The Memorial Hospital
119 Belmont Street
Worcester
Massachusetts 01605
(617) 793-6611

September 29, 1982

Thomas T. Martin, Director
Division of Engineering and Technical Programs
Nuclear Regulatory Commission - Region 1
631 Park Avenue
King of Prussia, Pennsylvania 19406

SUBJECT: Inspection No. 82-01 Docket Nos. 30-01847 and 30-00234

Dear Mr. Martin:

Please excuse our delayed response to your letter of August 26, 1982 with its enclosed Notice of Violation subsequent to a routine safety inspection conducted by Miss J. McGinness on July 26, 1982 of activities authorized by NRC License Nos. 20-02452-01 and 20-02452-03. Failure to respond within the thirty day limit was due to an oversight on my part which was communicated to Dianna of your staff by telephone on September 27, 1982.

The response of The Memorial Hospital is as follows:

A. With respect to the evaluation of the dose to the hands and fingers of individuals who routinely handle Cesium-137 contained in brachytherapy sources, we wish to note that our current procedure which involves the use of long forceps to handle sources coupled which our annual volume of 10-12 procedures per year make the likelihood of excessive exposure extremely remote. Nevertheless, finger badges for the individuals involved have been ordered to permit evaluation of exposure levels in the future. Estimated date of compliance - November 1, 1982.

   With respect to the unprocessed finger film badges of employees handling unsealed sources, we would point out that the maximum reading of processed badges in the past has been 320 mrem/mo and most readings are below 200 mrem. It is therefore not likely that any individual would receive greater than 25% of the permissable dose specified in 10 CFR 20.101 (a) and that under 10 CFR 20.202 (a1) there is no absolute requirement for the use of finger badges. Furthermore, the finger badge levels in our laboratory have never been above action level I of the model ALARA program and it is reasonable to assume that under our operating conditions they will remain so. It is thus not clear under what regulations we are cited. We would also point out that unreported badges are evaluated in an effort to determine the reason for such omissions and minimize them.

B. The dosimetry system used to calibrate the teletherapy unit on June 23, 1982 is a Victoreen Radocon III (Electrometer Serial No. 460, Chamber 550-6, Serial No. 665) which was factory-checked on March 15, 1982. Calibration by the Northeast Regional Calibration Laboratory has been contracted (under Worcester City Hospital, M.M. Castro), and is scheduled to be called in May 1983. In the meantime, we are confident that this dosimetry system is functioning properly, firstly from the aforementioned factory check, and

A Major Affiliate of the University of Massachusetts Medical School

secondly, in light of results from checks conducted twice a year by the Northeast Center for Radiological Physics (Project: Eastern Cooperative Oncology Group in which Worcester City Hospital is a participant). The initial visit by CRP staff was on June 10, 1981 and the dose ratios CRP/institution ranged from 0.99 to 1.01. The most recent follow-up check was on June 1, 1982.

Enclosed are copies of the reports of the factory check and CRP initial and most recent follow-up visit.

C. Monthly spot check measurements to include a determination of the timer accuracy will be recorded for the telemetry unit effective immediately.

D. 1. The omission of thyroid uptake measurements between March 5, 1981 and December 9, 1981 (NOTE: Your letter misprints this as December 9, 1982) was occasioned by the resignation of our chief technologist and failure to note the schedule until our new chief technologist was hired. The one month excess delay between measurements of March 1, 1982 and July 1982 was due to an oversight due to vacation schedules. In an effort to prevent this in the future, we have set up calendar reminders of the appropriate survey dates and the assignment of secondary responsibility in the event of absence of our chief technologist. Thyroid surveys in the past have never shown individuals to have thyroid activity above action levels and since our operating procedures our constant, we do not believe the omission of these surveys represented an actual hazard.

