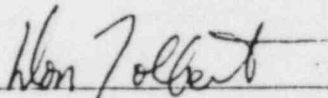


A REPORT OF PHYSICS CALIBRATION MEASUREMENTS
ON TRIPLER ARMY MEDICAL CENTER
THERATRON 80 COBALT 60 UNIT

Source Installation Completed November 30, 1982

8605190413 860506
REQ5 LIC30
53-00458-05 PDR



Don Tolbert, Ph.D.
Certified Radiological Physicist
January 3, 1983

Enclosure 1

PREFACE

The following is a report of physics measurements made subsequent to installation of the new Cobalt source (S/N 3416) on November 29 and 30, 1982. The activity of this source was factory calibrated at 6000 curies on September 8, 1982. Installation was made on the Tripler Army Medical Center Theratron 80 Cobalt unit. The measurements reported herein were made on December 1, 2, 3, and 14, 1982.

EQUIPMENT

The secondary electrometer system used was the Capintec model 192 (S/N 19021124). The chamber used with this system was a Capintec Farmer type, with air equivalent plastic tip and 0.6 cc sensitive volume (S/N .62758). A Cobalt 60 build up cap was used throughout. The calibration factor for the Capintec-Capintec secondary dosimetry system was determined by in-air Cobalt 60 comparison with a Victoreen model 570 system (S/N 2411) on July 22, 1982. This primary system was last calibrated by a Regional Calibration Laboratory in July, 1982. *Memorial Sloan Kettering RCL*

A copy of the reports of all calibration and inter-comparison measurements are on file at the office of Mid-Pacific Medical Physics.

OUTPUT

The output was determined in water rads/minute to a volume of tissue large enough to provide electronic equilibrium at 80 cm. This measurement was made for a 10x10 cm² field size with the trimmers set at 45 cm. The output and timer error measurements reported here were made with the primary dosimetry system described above.

EXPOSURE TIME RELATED ERRORS

The on-off error was determined from a 0.28 minute continuous exposure (X_L), an accumulation of 4, 0.07 minute exposures (X_S), and the requirement that:

$$X_L/0.28 \text{ minutes} + \Delta = X_S/4 (0.07 \text{ minutes} + \Delta)$$

where Δ is the on-off error. Solving for Δ in the above expression yields:

$$\Delta = 0.28 (X_S - X_L)/(4X_L - X_S).$$

The on-off error measurement was made by taking the average of at least three exposures. The timer error thus measured was -0.015 minutes.

The output measurement included corrections for temperature-pressure Roentgen to rad factor (0.965), displacement factor (0.985), and timer error. The output at 80 cm, in air, to a small piece of tissue large enough to provide electronic equilibrium, was determined to be 173.1 water rads per minute on December 3, 1982.

The accuracy of the timer along with that of the elapsed timer (Vera Timer) was checked against a Seiko wrist watch which has remained within 30 seconds of the National Bureau of Standards time during the past calendar year. The Theratron 80 timer agreed with the Seiko to within $\pm 1\%$ while the Vera-Timer agreement was to within $\pm 2\%$.

The enclosed Table 1 provides output values for the first six months of 1983 corrected to the fifteenth of each month. A half life of 5.24 years was assumed for Cobalt 60.

INVERSE SQUARE MEASUREMENTS

Inverse square measurements were made at source to chamber distances of 80, 90, and 100 cm. A $10 \times 10 \text{ cm}^2$ field size at 80 cm was maintained for each trimmer setting. The results of these measurements are shown in the attached Figure 1 where the output multiplied by source to chamber distance squared is plotted versus source to chamber distance. The values at 90, and 100 cm are plotted relative to that at 80 cm. As indicated, the inverse square relationship holds true for these distances to within 1.3%.

AREA FACTORS FOR FIELD SIZE DEPENDENCE

Area factors were measured with the center of the chamber at 80 cm from the source. Measurements were made with side of equivalent squares equal to 5, 6, 7, 8, 10, 12, 15, 20, 25, and 33 cm. At each field size measurements were made for trimmer positions at 45, 55, and 65 cm. The average output for each field size and trimmer position was obtained from an average of at least three measurements. The resulting field size dependence factors were all normalized to the output for a $10 \times 10 \text{ cm}^2$ square field with trimmers positions at 45 cm.

The results are shown on Figures 2, 3, and 4 of the attached. In each figure, the solid line is a smooth representation of measured data while the x's correspond to values obtained from previous measurements. These previous measurement values have been used clinically prior to installation of the new source.

