0-	1	-0-	-0-
8-22-78	-0-	-0-	-0-	1	-0-	-0-
8-29-78	-0-	-0-	-0-	1	-0-	-0-
9-5-78	-0-	-0-	-0-	1	-0-	-0-
9-11-78	-0-	-0-	-0-	1	-0-	-0-
9-19-78	-0-	-0-	-0-	1	-0-	-0-
9-26-78	-0-	-0-	-0-	1	-0-	-0-

DATE	Rm #1	Rm #2	HOT LAB	U. E. W	OFFICE
10-2-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
10-9-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
10-16-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
10-24-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
11-1-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
11-7-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
11-13-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
11-20-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
11-27-78	- 0 -	- 0 -	.8 m/h	- 0 -	- 0 -
12-5-78	- 0 -	- 0 -	.8 m/m	- 0 -	- 0 -
12-12-78	- 0 -	- 0 -	.8 m/m	- 0 -	- 0 -
12-19-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
12-27-78	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
1-9-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
1-16-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
1-23-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
2-2-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
2-6-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
2-12-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
2-20-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
2-27-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
3-2-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
3-9-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
3-16-79	- 0 -	- 0 -	.6 m/h	- 0 -	- 0 -
3-28-79	- 0 -	- 0 -	.6 m/h	- 0 -	- 0 -
4-2-79	- 0 -	- 0 -	.6 m/m	- 0 -	- 0 -
4-10-79	- 0 -	- 0 -	.6 m/m	- 0 -	- 0 -
4-17-79	- 0 -	- 0 -	.7 m/m	- 0 -	- 0 -
4-25-79	- 0 -	- 0 -	.7 m/h	- 0 -	- 0 -
5-2-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
5-9-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
5-21-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
5-28-79	- 0 -	- 0 -	1 m/h	- 0 -	- 0 -
6-4-79	- 0 -	- 0 -	.8 m/m	- 0 -	- 0 -

	Rm #1	Rm #2	HOT LAB	U, E, W	OFFICE
6-11-79	-0-	-0-	.7 m/h	-0-	-0-
6-18-79	-0-	-0-	.6 m/h	-0-	-0-
6-25-79	-0-	-0-	.6 m/h	-0-	-0-
7-2-79	-0-	-0-	.5 m/h	-0-	-0-
7-16-79	-0-	-0-	.7 m/h	-0-	-0-
7-23-79	-0-	-0-	.8 m/h	-0-	-0-
7-30-79	-0-	-0-	.8 m/h	-0-	-0-
8-6-79	-0-	-0-	1 m/h	-0-	-0-
8-13-79	-0-	-0-	1 m/h	-0-	-0-
8-20-79	-0-	-0-	2 m/h	-0-	-0-
8-27-79	-0-	-0-	.8 m/h	-0-	-0-
9-3-79	-0-	-0-	.7 m/h	-0-	-0-
9-10-79	-0-	-0-	.6 m/h	-0-	-0-
9-18-79	-0-	-0-	.6 m/h	-0-	-0-
9-25-79	-0-	-0-	.6 m/h	-0-	-0-
10-2-79	-0-	-0-	.6 m/h	-0-	-0-
10-9-79	-0-	-0-	.5 m/h	-0-	-0-
10-23-79	-0-	-0-	.5 m/h	-0-	-0-
10-29-79	-0-	-0-	.5 m/h	-0-	-0-
11-5-79	-0-	-0-	.6 m/h	-0-	-0-
11-13-79	-0-	-0-	.7 m/h	-0-	-0-
11-19-79	-0-	-0-	1 m/h	-0-	-0-
11-26-79	-0-	-0-	1 m/h	-0-	-0-
12-3-79	-0-	-0-	1 m/h	-0-	-0-
12-10-79	-0-	-0-	1 m/h	-0-	-0-
12-18-79	-0-	-0-	1 m/h	-0-	-0-
12-27-79	-0-	-0-	.8 m/h	-0-	-0-
1-4-80	-0-	-0-	.8 m/h	-0-	-0-
1-8-80	-0-	-0-	.5 m/h	-0-	-0-
1-15-80	-0-	-0-	.5 m/h	-0-	-0-
1-22-80	-0-	-0-	.5 m/h	-0-	-0-
1-29-80	-0-	-0-	.5 m/h	-0-	-0-
2-4-80	-0-	-0-	.5 m/h	-0-	-0-
2-11-80	-0-	-0-	.5 m/h	-0-	-0-
2-18-80	-0-	-0-	.3 m/h	-0-	-0-

