



# ST. MARY'S HOSPITAL

mb

3483

December 24, 1979

Mr. Francis A. St. Mary  
Material Licensing Branch  
Division of Fuel Cycle and Material Study  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

RECEIVED  
JAN 3 AM 11:01  
U.S. NUCLEAR REGULATORY COMMISSION  
MAIL SECTION

Dear Mr. St. Mary:

This is in reference to your letter dated December 6, 1979 concerning Teletherapy License No. 45-11367-01; Control No. 01321. The information requested is provided below:

1. A revised survey of the leakage radiation from the source head has been made in the off position and our new report is enclosed. These values were obtained with the collimators completely closed throughout the survey. It appears that at the time of the previous survey (our letter dated May 26, 1978), the collimators were not completely closed except when the reading at point 3 was taken. In view of the revised data, we are convinced that the average leakage radiation level will not exceed the 2 mR/hour value when an 8600 curie source is loaded into the unit. Incidentally, according to Neutron Products, Inc. from whom we will purchase the source, stated that the maximum activity of the source will be 8600 curies. We requested renewal of the license to include two sources each of 9000 curies to allow for some margin.
- 2&3. Enclosed are drawings showing the floor plan and elevation of the cobalt room and the immediate surroundings. The radiation levels expected with a 8600 curie source at various locations marked in these diagrams are as follows:

<u>Location</u>	<u>Measured Maximum Radiation Level (mR/hr)</u>	<u>Maximum Radiation level in any one hour (mR)</u>	<u>Maximum Radiation level in any seven consecutive days (mR)</u>
J	< 0.08	< 0.012	< 0.48
K	< 0.08	< 0.012	< 0.48
L	< 0.08	< 0.012	< 0.48
M	< 0.08	< 0.012	< 0.48
N	< 0.08	< 0.012	< 0.48
O	< 0.08	< 0.012	< 0.48
P	< 0.08	< 0.012	< 0.48
Q (Atrium)	4 (?)	0.6	24

All are treated as unrestricted areas.

COPIES SENT TO OFF. OF INSPECTION AND ENFORCEMENT

5801 BREMO ROAD

RICHMOND, VIRGINIA 23226

(804) 285-2011

If Q has 12mR/hr  
we expect from  
1978 survey of  
ca 0.15 hr on/h then  
12 x 0.15 = 1.8 mR in any 1 hour  
OK w/ 2/10/85 (1) JCV

30-522

8042014418 8pp.

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Teletherapy Lic #45-11367-01  
Control # 01321

The measured maximum radiation levels recorded above were obtained by direct measurement with the existing source (2239 curies) and proportionately increased to obtain projected values for the proposed 8600 curie source. They were obtained with the maximum field size and a water phantom in the beam. Thus they indicate the total leakage and scattered radiation levels. The primary beam is always intercepted by the beam stopper. Each reading was obtained with a beam orientation that results in the maximum value at that location.

The proposed 8600 curie source is expected to yield an output of approximately 230 R/min for a typical 10 cm x 10 cm field size at 80 cm SSD. This is based on the known output of 60 R/min for the existing 2239 curie source. We expect to treat a maximum of six patients in any one hour and the maximum dose per patient is about 350 rads/patient. This amounts to a maximum beam "ON" time of about nine minutes (0.15 hr) in any one hour and a maximum beam "ON" time of 360 minutes (6 hours) per week. The maximum radiation level expected in any one hour and the maximum radiation level expected in any seven consecutive days, listed in the above table are based on these beam "ON" times.

All measurements indicated in the preceding paragraphs were made with a Victoreen 471 RF survey meter, Serial #202, calibrated on November 28, 1979, against a Cs-137 standard, traceable to NBS.

- 4a) The unit has functioning interlocks to prevent operation unless (a) the entrance door is closed (b) the reset button on the control panel is pressed (c) the timer is set and (d) the head swivel is less than 4 degrees. If the door is opened and closed again, the unit will not operate unless the reset knob is pressed at the console.
  - b) Out Theratron 80 unit has interlocks that are operating to prevent head swivel by more than 4 degrees. In other words, the unit will not operate without the beam being intercepted by the beam stopper.
  5. The patient is viewed continuously by closed circuit TV. If the TV system malfunctions, patient treatments will be suspended until the TV system is repaired and functioning again.
  6. Our personnel monitoring film badges are provided by Landauer Company. Only chest film badges are worn by personnel working with Teletherapy units. They are sent to Landauer for read-out once every month.
- 7&8. The radiation monitoring and survey instruments we use are:
- a) Victoreen Model 471 RF survey meter, serial No. 202  
Minimum range: 0-1 mR/hr  
Maximum range: 0-3000 mR/hr
  - b) Victoreen Model 740 B Cutie Pie Survey meter, serial no. 1302  
Minimum range: 0-25 mR/hr  
Maximum range: 0-2500 mR/hr
  - c) Victoreen Model 493 GM Survey meter, serial no. 612  
Minimum range: 0-0.5 mR/hr  
Maximum range: 0-50 mR/hr

