

The following calibration reports are submitted to
the NRC in accordance with its rules and regulations.

The reports are for:

St. Peter's Hospital
NRC 25-12453-03
2475 Broadway
Helena, Montana

*Control —
Teliththerapy
Survey Report*

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FEE EXEMPT

to Survey

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CERTIFICATE OF CALIBRATION

Hospital: St. Peter's Hospital

Date:

Instrument:

Description:

On November 3, 1981 your Cobalt 60 teletherapy treatment machine was calibrated. The calibration included measurement of dose rate at the indicated depths, radiation and light field congruence, verification of the distance-measuring devices, uniformity of the radiation field, and a radiation protection survey of the treatment room and teletherapy head.

Measurements were done in accordance with the Nuclear Regulatory Commission's guide, Title 10, Part 35, Section 21-25, and meet the NRC's guidelines for a full calibration of the Cobalt 60 teletherapy unit.

If there are any questions about this calibration, please feel free to contact me.

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CS893

William K
 D. Lb → Drum → 3/5
 D. Lb → St. Mdm → 3/15
 D. Lb → Cur → 3/16
 Rds → Cur → 3/23

HOSPITAL: St. Peters Hospital

BAROMETRIC PRESSURE: 664

TEMPERATURE: 32° C

DOSE CONVERSION: .95

PERCENT DEPTH DOSE: .787

SHUTTER TIME: -.025

CHAMBER FACTOR:

WATER TO MUSCLE: .99

C_{bp} : 1.145

C_T : 1.034

C : .95

C_{DD} : .787

C_s : .975

C_{ch} : 41.15

C : .99

The following measurements were made in water at 5 cm depth for the field size indicated.

Field Size (cm)	R_1	R_2	R_3	R^-	%DD	Dose Rate (Rad/min)
5	1.451	1.457	---	1.456	.747	105
10	1.581	1.581	1.579	1.582	.787	108.1
15	1.658	1.658	---	1.658	.802	111.3
20	1.712	1.718	---	1.715	.811	113.8
25	1.740	1.741	---	1.741	.817	114.7
30	1.745	1.747	---	1.746	.821	114.5

7
60 cm X

The following measurements were used to determine the timer error. A series of five measurements were made for .2 minute per interval for a total time measurement time of one minute.

$$R(5)_I = 1.753$$

$$R(5)_{II} = 1.763$$

$$R = 1.758$$

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$$\frac{R_m - R_s}{5 \times R_s - R_m} = ts = -.025$$

Because of reported differences between the measurements of dose made in air and those made in water, measurements of dose was made in air to provide an initial measurement for the monthly check measurements.

Field Size: 10 x 10
SSD: 80 cm

R_1	R_2	R_3
1.957	1.957	1.953

Barometric Pressure: 664

C_{bp} : 1.145

Temperature: 22° C

CT: 1

A_{eq} : .985

A_{eq} : .985

T Shutter: .025

C : .975

Chamber Factor: 47.15

C_{ch} : 47.15

Dose to Muscle: .957

C Dose: .957

Back Scatter: 1.035

C_{bsk} : 1.035

Dose: 105.7 rad/minute

which is 2.7% lower than the water calibration.

A comparison between the measured exposure rate and the exposure rate measured by Neutron products in a scatter free cell is made. The comparison necessitates the Neutron products measurement being compared to a 20 x 20 centimeter field for the St. Peter measured dose rate.

It is necessary to convert the dose rate to Roentgens and divide out the backscatter for the St. Peter data.

Neutron products scatter free measurement: 4,460 Rhm

The St. Peters Community Hospital measurement is:

$$113.8 \times \frac{(80)^2}{(100)} \div 1.035 \times 60 = 4,444 \text{ Rhm}$$

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for a difference of .3% which is certainly a good agreement between the two measurements.

ST. PETER'S HOSPITAL

The following is a protection survey conducted at the hospital indicated at the date indicated following new Cobalt 60 source installation. The protection survey was designed to measure operator and the patient's safety in addition to the exposure rates in the environs. A calculation is made for exposure to non-occupationally-exposed locations and occupationally exposed locations for the sites surveyed.

ST. PETER'S HOSPITAL

October 1, 1981

Angle	HEAD LEAKAGE SURVEY	BEAM OFF B (mR/hr)	MEASURED AT 1 METER C (mR/hr)
	A (mR/hr)		
0	2.0	1.0	.4
45	2.1	1.1	.2
90	2.4	2.2	.2
135	2.0	1.0	.4
180	1.8	1.0	.3
225	1.3	1.2	.4
270	1.9	.8	.2
315	2.0	.6	.3

Along source travel: $2 \frac{1}{2}$ 50 mR/hr - less than 10 mR/hr when averaged over 100 cm²

Average: over 24 points is 1.1 mR/hr

Protection Survey Table

Location	Rate mR/hr	Weekly Exposure in mR
North wall	.1 mR/hr	.1
West wall	not done because it is at ground level	
South Wall	.1 mR/hr	.1
East Wall	.1 mR/hr	.1
Ceiling	.1 mR/hr	.1
Floor is at grade	--	

The radiation protection survey was conducted with anthropomorphic phantom in a 30 x 30 field with the machine at a 45° angle so that the maximum amount of scatter strikes the wall.

For the ceiling and floor an anthropomorphic phantom was placed in a 30 x 30 field with the machine pointed at the floor or at the ceiling.

The weekly exposure rates were calculated by assuming the beam remains on 1 hour per week.