Calumet Public Hospital
205 Osceola Street • Laurium, Michigan 49913
(906) 337-3100

"Working Together For Health"

October 29, 1982

D.J. Sreniawski, Chief
Materials Radiation Protection
Section 2
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

RE: License No. 21-20242-01, Inspection of 9-24-82

Pursuant to your correspondence of 10-7-82 regarding the routine safety inspection, three infractions are itemized to which we respond as follows:
(1) The radiation safety committee has been revised to consist of the Hospital radiologist who serves as radiation safety officer and as user of the radionuclide and interpreter of the scans, the hospital administrator, and the director of nursing. The original medical isotope committee first met on 8-10-82. The meeting was not held prior to July 30, 1982, because of the various problems encountered with the operation of the newly installed nuclear scanner which deferred service and for which reasons we deferred the meeting. The scanner is now operational and we anticipate no further interruptions in the meetings which will be automatically scheduled for the beginning of each month of May, August, November, and February. The minutes of the meeting of 10-29-82 are enclosed and the next meeting will be approximately three months from now. We see no reason why the meetings cannot be performed in a timely manner from this time forward.
(2) Regarding calibration of the dose calibrator. A copy of the calibration dated 9-27-82 is enclosed for your inspection. We understand that this is not a repeated requirement.
(3) The surveying and wipe testing that are required weekly are being performed and copies of the notations are enclosed. We anticipate that this will be performed on Friday of each week and will be duly ~~regarded~~ documented.

We hope that this information satisfies the infractions. If there is any further question please advise.

Sincerely,

Robert B. Neale, M.D.

RBN/baj

ENCLOSURES: 3

NOV 4 1982

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Minutes of Radiation Safety Committee meeting dated 10-29-82.

First item is a change in the title to Radiation Safety Committee from Medical Isotope Committee. Membership has been revised to include the following persons: (1) Hospital Administrator, (2) Director of Nursing, and (3) Hospital Radiologist, who serves as radiation safety officer and as the interpretor of the nuclear scans and professional chief of the department.

The NRC inspection findings were discussed and a copy of the response is enclosed for the department records.

On Tuesday October 26, 1982 the Picker serviceman inspected the equipment for the last time under warranty and recalibrated the photo-multiplier tubes, improving the image from an oval to a round configuration. No other problems with the equipment were noted at this time.

The Siemens film badge reports for nuclear medicine personnel were reviewed. The readings appear to be within acceptable limits.

It is understood that a representative from the Stan Huber Associates will visit in the near future and will give an inservice on the handling of radiation accident patients in the emergency room and will offer guidelines in the establishment of a written protocol for this subject.

It is noted that the limousine courier who brings the generator from the airport each week is upset because he is required to wait for what he considers to be unreasonable periods of time to formally deliver the generator through the scanning room into the hotlab from the switchboard. It is understood that he will be contacted to recommend that he call ahead of time so that he can be escorted without unreasonable delay or inconvenience to himself before actually bringing the generator. Prospect of changing the protocol was discussed considering the practical elements of this problem, and because of the required amendment involved, we will defer any further action of this subject until the Stan Huber visit.

It is noted that technologist Ginger Smith attended the Stan Huber Seminar on Current Theory and Practical Application of Nuclear Medicine Technology in Chicago from October 4th to 8th.

The questions regarding the handling of nuclear medicine patients on the floors was discussed with the Director of Nursing as the final item on the agenda of this meeting.

The meeting was then adjourned.