- d) Victoreen Model 790 Thyac III survey meter with Model 489-50  
Serial #1170 Scintillation probe  
Minimum range: 0-800 CPM  
Maximum range: 0-800,000 CPM

The above instruments are calibrated at least annually and following repair. They are checked with a check source every time used. The annual calibrations are performed in accordance with Appendix D, Calibration of Survey Instruments (NRC Guide). Further details requested are as follows:

(a.b.&c.) Calibration Sources

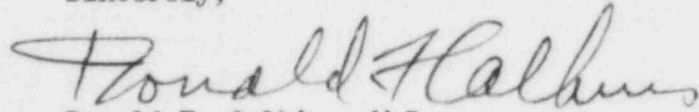
1. Nuclear Associates Model 67-82 Cs-137 source (18.6 mCi as of 2/17/79)
  2. NEN Model 206 Co-57 source (4.65 mCi as of 2/17/79)
  3. Accuracy: Plus or minus five percent.
  4. Traceability to primary standard: NBS
- d) Each scale of the instrument is calibrated at least at two points such that (a) one point is in each half of the scale and (b) the two points are separated by 35-50% of full scale. If the calibration is off by more than + 10%, a correction factor is determined and if it is off by more than + 20%, the instrument calibration is adjusted internally or sent for repair. Inverse square law and the specific gamma ray constant are used to calculate exposure rates at the distances used during calibration. Radioactive decay law is used to correct for source decay.
- e) The calibrations are performed by or under the supervision of a qualified radiation physicist. Our current consultant is Dr. Gopala Rao, Professor and Chairman of the Radiation Physics Division at the Medical College of Virginia in Richmond. He holds a Doctor of Science degree in Radiological Science from John Hopkins University, has full time association with radiation therapy departments for more than a decade and is certified by the American Board of Radiology in all branches of Radiological Physics.
9. Does not apply.
  10. The teletherapy source will be tested for leakage at intervals not exceeding six months in accordance with condition 14 of our license. The swabs will be counted in a well scintillation counter (Picker Spectrosalar III A, Model 28041. Well Counter Serial no. 959. A standard Co-60 source (NEN 0.100  $\mu$ Ci as of 5/12/79) will be used for calibrating the instrument. Tests will be performed by or under the direct supervision of a qualified consultant radiological physicist. Currently our consultant is Dr. Gopala Rao.
  11. Emergency procedures enclosed.

In addition to the above, we wish to confirm that soon after source installation, a survey report will be submitted in accordance with Appendix A of your guide for teletherapy programs. Tests will be made to determine proper operation of door interlock, on-off indicators, timing device, head swivel interlock and the on-off mechanism.

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The source is scheduled to be installed in January and we shall appreciate your prompt action in this matter. If any further information is desired, please contact our consultant physicist at (804) 786-7233 by telephone to expedite matters. Please also advise us whether or not patients can be treated until the post installation survey report is approved by you.

Sincerely,



Ronald F. Calkins, M.D.  
Chairman, Department of Radiology

RFC/crs

Enclosures

EMERGENCY INSTRUCTIONS

Cobalt Unit (AECL Theratron 80)

If the shutter fails to close after a treatment proceed as follows:

a) If the patient is ambulatory

Instruct him to get off the table and leave the room

b) If the patient is not ambulatory

Enter the room and slide the couch top so that the primary beam no longer strikes the patient. Transfer the patient to a stretcher and remove him from the room (always be careful to avoid the primary beam).