DATE	Rm #1	Rm #2	HOT LAB	U. E. W.	OFFICE
2-25-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
3-3-80	- 0 -	- 0 -	.2 m/hr	- 0 -	- 0 -
3-10-80	- 0 -	- 0 -	.2 m/hr	- 0 -	- 0 -
3-17-80	- 0 -	- 0 -	.2 m/hr	- 0 -	- 0 -
3-24-80	- 0 -	- 0 -	.1 m/hr	- 0 -	- 0 -
4-7-80	- 0 -	- 0 -	.1 m/hr	- 0 -	- 0 -
4-15-80	- 0 -	- 0 -	.1 m/hr	- 0 -	- 0 -
4-22-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
4-28-80	- 0 -	- 0 -	.2 m/hr	- 0 -	- 0 -
5-5-80	- 0 -	- 0 -	.2 m/hr	- 0 -	- 0 -
5-12-80	- 0 -	- 0 -	.4 m/hr	- 0 -	- 0 -
5-19-80	- 0 -	- 0 -	.1 m/hr	- 0 -	- 0 -
5-27-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
6-7-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
6-14-80	- 0 -	- 0 -	.6 m/hr	- 0 -	- 0 -
6-21-80	- 0 -	- 0 -	.7 m/hr	- 0 -	- 0 -
6-28-80	- 0 -	- 0 -	.5 m/hr	- 0 -	- 0 -
7-7-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
7-14-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
7-21-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
7-29-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
8-4-80	- 0 -	- 0 -	.4 m/hr	- 0 -	- 0 -
8-11-80	- 0 -	- 0 -	.5 m/hr	- 0 -	- 0 -
8-19-80	- 0 -	- 0 -	.5 m/hr	- 0 -	- 0 -
8-26-80	- 0 -	- 0 -	.5 m/hr	- 0 -	- 0 -
9-2-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
9-9-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
9-15-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
9-22-80	- 0 -	- 0 -	.3 m/hr	- 0 -	- 0 -
9-30-80	- 0 -	- 0 -	.1 m/hr	- 0 -	- 0 -
10-6-80	- 0 -	- 0 -	.2 m/hr	.2 m/hr	.1 m/hr
10-13-80	- 0 -	- 0 -	.3 m/hr	.3 m/hr	.1 m/hr
10-20-80	- 0 -	- 0 -	2.0	- 0 -	- 0 -
10-27-80	- 0 -	- 0 -	1	- 0 -	- 0 -
11-3-80	- 0 -	- 0 -	1.5	- 0 -	- 0 -
11-10-80	- 0 -	- 0 -	1.5	- 0 -	- 0 -

DATE	Rm #1	Rm #2	Work.	U. & W	Office	Rm #3
11-17-80	-0-	-0-	1.5	-0-	-0-	
11-24-80	-0-	-0-	1.5	-0-	-0-	}
12-1-80	-0-	-0-	1.5	-0-	-0-	
12-16-80	-0-	-0-	1	-0-	-0-	
12-22-80	-0-	-0-	1	-0-	-0-	
12-29-80	-0-	-0-	1.5	-0-	-0-	
1-5-81	-0-	-0-	1.5	-0-	-0-	
1-5-81	-0-	-0-	2.0	-0-	-0-	-0-
1-12-81	-0-	-0-	1	-0-	-0-	-0-
1-19-81	-0-	-0-	1	-0-	0-	-0-
1-26-81	-0-	-0-	1	-0-	0-	-0-
2-2-81	-0-	-0-	1	-0-	0-	-0-
2-9-81	-0-	-0-	1	-0-	0-	-0-
2-16-81	-0-	-0-	1.0	-0-	0-	-0-
2-23-81	-0-	-0-	2.0	-0-	0-	-0-
3-3-81	-0-	-0-	1.5	-0-	0-	-0-
3-9-81	-0-	-0-	2.0	-0-	0-	-0-
3-16-81	-0-	-0-	2.0	-0-	0-	-0-
3-23-81	-0-	-0-	1.5	-0-	-0-	-0-
3-30-81	-0-	-0-	1 mr	-0-	-0-	-0-
4-1-81	-0-	-0-	1 mr	-0-	-0-	-0-
4-13-81	-0-	-0-	2 mr	-0-	-0-	-0-
4-20-81	-0-	-0-	2.5 mr	-0-	0-	-0-
4-27-81	-0-	-0-	2.0 mr	-0-	-0-	-0-
5-5-81	-0-	-0-	2.0 hr	-0-	-0-	-0-
5-12-81	-0-	-0-	2.5 mr	-0-	-0-	-0-
5-18-81	-0-	-0-	2.5 mr	-0-	-0-	-0-
5-27-81	-0-	-0-	2.5 mr	-0-	-0-	-0-
6-2-81	-0-	-0-	2.0 w/	-0-	-0-	-0-
6-9-81	-0-	-0-	2.0 w/	-0-	-0-	-0-
6-16-81	-0-	-0-	2.0 w/	-0-	-0-	-0-
6-23-81	-0-	-0-	1.7 hr	-0-	-0-	-0-
6-30-81	-0-	-0-	2.0 w/	-0-	-0-	-0-
7-6-81	-0-	-0-	1.5 w/	-0-	-0-	-0-
			1.7 w/	-0-	-0-	-0-

