



Springfield Hospital Wesson Memorial Hospital Wesson Women's Hospital

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July 18, 1979

U.S. NUCLEAR REG
COMMISSION
GENERAL SECTION

Patricia Vacca
License Management Branch
Division of Fuel Cycle and Material Safety
US NRC, Washington, D.C. 20555

Subject: Installation of New Cobalt-60 Source in Theratron 780 (AECL)

Reference: NRC License #20-01412-03
Baystate Medical Center:SHWW Unit
Date of Expiration: July 31,1984

Dear Ms. Vacca:

A new Cobalt-60 Source was installed in Theratron-780 on July 5, 1979. The present estimated activity is 5365 curies on May 8, 1979. Refer to Attachments #1 and #2. The old Cobalt-60 source was transferred to AECL for disposal. Refer to Attachment #3.

As per requirements of our above license the following radiation surveys, leak-tests and interlock checks were completed to comply with conditions 18, 19 and 20.

I. Condition 18: Radiation surveys and tests were done on July 6, 1979 before the initiation of the treatment program on July 9, 1979.

- A) i. The fourteen point radiation survey of the source-head was done and the results of this test are shown in Attachment #4. This survey was done with the beam in "OFF" position.
- ii. The following tests were done with the beam "ON". Refer to Attachment #5. All radiation levels are within acceptable limits.
 - a) The personnel radiation exposures in excess of the prescribed limits for restricted areas are unlikely.
 - b) The radiation levels in excess of the specified limits for unrestricted areas are unlikely.
 - c) The output of the Cobalt-60 beam at the isocenter is 133.5 rads/min (Dmax). Field-size of 10 X 10 cm at 80 cm SSD.

- B) i. The tests of the electrical interlock system on the entrance door to the teletherapy room show that the interlock system is in normal operation. Refer to Attachment #6.

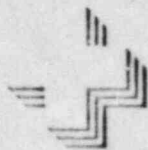
SENT TO OFF. OF INSPECTION AND ENFORCEMENT

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XA Copy Has Been Sent to PDR

no fee -
for survey
00686

HOLD



ii) The teletherapy source "ON-OFF" indicators at the source housing, above the entrance door and the control panel (located outside the treatment room) are in normal operation. The "ON-OFF" condition of the machine's primary beam is also controlled by the electrical interlock system on the entrance door.

iii) The electrical stops are installed to limit the use of primary radiation beam of Cobalt-60. The source-head can be rotated through 360° in beam "ON" mode only with the beam-stopper is in position. Further, if the head swivel is used to rotate the source head away from the beam stopper and direct the primary beam on the wall "B", the "shield-off" indicator comes "ON" and in this condition the beam cannot be turned "ON". Further, electrical stops limit the head swivel to 90° with the primary beam directed towards the wall "A" (refer to the diagram). The radiation surveys to test the integrity of the shielding of the wall "A" were done with the primary beam directed towards wall "A". Refer to Attachment #4.

iv) The teletherapy timing device was tested for its accuracy of time-intervals by comparing with the stop-watch. The timing device on the control panel is in normal operation.

C) Reports of all surveys, leak-tests and other interlock checks were sent to License Management Branch, Division of Fuel Cycle and Material Safety, US NRC, Washington, D.C. 20555 within 30 days of installation of this new Cobalt-60 Source. Copies are sent to US NRC regional compliance office and Department of Public Health, Boston, Mass.

Date of completion of installation:	July 5, 1979
Date of all the surveys, tes , etc.:	July 6-12, 1979
Date of initiation of treatment program:	July 9, 1979
Date of dispatch of reports:	July 18, 1979

II. Condition #19: This condition will be fulfilled if any changes are made in the present Cobalt-60 facility at SH-WW Unit of Baystate Medical Center.

III. Condition #20: A five year full inspection and service work was completed on July 5, 1979. Refer to Attachment #2.

IV. Other Documents: A wipe-test was done to test the leakage of new Cobalt-60 Source. Refer to Attachment #7.

A Radiation Safety Officer inspection was conducted to ensure safe operation of Cobalt-60 Unit. Refer to Attachment #8.