If there is difficulty in promptly removing the patient then enter the room with a special "T" bar provided and push the source to its safe position as indicated by the red mark on the bar no longer being visible. If the source will not return then close the collimators and direct the beam away from the patient before proceeding to remove him from the room.

c) Lock the door.

d) Call either:

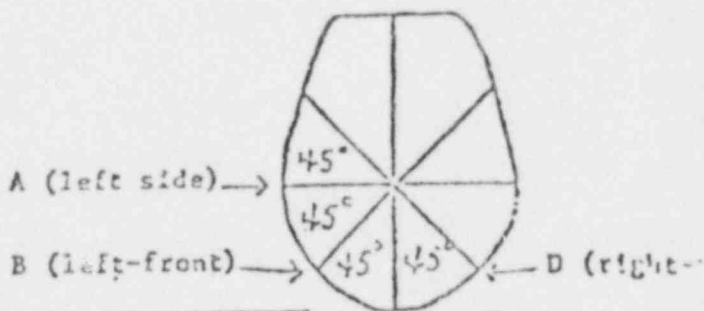
	Office	Home
Dr. Cavalcanti	281-8046	320-2097
Dr. Calkins	281-8166	272-0708
Dr. Rao	786-7233	270-0220
Dr. Reed	281-8264	740-4650



(Source in "OFF" position.  
Measurements taken one meter  
from source)

Top View - Showing orientation  
of Views A through D

Rear



Position No.	Radiation Level (mR/hr)
View A 1	0.6
2	0.2
3	1.9
4	0.1

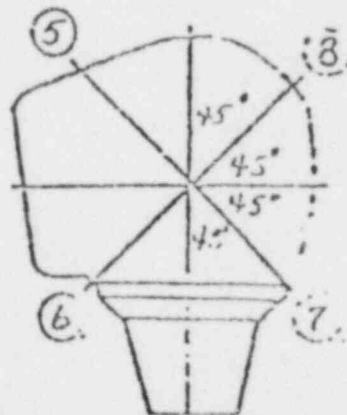
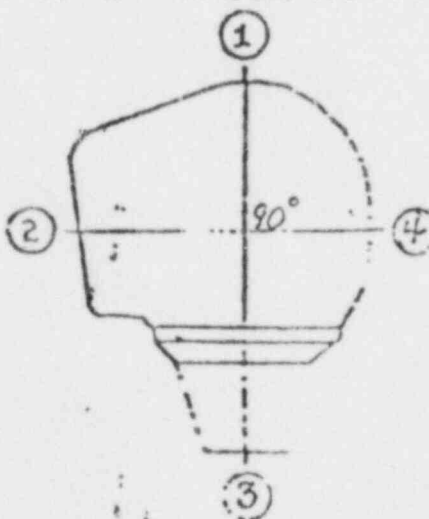
View A - Vertical from left side

C (front)

View B 5	0.2
6	0.6
7	0.5
8	0.2

View B - Vertical from left-front

View C 9	0.6
10	0.6



View D 11	0.2
12	0.3
13	0.7
14	0.5

Average value 0.51 mR/hr

Maximum value 1.9 mR/hr

View C - Vertical from front

View D - Vertical from right-front

Instrument used \_\_\_\_\_

Victoreen 471 RF \*  
Serial 202

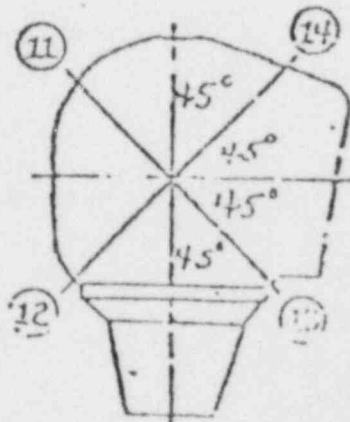
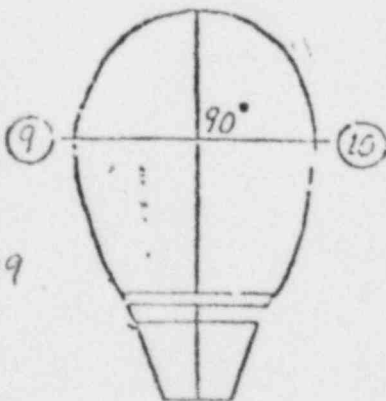
RHA 2399