(4-3-81)

DOSE CALIBRATOR

NEW Co⁵⁷

WIPE TEST

DATE	COUNTER	FLOOR	CONSISTANCY	833 = 255 μ li
6-10-81	.1 μ li	.1 μ li	254 μ li	
6-11-81	88 cpm	2 cpm	254 μ li	
6-12-81	80 cpm	8 cpm	254 μ li	
6-15-81	100 cpm	60 cpm	253 μ li	
6-16-81	100 cpm	50 cpm	253 μ li	
6-17-81	106 cpm	61 cpm	253 μ li	
6-18-81	109 cpm	66 cpm	253 μ li	
6-19-81	100 cpm	60 cpm	252 μ li	
6-22-81	80 cpm	55 cpm	252 μ li	
6-23-81	88 cpm	61 cpm	252 μ li	
6-24-81	100 cpm	66 cpm	251 μ li	
6-25-81	92 cpm	70 cpm	251 μ li	
6-26-81	90 cpm	80 cpm	251 μ li	
6-27-81	90 cpm	74 cpm	251 μ li	
6-29-81	54 cpm	70 cpm	250 μ li	
6-30-81	61 cpm	70 cpm	250 μ li	
7-1-81	70 cpm	100 cpm	250 μ li	
7-2-81	70 cpm	88 cpm	250 μ li	
7-3-81	70 cpm	80 cpm	249 μ li	
7-4-81	60 cpm	80 cpm	249 μ li	
7-6-81	60 cpm	83 cpm	249 μ li	
7-7-81	60 cpm	91 cpm	249 μ li	

CERTIFICATE OF SOURCE LEAK TEST

Model NES- 351 Radionuclide Co-57Serial Number 3510481A-02 Test Date 4/1/81

The subject source was tested for surface contamination and radioactivity leakage utilizing a wipe test technique prescribed by ANSI standard N5.10-1968. Leakage/contamination of less than 5×10^{-4} microcurie was detected.

NEN hereby certifies that the subject source was tested and determined to be free of leakage or contamination as specified by applicable regulations and specifications. Subsequent smear tests such as described below on this certificate must be conducted by the licensed user at six month intervals.

For: NEW ENGLAND NUCLEAR

By: Robert Melanson
Robert MelansonRECOMMENDED WIPE (SMEAR) TEST

This leak test procedure is recommended if the user does not already employ an approved procedure.

Wipe all external surfaces of the source, including the source seal area, with a piece of H₂O moistened filter paper or other suitable "swab". Measure the total activity on the paper or "swab" with an appropriately calibrated gamma scintillation counter. Care should be taken to assure proper counting time for reasonable statistical validity of values obtained. Record test results in proper source log for future reference.

If the total activity smeared from the source is less than the previous smear test, and less than 5×10^{-4} microcuries, then the source shall be considered leak free. If the total activity measured is significantly more than the previous test value, then the source should be removed from service until the source leakage can be confirmed or other source of contamination found. (even though the detected quantity may be less than that specified on the user's license for reportable source leakage) A 'hot' smear should be checked every few days to determine if the activity is from a short-lived nuclide utilized nearby. If two smears at 7 day intervals reveal positive values, the source should be disposed of or returned to NEN for evaluation.