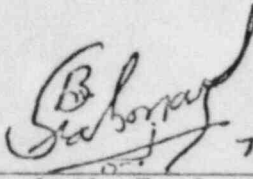


Our emergency instruction procedures were modified to include the telephone numbers of personnel listed to respond to emergency situations. Refer to Attachment #9.

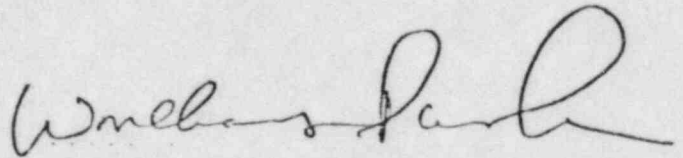
We will be glad to furnish any other information that will be required to process this exchange of Cobalt-60 Source in our Theratron-780 Unit.

Thank you.

Sincerely,

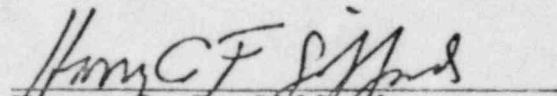
 7/18/79

Suresh M. Brahmavar, Ph.D.
Director,
Medical Physics and Radiation
Safety



Won C. Park, M.D.
Director,
Radiation Oncology Service

The above has my endorsement.


Harry C. F. Gifford
President,
Baystate Medical Center

Attachments 1 through 9

US NRC Region 1
Department Public Health

cc: Harry C. F. Gifford
Robert A. Grugan, M.D.
Gerald A. Kerrigan, M.D.
Won C. Park, M.D.
Suresh M. Brahmavar, Ph.D.
Michael R. Young



**Atomic Energy of Canada Limited
Commercial Products
SOURCE DISPOSAL CERTIFICATE**

TO WHOM IT MAY CONCERN:

This is to certify that the following source has been removed from the unit described herein, and returned to Atomic Energy of Canada Limited, Commercial Products, Ottawa, Ontario, Canada for disposal:

COBALT 60 OR CAESIUM 137 SEALED SOURCE	SERIAL NO. <i>S 1964</i>	DEPLETED URANIUM lb.	UNIT <i>T-780</i>	UNIT SERIAL NO. <i>009</i>
LOCATION OF UNIT <i>BAY STATE MEDICAL CENTER</i> <i>CHESTNUT & PRATT ST</i> <i>SPRINGFIELD, MA</i>				
Date: <i>JULY 5, 1979</i>		Signed: <i>Shall E. [Signature]</i> <small>A.E.C.L. Service Representative</small>		



**Atomic Energy of Canada Limited
Commercial Products**

INSPECTION CERTIFICATE

AUTHORIZED INSPECTION AND SERVICING OF AECL TELETHERAPY UNIT

MODEL NO. T-780 SERIAL NO. 009

TELETHERAPY SOURCE SERIAL NO. 52969 CURIES 5365 DATE MAY 8, 1979

CUSTOMER BAY STATE MEDICAL CENTER
CHESTNUT AND PRATT ST SPRINGFIELD, MA

This teletherapy unit was inspected and serviced in accordance with Atomic Energy of Canada Limited USNRC License No. 54-00300-04.

Date of Inspection JULY 5, 1979

This is to certify that the unit was inspected and serviced in accordance with the conditions of the License. Each teletherapy machine shall be fully inspected and serviced during source replacement or at intervals not to exceed five years.

By Donald E. Johnson JULY 5, 1979
Authorized Source Handler (date)

Medical Products
SERVICE/PARTS RECORD

P&S. No. & DATE 4037

REPORT No. 05 58410

Customer Order No. _____ Date _____ Tax Exemption No. _____ Service Contract No. _____ Stand-by Hrs. _____ HV. Hrs. _____

Service Req. Date _____ Date Started 7/11/75 Date Completed 7/11/75 Date Shipped _____

Equipment Location
CUSTOMER
ADD. 100

Shipping Address _____ Customer Address
STATE MEDICAL CENTER
SPRINGFIELD HOSPITAL
159 CHESTNUT ST
SPRINGFIELD, MA