Curies 2239

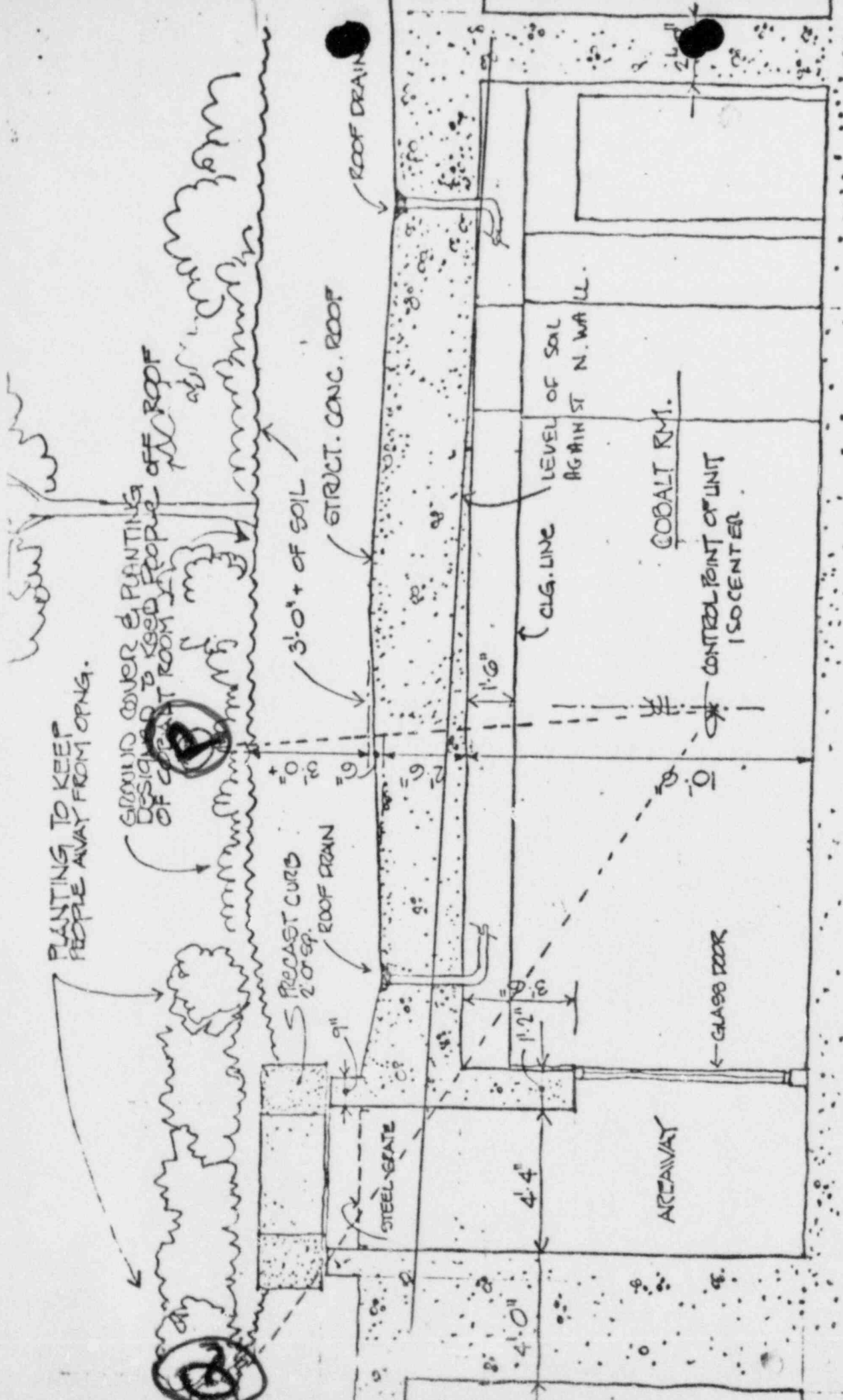
&

Date 12-17-1979

Manufacturer's name & model # of teletherapy unit AECL



calibrated on NOV 25, 1979 with NBS Traceable Cs-137 Standard



SOUTH ELEVATION OF COBALT RM.

1/4" = 1'-0"

9/24/77 BY JMN.

ST. MARYS HOSP  
RICHMOND VA.

WALKWAY  
CEILING LEVEL  
(SEE FIG-2)

(N)

CONTROL ROOM  
5'-0" x 12'-0"

3" STEEL

CCM

9" STEEL

CONTROL POINT OF VIEW

EXIT  
AREA WAY

LINE OF SIGHT

0

(R)

3

3

(5)

(K)

(L)

(7)

(M)

TO DRAIN E