Robert B. Neale, M. D.
Department of Radiology

CALUMET PUBLIC HOSPITAL
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TELEPHONE (906) 337 - 3100

MEDICAL ISOTOPE COMMITTEE MEETING MINUTES

On August 23, 1982 at 11:15 AM the Medical Isotope Committee held its first meeting at Calumet Public Hospital. The meeting was held within the Nuclear Medicine departmental facility and those in attendance were as follows:

Dr. Robert B. Neale, Radiation Safety Officer
Mr. Dion Paquette, Hospital Administrator
Dr. Howard Otto, Pathologist*
Gordon Rintala, Department Supervisor
Michele D. Nash, R.T.(N)
Ginger Smith, R.T.R.
*Note: Dr. Belej, Internal Medicine-4th.committee member was not present

The meeting opened with a brief summary of the report on the visit and findings of Stan Huber Consultants and a discussion of the licensing amendments as drawn up and submitted to the NRC by the consultants. It was mentioned by Mr. Paquette that the NRC has acknowledged receipt of the amendment application and the hospital is now awaiting its approval by the agency.

Dr.Neale then proceeded with a basic review of the ALARA Management Program and its incorporation into departmental practice. Siemens film badge reports to date were reviewed for nuclear personnel. It was noted that finger badge readings ran a bit high for M. Nash on the July report, but were still below the NRC and ALARA management program quarterly limits. It was further stated that the recent acquisition of a syringe shield by the department should greatly reduce future hand exposure readings.

The subject of continuing education was brought up for discussion. M. Nash confirmed that Stan Huber & Assoc. had been contacted regarding information on their two week Seminar Series to be conducted near Chicago sometime in early October of this year. Details on the program and an application for attendance is being forwarded to us by the firm. It is intended that G. Smith attend and gain valuable academic backround in nuclear physics, radiochemistry, principles of radiation safety, etc., from an instructional review of this nature.

The next scheduled meeting of the M.I.C. is tentatively set for the early part of November, hopefully to coincide with a scheduled visit by the consultants. This meeting was adjourned at 12:05 PM.

Robert B. Neale, M.D.

Michele D. Nash, R.T.(N)

Michele D. Nash, R.T.(N)

MDN/baj 8-31-82

CALUMET PUBLIC HOSPITAL
LAURIUM, MICHIGAN 49913

TELEPHONE (906) 337 - 3100

September 30, 1982

In response to the non-compliance of our referenced application (Item No.10) and the requirement for a geometrical variation check to be performed upon the installation of our dose calibrator, as outlined in Regulatory Guide 10.8 Appendix D, ---said check has been performed with acceptable results obtained (see attached data and graph). Since the geometrical variation check need only be performed at installation of unit (in this instance on September 27, 1982), the possibility for further non-compliance is not applicable.

Michele D. Nash, R.T.

Michele D. Nash, R.T.(N)