2. Radioactive materials used in the Hemophilia Research Laboratories (I-125, tridium) are used in diluted form in extremely small quantities which makes the possibility of exposure from spillage very remote. In addition all bench tops are lined with disposable paper which is disposed of at least weekly, and often immediately after use. Nevertheless, monthly wipe tests with results evaluated for contamination will be instituted effective immediately.

If you have any questions or concerns regarding our response, please do not hesitate to contact me at (617) 793-6264.

Sincerely,

Scott B. Bullock

Scott B. Bullock
Associate Executive Director
Operations

Enclosures

/mjs

MODEL 550 RADOCON III TEST DATA

REP 7411

SERIAL NUMBER 460

DATE 3-15-82

CHECKED BY DLC

1) PREAMPLIFIER TESTS

A) Input Current Check (Section 4-3 In The 550 Manual)

zero reading	rate reading
0.75 mr/sec	0.74
0.00 mr/sec	0.00

B) Rate Calibration (Section 4-4.2 In The 550 Manual)

input voltage 10.00

input resistance 5.0135 x 10^0

550 voltage output 1.9946

C) Exposure Calibration

input voltage 19.960

input capacitor .014f

550 voltage output 19.912

D) Capacitor Time Constant (Section 4-3 In The 550 Manual)

550 reading at start 199.1

starting time 2:00

550 reading at end 199.3

ending time 3:00

2) READOUT TESTS (SECTION 4-4.1 IN THE 550 MANUAL)

A) Zero Voltage Checks

voltage after setting R3 0.00V

voltage after setting R27 0.00V

B) 550 Voltmeter Accuracy After Calibration

Range	Voltage In	550 Reading
10 mr/sec	199.00 mv	+1990
100 mr/sec	1.9900 V	+19.92
1000 mr/sec	19.900 V	+199.0
10 R/sec	199.00 V	+1990

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NORTHEAST CENTER FOR RADIOLOGICAL PHYSICS
MEMORIAL SLOAN-KETTERING CANCER CENTER
1275 YORK AVENUE, NEW YORK, NEW YORK 10021
(212) 794-7367

RADIATION THERAPY DOSIMETRY REPORT

REVIEW VISIT

Dosimetry SYSTEM USED IN Full calibration of Memorial Hosp., Worcester

Institution: Worcester City Hospital, Worcester, MA

Radiotherapist: Miljenko V. Pilepich, M.D.

Date of Visit: 6/10/81

Machine: Picker C-9, Brachytherapy Sources

Staff Present: Mary Ellen Masterson, M.S., Margie Hunt, M.S., M.M. Castro, Ph.D.

This report summarizes the results of measurements made by NE-CRP physicists at your institution. The NE-CRP follows a measurement protocol which is being uniformly applied by the six regional Centers for Radiological Physics at all Cancer Control Program radiation therapy affiliates. Copies of this report are sent only to the participating radiotherapist and physicist. If your institution is participating in NCI supported national clinical study groups, data required to verify the clinical records of patients entered into these studies will be supplied to the Radiological Physics Center, Houston, Texas.

Report Prepared By:

Margie Hunt, M.S.
CRP Physicist

Report Reviewed By:

Cindy Thomason, M.S.
CRP Physicist

Report Approved By:

Mary Ellen Masterson, M.S.
Associate Director

cc: Dr. John S. Laughlin, Director - NE-CRP
Dr. M.M. Castro

Supported by a contract with the Division of Cancer Control and Rehabilitation of the National Cancer Institute

.ATION DOSE

Dose was measured with an ion chamber in full phantom for distances, field sizes, depths and timer settings indicated below. In all cases the direction of the beam was vertically down. A detailed description of measurement and computation methods is given in the Appendix.

Timer settings were computed by the institution (see Appendix) to deliver 100rad for the given conditions. CRP/Institution is dose measured by the CRP divided by 100rad. All values listed below represent radiation dose to muscle.