RADIOACTIVE SHIPMENT RECEIPT REPORT

1. P.O. No.: _____ Survey Date _____ Time _____
Surveyor _____
2. CONDITION OF PACKAGE :
_____ O.K. _____ Punctured _____ Status _____ Wet
_____ Crushed _____ Other
3. RADIATION UNITS OF LABEL: _____ Units (mR/hr)
4. MEASURED RADIATION LEVELS :
 - a. Package surface _____ mR/hr
 - b. 3 feet or 1 meter from surface _____ mR/hr
5. DO PACKING SLIP AND VIAL CONTENTS AGREE?
 - a. Radionuclide _____ yes _____ no, difference _____
 - b. Amount _____ yes _____ no, difference _____
 - c. Chem Form _____ yes _____ no, difference _____
6. WIPE RESULTS FROM:
 - a. Outer _____ CPM = _____ DPM
eff = ()
 - b. Final source container _____ CPM = _____ DPM
eff = ()
8. SURVEY RESULTS OF PACKING MATERIAL AND CARTONS _____ mR/hr, CPM
9. DISPOSITION OF PACKAGE AFTER INSPECTION _____
10. IF NRC/CARRIER NOTIFICATION REQUIRED, GIVE TIME, DATE, AND PERSONS NOTIFIED.

Signature

Date

CERTIFICATE OF RADIOACTIVITY CALIBRATION

Cesium-137 Reference Source – NES-356

Half-Life: 30.0 ± 0.2 years

The cesium-137 activity was determined to be 209 microcuries on 4/29/81 for Source Serial Number 3560481A-40

DESCRIPTION OF THE SOURCE – The activity is uniformly distributed in a cast epoxy matrix equivalent to 20 milliliters of solution in a 27 milliliter polyethylene vial.

DECAY SCHEME – Principle Emissions

ENERGY (MeV)	X-ray 0.0318	X-ray 0.0322	X-ray 0.0364	0.6616
INTENSITY (%)	2.0	3.7	1.34	85.0

Reference: *A Handbook of Radioactivity Measurements Procedures*, NCRP Report No. 58, November 1978.

METHOD OF CALIBRATION – The source was calibrated by direct measurement with an ionization chamber whose response for the radionuclide and geometry had been verified through the use of a secondary standard. The secondary standard was prepared gravimetrically from a solution whose activity was determined by direct comparison to an NBS certified solution, SRM 4233. New England Nuclear participates in a National Bureau of Standards-Atomic Industrial Forum measurement assurance program in order to insure the continuing traceability of NEN's radioassays to NBS.

RADIOIMPURITIES – The solution from which this reference source was prepared was examined for photon-emitting impurities with a Ge(Li) spectrometer system. The radioimpurities were determined to be <1% expressed as a percentage of the gamma-ray-emission rate of the 661.6 keV gamma ray of cesium-137.

ERRORS

Random Errors (99% confidence level)

Precision of the measurement of the source $\pm 0.6\%$
Precision of the measurement of the NEN secondary standard $\pm 0.6\%$

Systematic Errors

Accuracy of the NEN secondary standard (linear sum of the estimated upper limits of errors involved in preparation) $\pm 3.2\%$

Overall Error

$[(0.6)^2 + (0.6)^2]^{1/2} + 3.2 = \pm 4.0\%$ $\pm 4.0\%$

THIS VIAL "E" REFERENCE SOURCE IS LICENSED BY THE U.S. NUCLEAR REGULATORY COMMISSION PURSUANT TO 10 CFR 32.74 FOR DISTRIBUTION TO PERSONS LICENSED PURSUANT TO 10 CFR 35.14 OR EQUIVALENT AGREEMENT STATE LICENSE

Robert Melanson



New England Nuclear

601 Treble Cove Rd., North Billerica, MA 01862
CALL TOLL-FREE: 800-225-1572 Telex: 94-7126
(In Massachusetts and International: 617-667-9531)



New England Nuclear

549 Albany Street, Boston, Massachusetts 02118

CALL TOLL-FREE: 800-225-1572 Telex 94-0996
(In Massachusetts and International: 617-482-9595)