SUBJECT:

SECL Orientation

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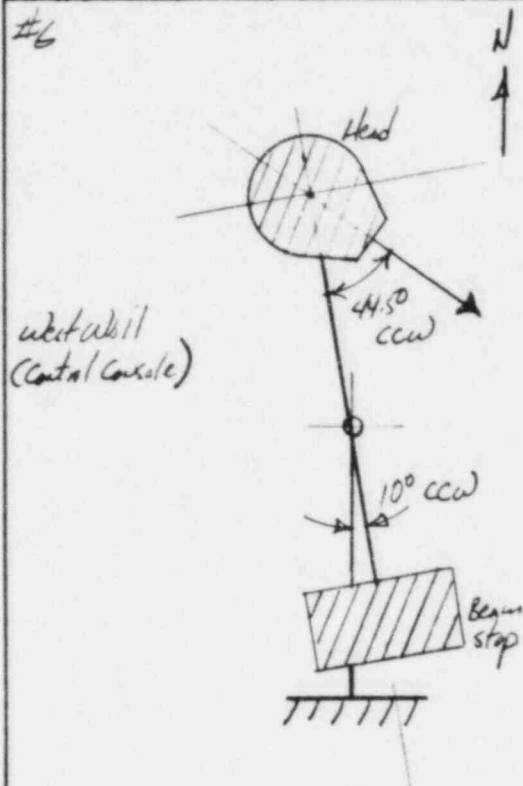
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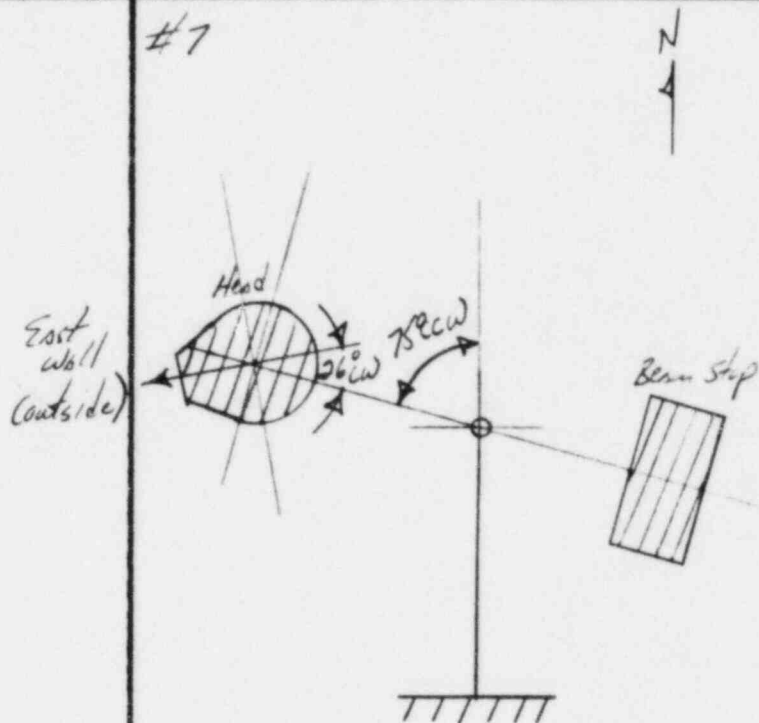
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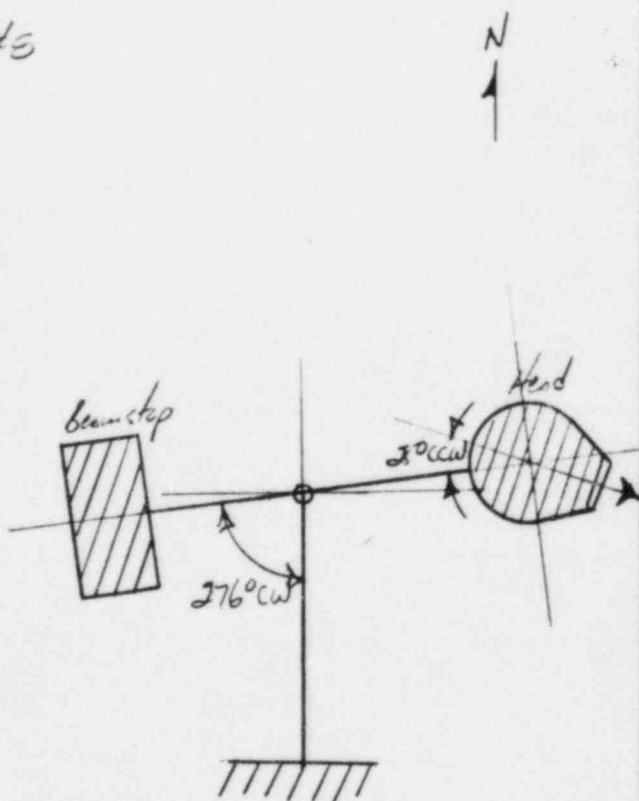
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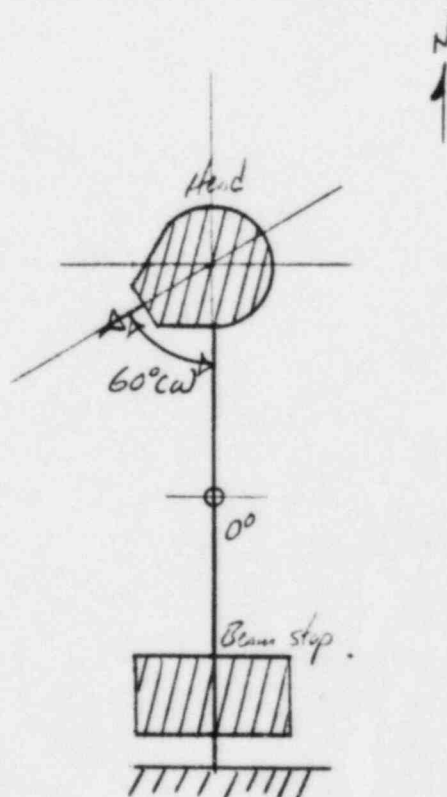
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USAEHA Form 67 7 Feb 79