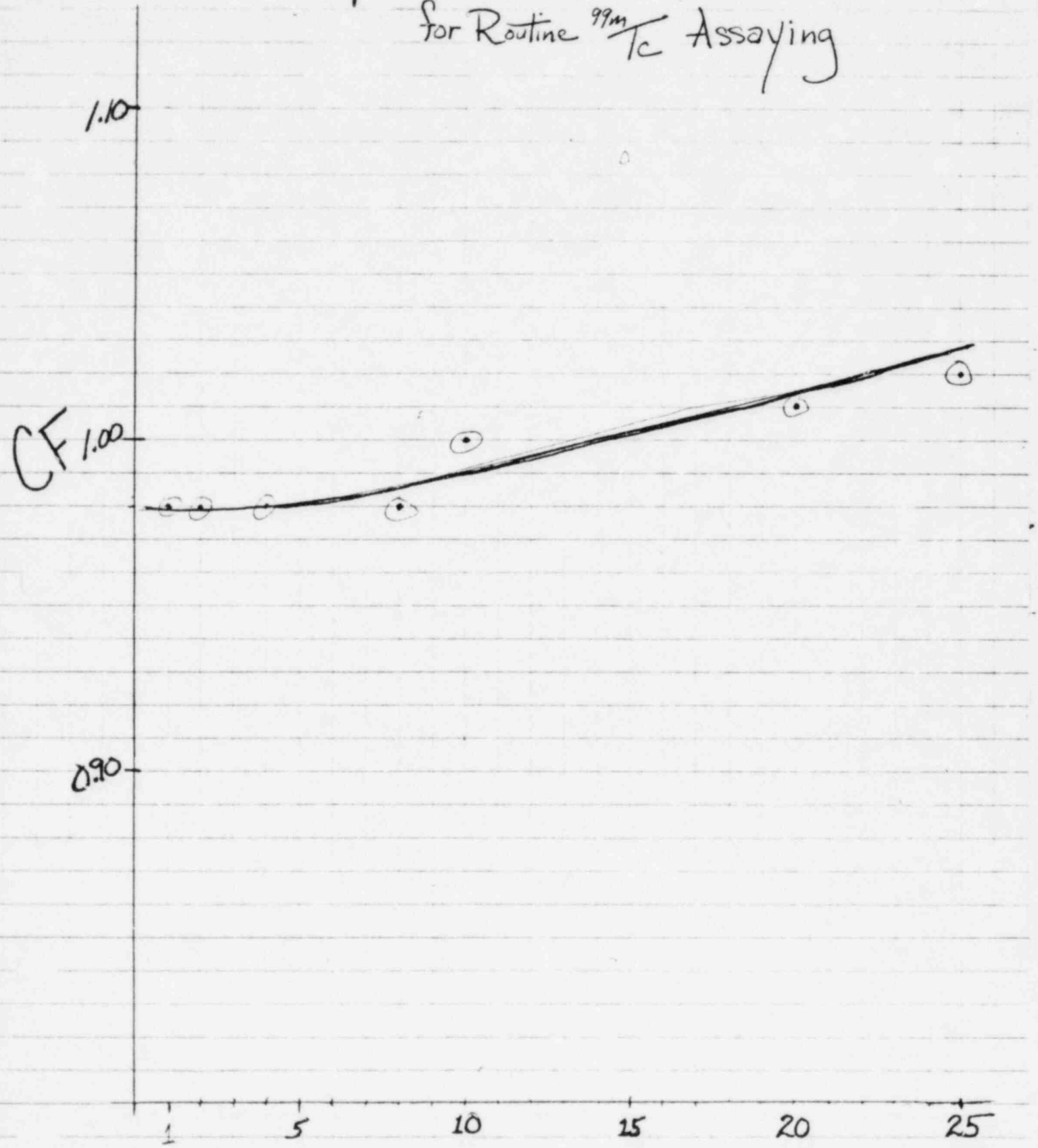
Geometrical Variation Check for Dose Calibrator

Test Data

volume	measured activity	Correction Factor
1 ml	2.05 mCi	$CF_{for\ 1\ ml\ vol.} = \frac{2.00}{2.05} = 0.98$
2 ml	2.05 mCi	$CF_{for\ 2\ ml\ vol.} = \frac{2.00}{2.05} = 0.98$
4 ml	2.05 mCi	$CF_{for\ 4\ ml\ vol.} = \frac{2.00}{2.05} = 0.98$
8 ml	2.04 mCi	$CF_{for\ 8\ ml\ vol.} = \frac{2.00}{2.04} = 0.98$
10 ml	2.00 mCi	$CF_{for\ 10\ ml\ vol.} = \frac{2.00}{2.00} = 1.00$
20 ml	1.98 mCi	$CF_{for\ 20\ ml\ vol.} = \frac{2.00}{1.98} = 1.01$
25 ml	1.97 mCi	$CF_{for\ 25\ ml\ vol.} = \frac{2.00}{1.97} = 1.02$

Test performed
on: 9-27-82
by MDm

Graphic Determination of Volume Correction Factors for Routine ^{99m}Tc Assaying



*Copy is posted in Dept. "hot lab"

9-27-82
MBn

Assay Time* (hr)	Correction Factor
0	31.633
6	15.853
24	1.995
30	1
48	0.126

Example: If the net activity measured at 30 hours was 15.625 mCi, the calculated activities for 6 and 48 hours would be 15.625 mCi x 15.853 = 247.7 mCi and 15.625 mCi x 0.126 = 1.97 mCi, respectively.