TECHNICAL DATA

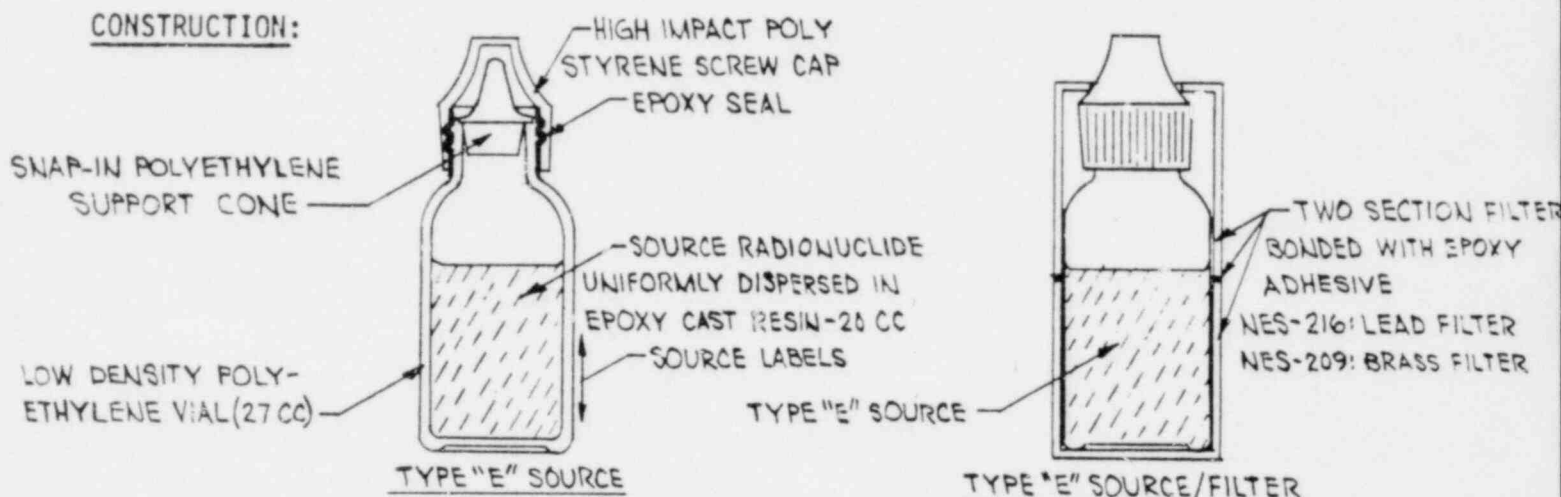
RADIATION SAFETY INSTRUCTIONS & RECOMMENDATIONS FOR USE & STORAGE OF

VIAL TYPE "E" ION CHAMBER GAMMA REFERENCE SOURCE

MODEL NES-356 NUCLIDE Cs-137
 LOT/SERIAL NO. 3560481A-40 CONTENT 0.209 MILLICURIE(S)

See Certificate For Calibration Data, If Applicable.

CONSTRUCTION:



The NEN Vial Type "E" source has been designed and manufactured to provide maximum safety and service, having satisfied the safety performance requirements of ANSI Standard N5.10-1968 for Classification C22212, as recommended for calibration (reference) sealed sources.

RECOMMENDED USE & SERVICE:

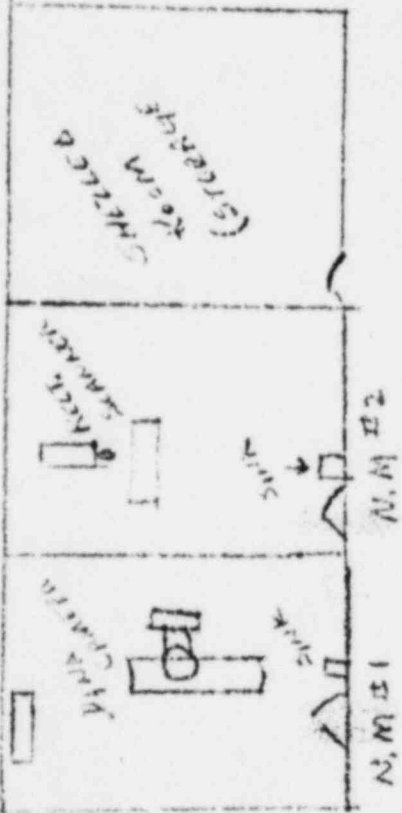
NEN Vial Type "E" Gamma Reference Sources are employed to develop and maintain radioassay calibration factors for ionization chamber type 'isotope calibrator' measurement systems utilized in nuclear medicine departments for assay of scanning agent radioactivity as prescribed for diagnostic procedures.

For maximum safety and service, Vial Type "E" sources should be used and stored at 10-40°C, 10-80% RH, ambient pressure, with care to avoid contact with strong organic solvents, hot surfaces, and excessive mechanical stress.

RADIATION SAFETY RECOMMENDATIONS:

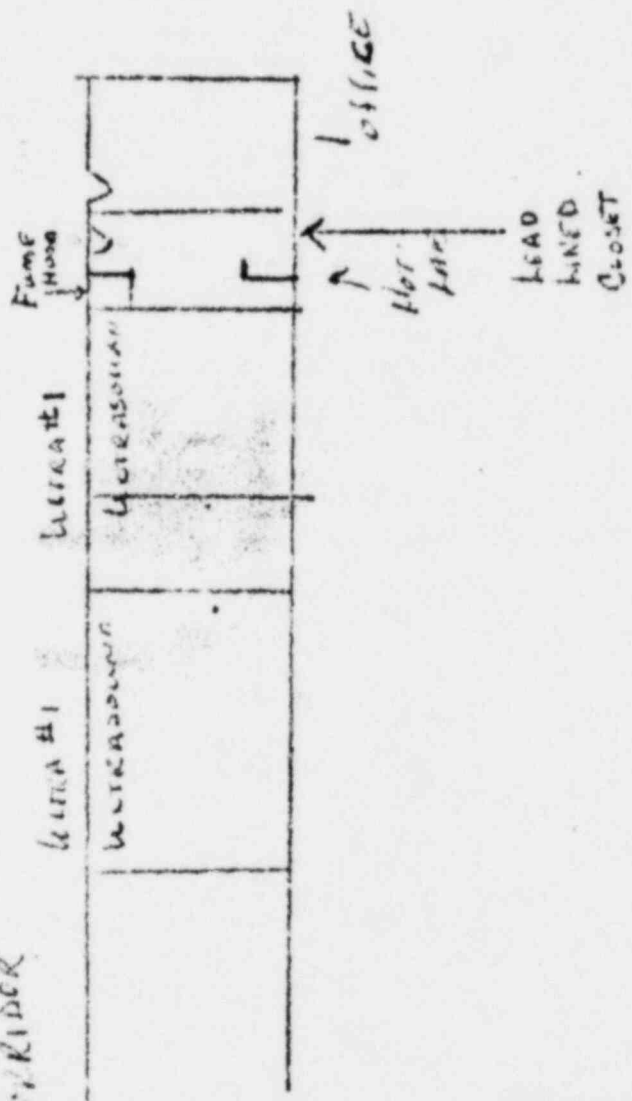
1. Radiation protection procedures utilized for handling and measurement of scanning agents are generally quite adequate for use of Type "E" Gamma Reference sources. Specific dose factors and effective lead shielding thicknesses for nuclides utilized in the Reference source series are provided in the following table to aid in effective exposure control.

CEILING



EACH N.M. ROOM
PROVIDED 2 AIR VENTS

CORRIDOR



IT-101 # 11
DATE: 1-2-79

ISOTOPE CLOSET
LINED 2 SIX POUND
LEAD PROTECTION
ALL RADIO ACTIVE MATERIALS
WILL BE KEPT IN THIS ROOM.

**NURSING INSTRUCTIONS FOR PATIENTS TREATED
WITH BRACHYTHERAPY SOURCES**

Patient's Name: _____

Room Number: _____ Physician's Name: _____

Isotope and Activity: _____

Date and Time of Administration: _____

Date and Time Sources Are To Be Removed: _____ Isotope: _____

Exposure Rates in mR/hr

Bedside

3 feet from bed

10 feet from bed

_____	_____	_____
_____	_____	_____
_____	_____	_____

(Comply with all checked items.)

- _____ 1. Wear film or TLD badge.
- _____ 2. Wear pocket chambers for supplementary personnel monitoring of individual tasks.
- _____ 3. Wear rubber gloves.
- _____ 4. Tag the following objects and fill out the tag:
 - _____ door _____ chart
 - _____ bed _____ wrist
- _____ 5. Place laundry in linen bag and save.
- _____ 6. Housekeeping may not enter the room.
- _____ 7. Visiting time permitted: _____
- _____ 8. Visitors must remain _____ from patient.
- _____ 9. Patient may not leave the room.
- _____ 10. Patient may not have visitors.
- _____ 11. Patient may not have pregnant visitors.
- _____ 12. Patient may not have visitors under 18 years of age.
- _____ 13. Patient must have a private room.
- _____ 14. A dismissal survey must be performed before the patient is discharged.

CERTIFICATE OF RADIOACTIVITY CALIBRATION

Cobalt-57 Reference Source NES- 351 Half-Life: 270.9 ± 0.6 days

The Cobalt-57 activity was determined to be 319 microcuries on 4/3/81
for Source Serial Number 3510481A -02

DESCRIPTION OF THE SOURCE.

The activity is uniformly distributed in a cast epoxy matrix equivalent to 20 milliliters of solution in a 27 milliliter polyethylene vial.

DECAY SCHEME

	Intensity (%)
Y ₁ 0.0144 MeV	9.54
Y ₂ 0.1221	85.59
Y ₃ 0.1364	10.61 (6 weak gammas omitted)
Y ₉ 2.6920	0.16

Reference: A Handbook of Radioactivity Measurements Procedures, NCRP Report No. 58, November 1978.