Inclusion 4

RECORD OF INTERCOMPARISON

DATE: 12/3/82

RADIATION SOURCE: Cobalt-60

PRIMARY DOSIMETRY SYSTEM (PDS):

	ELECTROMETER	CHAMBER
MANUFACTURER:	<u>Victoreen</u>	<u>Victoreen</u>
MODEL:	<u>570</u>	<u>621</u>
SERIAL NUMBER:	<u>2411</u>	<u>2411</u>

PLACE/DATE OF LAST CALIBRATION: Memorial Sloan-Kettering RCh, July 1982

PRIMARY DOSIMETRY SYSTEM CALIBRATION FACTOR: _____

SECONDARY DOSIMETRY SYSTEM (SDS): TAMC owned

	ELECTROMETER	CHAMBER
MANUFACTURER:	<u>Victoreen</u>	<u>Victoreen</u>
MODEL:	<u>570</u>	<u>621</u>
SERIAL NUMBER:	<u> </u>	<u>3130</u>

SETTINGS: Normal

CONDITIONS: Readings taken at 80.0 cm, 10x10 cm², trimmers at 45 cm.

Readings equally distributed on either side of central axis. Gantry
angle 270°.

DATA:

											AVG.
PDS	50.0	50.0	49.9	50.0	49.9	49.9	50.0	49.9			
SDS	48.0	48.0	48.0	48.0	47.9	48.0	48.0	47.9			

SECONDARY DOSIMETRY SYSTEM CALIBRATION FACTOR: 1.000

Don Tolbert
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Inclusion 2

ANNEX (a)

Tripler Army Medical Center, HI
 Exposure Levels in Areas Adjacent to the Teletherapy Facility

A. EXPOSURE GEOMETRY

Run #	Beam Condition	Geometry	Angle of Beam	Beam Stop	Direction	SSD
6	ON	10° CW	44.5° CW	No	Toward outside	284.5 cm
7	ON	7° CW	36° CW	No	Toward central wall	80 cm
8	ON	276° CW	25° CW	No	Toward outside wall	80 cm
9	ON	0°	60° CW	No	Toward central wall	222.2 cm
10	ON	0°	60° CW	No	Toward outside wall	222.2 cm

B. EXPOSURE MEASUREMENTS (mR/hr)

Depth	Exposure Measurements (in R/hr)																		2' #	4' #	10' 3m exposure		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18					
6	0.01	0.01	0.16	0.01	0.05	0.05	0.01	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	10.5	-	-
7	1.0	15.5	5.95	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	4.2	-
8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	1.0
9	0.9	11.4	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	11.1	-	2.0



DEPARTMENT OF THE ARMY
OFFICE OF THE SURGEON GENERAL
WASHINGTON, DC 20310

Dec'd - 28 MAR 83
new DR

REPLY TO
ATTENTION OF

DASG-PSP-E

17 March 1983

SUBJECT: US Nuclear Regulatory Commission (NRC) Request for Information, NRC
Control Number 13546

THRU:

Commander
US Army Health Services Command
ATTN: HSPA-P
Ft Sam Houston, TX 78234

7 23 MAR 83

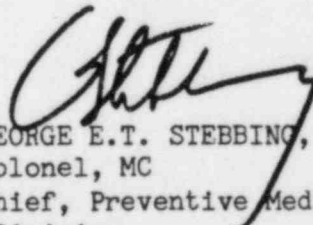
TO:

Commander
Tripler Army Medical Center
TAMC, Hawaii 96859

1. Attached is USNRC request for additional information concerning your License No. 53-00458-05.
2. Request you submit your response to this office in three copies by 4 April 1983. Refer to USNRC Control No. 13546.

FOR THE SURGEON GENERAL:

1 Incl
as


GEORGE E.T. STEBBINS, M.D.
Colonel, MC
Chief, Preventive Medicine Consultants
Division

CF:
CDR, USAEHA