4. On log-log coordinate paper, plot the measured net activity (for each time interval) versus the calculated activity (for the same time interval).

5. The activities plotted should be within ±5 percent of the calculated activity if the instrument is linear and functioning properly. Errors greater than ±5 percent indicate the need for repair or adjustment of the instrument.

6. If instrument linearity cannot be corrected, it will be necessary in routine assays to use either (a) an aliquot of the eluate that can be accurately measured or (b) the graph constructed in step 4 to relate measured activities to calculated activities.

F. Test for Geometrical Variation

There may be significant geometrical variation in activity measured as a function of sample volume or configuration, depending on the volume and size of the ionization chamber used in the dose calibrator. The extent of geometrical variation should be ascertained for commonly used radionuclides and appropriate correction factors computed if variations are significant, i.e., greater than ±2 percent. (Even though correction factors may be provided by the manufacturer, the accuracy of these should be checked.) When available from the manufacturer, certified data on geometrical variations may be used in lieu of these measurements.

To measure variation with volume of liquid, a 30-cc vial containing 2 mCi of Co-57 or other appropriate radionuclide in a volume of 1 ml will be used.

1. Assay vial at the appropriate instrument setting, and subtract background level to obtain net activity.

2. Increase the volume of liquid in the vial in steps to 2, 4, 8, 10, 20, and 25 ml by adding the appropriate amount of water or saline. After each addition, gently shake vial to mix contents and assay as in step 1. (Follow good radiation safety practices to avoid contamination and to minimize radiation exposure.)

3. Select one volume as a standard (such as the volume of reference standard used in performing the test for instrument accuracy), and calculate the ratio of measured activities for each volume to the reference volume activity. This represents the volume correction factor (CF).

Example: If activities of 2.04, 2.02, and 2.00 mCi are measured for 4, 8, and 10 ml volumes and 10 ml is the reference volume selected.

$$4 \text{ ml Volume CF} = \frac{2.00}{2.04} = 0.98$$

4. Plot the correction factors against the volume on linear graph paper. Use this graph to select the proper volume correction factors for routine assay of that radionuclide.

5. The true activity of a sample is calculated as follows:

True Activity = Measured Activity x Correction Factor

where the correction factor used is for the same volume and geometrical configuration as the sample measured.

6. Similarly, the same activity of Co-57 in a syringe may be compared with that of 10 ml in a 30-cc vial, and a correction factor may be calculated.

7. It should be noted that differences of 200 percent in dose calibrator readings between glass and plastic syringes have been observed for lower-energy radionuclides such as I-125, which should be assayed in a dose calibrator only if the reliability of such an assay can be established. Glass tubes and syringes may also vary enough in thickness to cause significant errors in assaying I-125. Hence, adequate correction factors must be established.

An alternative to providing syringe calibration factors is to simply assay the stock vial before and after filling the syringe. The activity in the syringe is then the difference in the two readings (with a volume correction if significant).

G. Test for Instrument Accuracy

Check the accuracy of the dose calibrator for several radionuclides, including Cs-137, Co-57, and Ba-133, using appropriate reference standards whose activities have been calibrated by comparisons with standard sources that have been assayed by NBS and documented.

Procedure followed as designated by NRC Reg Guide

*Assay times should be measured in whole hours and correction factors should be used to the third decimal place as indicated. The more recent half-life of $T_{1/2}$ = 6.02 hours has been used in calculating these correction factors.

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OCTOBER 4, 1982

Area wipe tests are being performed once weekly (on Friday afternoons). Departmental procedure consists of wiping with a dampened cotton swab in a cross-hatch pattern over the designated areas on the attached record forms. All wipes are then measured in a low background area with a G.M. Survey Meter (w/open window), and results are recorded in counts per minute units. Readings are compared to a background reading expressed in equivalent units. Any area reading greater than ten times the daily background reading merits a re-check and follow-up decontamination if necessary.