SSD (cm)	Field Size (cm)	Depth (cm)	Time Set (min)	Measured Dose (rad)	CRP/ Institution
80.0	5 X 5	5.5	1.59	99	0.99
80.0	10 X 10	0.5	1.08	101	1.01
80.0	10 X 10	5.5	1.43	100	1.00
80.0	10 X 10	10.5	2.03	101	1.01
80.0	15 X 15	5.5	1.33	100	1.00
80.0	20 X 20	5.5	1.27	101	1.01

CENTRAL AXIS PERCENT DEPTH DOSE

Percent depth dose has been computed from dose rate measurements at the depth of maximum buildup and at depths of 5.5cm and 10.5cm. The results are given below in comparison with values from The British Journal of Radiology, Supplement Number 11.

SSD (cm)	Field Size (cm)	Depth (cm)	Percent Depth Dose CRP	Percent Depth Dose BJR-11
80.0	10 X 10	5.5	75.3	76.0
80.0	10 X 10	10.5	53.3	53.6

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RADIATION THERAPY DOSIMETRY REPORT
MAILED DOSIMETRY MONITORING PROGRAM

Institution: Worcester City Hospital, Worcester, MA

Project: Eastern Cooperative Oncology Group

Radiotherapist: Won Tak, M.D.

Date of Irradiation: 6/1/82

Therapy Unit: Picker C-9

Dosimetry System used in Full Calibration of Memorial Hosp., Worcester.

This report describes results from the radiation therapy dosimetry kit irradiated at your institution and returned to the NE-CRP for analysis. Copies of this report are sent only to the participating radiotherapist and physicist. If your institution is participating in national clinical study groups a condensed report is sent to the Radiological Physics Center, Houston, Texas.

The kit contained thermoluminescent dosimeters (TLD) for measuring radiation dose and contained x-ray film for determining the agreement between light and radiation fields.

Any recommendations made by the NE-CRP are of a review nature. Changes initiated by our recommendations should be made only after the institution has independently verified the need for change. Any changes should be made with the full knowledge of all individuals concerned, and special consideration must be given to changes which result in the alteration of true patient dose with respect to previous clinical experience.

Report Prepared By:

Cindy Thomason

Cindy Thomason, M.S.
Senior Physicist

Report Approved By:

Margie Hunt

Margie Hunt, M.S.
Senior Physicist

cc: Mary Ellen Masterson, M.S., Associate Director, NE-CRP
Mabini M. Castro, Ph.D.

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Machine: Picker C-9

I. Radiation Dose.

The CRP requested that 150 rad be delivered to the center of a 15x15 cm field at a water-equivalent depth of 5.3 cm. Institutional personnel calculated the timer setting to fulfill this prescription and performed the irradiation. A copy of the institution's worksheet is attached with this report. The uncertainty of the measured dose is 5%.

Date of Irradiation	SSD (cm)	Timer Setting (min)	Dose Measured (rad)	Measured Dose/ Requested Dose
6/1/82	80	2.23	149	0.99

Dose reference material. Muscle.

II. Light Field and Radiation Field Coincidence.

Kodak RP/V film was exposed in a 10x10 cm field at the depth of maximum dose. The film was scanned through the central axis at the midpoint of each border with a computer driven densitometer. Optical density was then related to relative dose. The edge of the radiation field is defined as the relative dose contour corresponding to 50% of the dose on the central axis. Light and radiation field coincidence was determined at the midpoint of each border and was found to be within 3 mm. Film analysis details can be found on the following pages.

III. Beam Symmetry

The above film was also used to derive a quantitative measure of beam symmetry. Relative dose measurements were made on the film for a series of special points located along the diagonals and perpendicular bisectors of the film at a point two thirds of the distance from the central axis to the edge of the field along a perpendicular bisector. These measurements were then compared to the central axis relative dose to get an off-center ratio. Beam symmetry is taken to be the maximum/minimum of the off-center ratios at the special points and was found to be 1.01. Film analysis details can be found on the following pages.