METHOD OF CALIBRATION

The source was calibrated by direct measurement with an ionization chamber whose response for the radionuclide and geometry had been verified through the use of a secondary standard. The secondary standard was prepared gravimetrically from a solution whose activity was determined by direct comparison to a solution submitted to NBS for calibration under Test No. 234571.

New England Nuclear Corp. participates in a National Bureau of Standards - Atomic Industrial Forum measurement assurance program in order to insure the continuing traceability of NEN's radioassays to the NBS.

RADIOIMPURITIES

The solution from which this reference source was prepared was examined for photon-emitting impurities with a Ge(Li) spectrometer system. The radioimpurities were determined to be < 1% expressed as a percentage of the gamma-ray-emission rate of the 122.1 KeV gamma ray of Cobalt-57.

ERRORS

Random Errors (99% confidence level)

Precision of the measurement of the source	± 1.5%
Precision of the measurement of the NEN secondary standard	± 1.5%

Systematic Errors

Accuracy of the NEN secondary standard (linear sum of the estimated upper limits of conceivable errors involved in its preparation).	± 2.6%
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Overall Error

$$((1.5)^2 + (1.5)^2)^{1/2} + 2.6 = \pm 4.7\%$$

RADIOACTIVE MATERIAL
The radioactive material contained in this product is naturally occurring or accelerator produced; hence, the radiation control agencies in various states exercise regulatory authority for its receipt, possession, use and transfer.



New England Nuclear

549 Albany Street, Boston, Massachusetts 02118

CALL TOLL-FREE 800-225-1572 Telex 94-0996
(In Massachusetts and International 617-482-9595)

Robert Melanson



New England Nuclear

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CALL TOLL-FREE 800-225-1572 Telex 94-C996
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TECHNICAL DATA

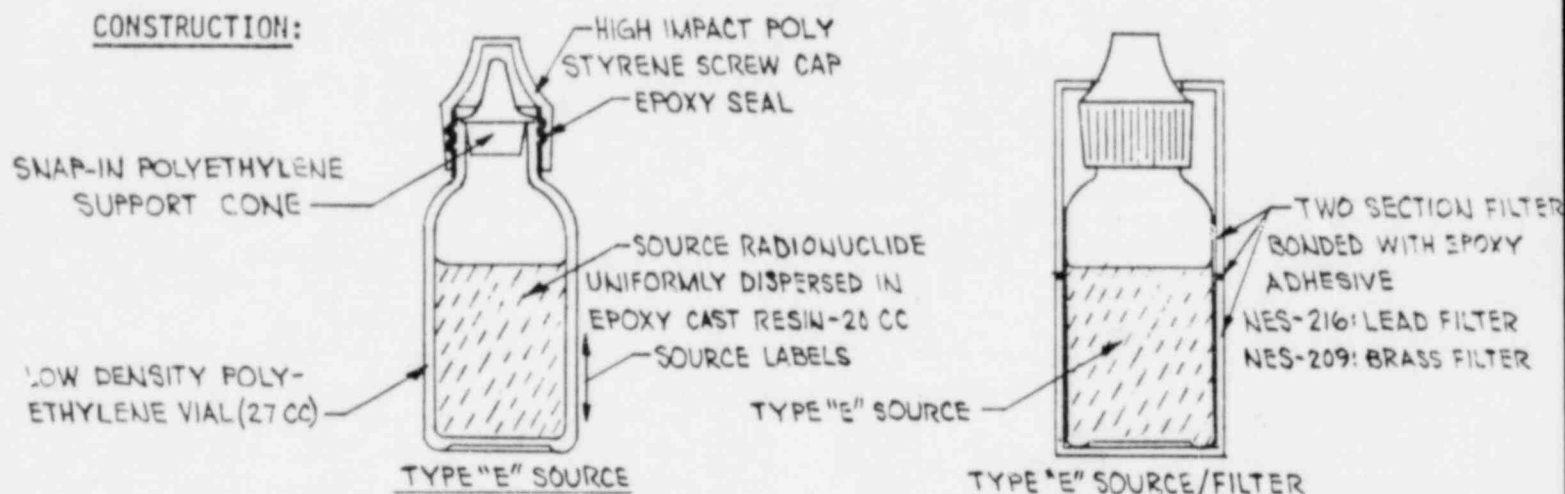
RADIATION SAFETY INSTRUCTIONS & RECOMMENDATIONS FOR USE & STORAGE OF

VIAL TYPE "E" ION CHAMBER GAMMA REFERENCE SOURCE

MODEL NES-351 NUCLIDE Co-57
 LOT/SERIAL NO. 3510481A-02 CONTENT 0.319 MICROCURIE(S)

See Certificate For Calibration Data, If Applicable.