Michelle D. Nash

Michelle D. Nash, R.T. (R)

Initials Date

Prepared By

Approved By

Long Term Storage Area
G-M Survey & Wipe Tests

*Bkgd. - regard as <0.05 mr/hr reading

Unrestricted Areas

	Generator Info	1 "Hot Box" SURFACE reading	2 G-M reading @ 1 meter	3 Hallway reading adjacent to "Hot Box"	4 Bkgd. reading @ hallway junction	Outdoor wall @ Surface Parking Lot	Womens Lounge Wall adj. to "Hot Box"
1							
2	Date Stored: 9.24.82	0.3mr/hr	0.07mr/hr	0.02mr/hr	0.03mr/hr	0.03mr/hr	0.02mr/hr
3	Wipe test:	10 cpm's		Door handle: 10 cpm's		Bkgd: 10 cpm's	
4	Date disposed:						
5							
6							
7	Date Stored: 10-1-82	0.4 mr/hr	0.03mr/hr	0.01mr/hr	0.01mr/hr	0.05 mr/hr	0.02 mr/hr
8	Wipe test:	Box Top 15 cpm		Door knob: <10 cpm		Bkgd. = 10 cpm	
9	Date Disposed:						
10							
11							
12	Date Stored: 10-15-82	0.4 mr/hr	0.1 mr/hr	0.02 mr/hr	0.01 mr/hr		0.02 mr/hr
13	wipe test	10 cpm	Door Knob: 10 cpm		Bkgd. 10 cpm		
14	Date Disposed:						
15							
16							
17	Date Stored: 10-22-82	0.1 mr/hr	0.09mr/hr	0.01 mr/hr	0.01 mr/hr	0.02 mr/hr	0.02 mr/hr
18	wipe test	"Hot Box" 10 cpm		Door Knob: <10 cpm		BKGD: 10 cpm test wipe	
19	Date Disposed:						
20							
21							
22	Date Stored: 10-29-82	0.9 mr/hr	0.3 mr/hr	0.02 mr/hr	0.01 mr/hr	0.15 mr/hr	0.02 mr/hr
23	WIPE TEST	"Hot Box" Top 10 cpm		DOORKNOB: 20 cpm		BKGD: 20 cpm	
24	Date Disposed:						
25							
26							
27	Dated Stored:						
28							
29	Date Disposed:						
30							
31							
32	Date Stored:						
33							
34	Date Disposed:						
35							
36							
37	Date Stored:						
38							

DATE:

WEEKLY AREA WIPE TESTS

*Bkgd.

CAMERA ROOM

1) Camera console
2) Detector drum & control switches
3) Patient cart
4) Detector stand*
5) *Adjacent floor area
6) Linen cabinet-top & door handles
7) Desk
8) Phone

"HOT LAB"

1) Dose prep area
2) Dose calibrator
3) Counter top-adj. to sink
4) Sink
5) Floor area

Survey done by:

* Any reading > 10 times the daily bkgd. requires a re-check and follow-up decontamination if necessary.

DATE: 9-24-82

WEEKLY AREA WIPE TESTS

*Bkgd. ≈ 10 cpm

CAMERA ROOM

1) Camera console < 10 cpm
2) Detector drum & control switches 10 cpm
3) Patient cart 20 cpm
4) Detector stand* 2 cpm
5) *Adjacent floor area 10 cpm
6) Linen cabinet-top & door handles < 10 cpm
7) Desk 10 cpm
8) Phone 10 cpm

"HOT LAB"

1) Dose prep area 30 cpm
2) Dose calibrator < 10 cpm
3) Counter top-adj. to sink 10 cpm
4) Sink 20 cpm
5) Floor area 20 cpm

Survey done by:
Ginger Smith
@ 4 PM

*ANY READING > 10 times the daily bkgd. requires a re-check and follow-up decontamination if necessary.