CONSTRUCTION:



The NEN Vial Type "E" source has been designed and manufactured to provide maximum safety and service, having satisfied the safety performance requirements of ANSI Standard N5.10-1968 for Classification C22212, as recommended for calibration (reference) sealed sources.

RECOMMENDED USE & SERVICE:

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For maximum safety and service, Vial Type "E" sources should be used and stored at 10-40°C, 10-80% RH, ambient pressure, with care to avoid contact with strong organic solvents, hot surfaces, and excessive mechanical stress.

RADIATION SAFETY RECOMMENDATIONS:

1. Radiation protection procedures utilized for handling and measurement of scanning agents are generally quite adequate for use of Type "E" Gamma Reference sources. Specific dose factors and effective lead shielding thicknesses for nuclides utilized in the Reference source series are provided in the following table to aid in effective exposure control.

Nuclide	\sim mR/hr/mCi @ 12" Unshielded	\sim Shielding Lead Half Value Thickness
Cobalt-57	0.9	0.2 mm
Barium-133	2.5	2.5 mm
Tin-113	1.8	3 mm
Germanium-68	5.7	4.5 mm
Cesium-137	3.5	6 mm
Cobalt-60	14.2	11mm

2. The source should be stored in the lead storage container provided with it. The source in its container should be stored in a restricted access compartment to prevent unauthorized use or removal. An accountability log should be maintained for this and all radioactive sources and devices on hand, listing pertinent data and specified storage location.
3. Disposal of "spent" or otherwise unusable sources should be made by the authorized radioactive waste disposal method for solid materials.
4. Vial Type "E" Gamma Reference Sources should be Leak Tested at maximum intervals of 6 months, or whenever seal integrity failure is suspected, using a reliable method (ANSI Std. N5.10-1968 Procedure B2.1 recommended) with measurement employing a counting system with nanocurie response sensitivity i.e., gamma scintillation counter.

NOTICE

This approved model of the NEH Vial Type "E" Gamma Reference source is licensed by the U.S. Nuclear Regulatory Commission pursuant to Title 10 code of Federal Regulations Part 32.74, for distribution to persons licensed pursuant to 10CFR35.14 or an equivalent Agreement State License.

Receipt, use or transfer of this source not pursuant to the above licensing is prohibited unless specifically licensed by USNRC or State Regulatory Authority.

RADIOACTIVE MATERIAL

The radioactive material contained in this product is naturally occurring or accelerator produced; hence, the radiation control agencies in various states exercise regulatory authority for its receipt, possession, use and transfer.

FORM NO. RSI-100-679

CERTIFICATE OF SOURCE LEAK TEST

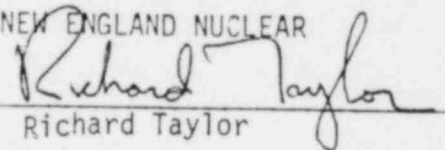
Model NES- 356 Radionuclide Cs-137

Serial Number 3560481A-40 Test Date 4/27/81

The subject source was tested for surface contamination and radioactivity leakage utilizing a wipe test technique prescribed by ANSI standard N5.10-1968. Leakage/contamination of less than 5×10^{-4} microcurie was detected.

NEN hereby certifies that the subject source was tested and determined to be free of leakage or contamination as specified by applicable regulations and specifications. Subsequent smear tests such as described below on this certificate must be conducted by the licensed user at six mont. intervals.

For: NEW ENGLAND NUCLEAR

By: 
Richard Taylor

RECOMMENDED WIPE (SMEAR) TEST

This leak test procedure is recommended if the user does not already employ an approved procedure.

Wipe all external surfaces of the source, including the source seal area, with a piece of H₂O moistened filter paper or other suitable "swab". Measure the total activity on the paper or "swab" with an appropriately calibrated gamma scintillation counter. Care should be taken to assure proper counting time for reasonable statistical validity of values obtained. Record test results in proper source log for future reference.

If the total activity smeared from the source is less than the previous smear test, and less than 5×10^{-4} microcuries, then the source shall be considered leak free. If the total activity measured is significantly more than the previous test value, then the source should be removed from service until the source leakage can be confirmed or other source of contamination found. (even though the detected quantity may be less than that specified on the user's license for reportable source leakage) A 'hot' smear should be checked every few days to determine if the activity is from a short-lived nuclide utilized nearby. If two smears at 7 day intervals reveal positive values, the source should be disposed of or returned to NEN for evaluation.

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