Attention _____ Tel. No. _____ Attention DR BRANNAN Tel. No. _____

Description _____ Model No. _____ Serial No. _____

Service Requested INSTALLED NEW CO 60
STRAP, PERFORMED SWIPE
TEST, 5/12 DISPOSITION
SERVICE
LABOUR

Invoicing Information
Travel Expenses Invoiced as Incurred
On-Site Labour | Standard | O/Time |
Travel Hours | Standard | O/Time |
Re-stock/Other Charges _____
Freight & Delivery Charges _____
Sales/Use Taxes _____
Locally Purchased Parts _____

Service Performed CO 1178
PARTS

Parts Used		Quantity	Part Number	Description	Unit Price	Total

Recommendations _____

Type of Service
Service Call Billed Not Billed
Installation
Service Contract
Warranty Labour
Other 00686

Service Rep. _____

REPORT OF TELETHERAPY TESTS AND SURVEYS

Licensee Baystate Medical Center: SH-WW Unit
 Address 759 Chestnut Street, Springfield, Massachusetts 01107
 License # 20-01412-03: Date of Expiration: July 31, 1984
 Date: July 6, 1979

TELETHERAPY TESTS

Yes The interlock on the door(s) to the teletherapy room was tested and found to function properly. When a door was opened with the source "ON", the source returned to the "OFF" position and could not be turned "ON" again until the door was closed and the system reset at the control panel.
 No

Yes The teletherapy source "ON-OFF" indicators, both at the source housing and on the teletherapy machine control panel, were tested and found to function properly.
 No

Yes The teletherapy treatment timing device was tested and found to be accurate and to return the source to the "OFF" position when the preset time elapsed.
 No

Yes Electrical and/or mechanical stops installed to limit the orientation of the teletherapy head with the source "ON" were tested and found to function properly. The limitations are:

- The rotation 360° permitted with beam stopper in place.
- If the source-head was off the beam stopped, the "shield-off" indicator turned "ON". In this condition beam cannot be turned "ON". The source-head can be rotated from floor to 90° with primary beam directed towards wall "A". If turned beyond 90°, the "shield-off" indicator comes "ON". Beam cannot be turned "ON".

TELE THERAPY HEAD SURVEY

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

Source: S2969 (1.5 cm) AECL type C146
Date: July 6, 1979

Top View - Showing orientation
of Views A through D

Position No.	Radiation Level (mR/hr)
View A 1	0.4
2	1.2
3	0.6
4	0.3

View B 5	1.1
6	1.4
7	0.5
8	0.4

View C 9	0.8
10	0.7

View D 11	0.2
12	0.4
13	1.2
14	0.9

Average value 0.72

Maximum value 1.4

Instrument used Victoreen

Panoramic

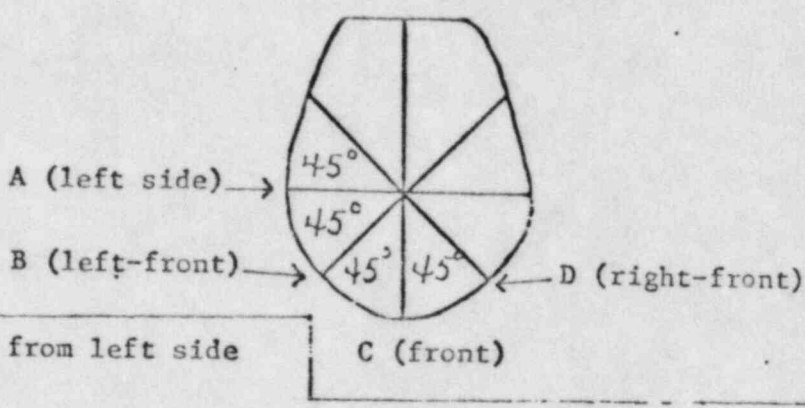
Curies 5365 Ci (May 8, 1979)
&
Date _____

Manufacturer's name & model #
of teletherapy unit Theratron 780 (AECL)

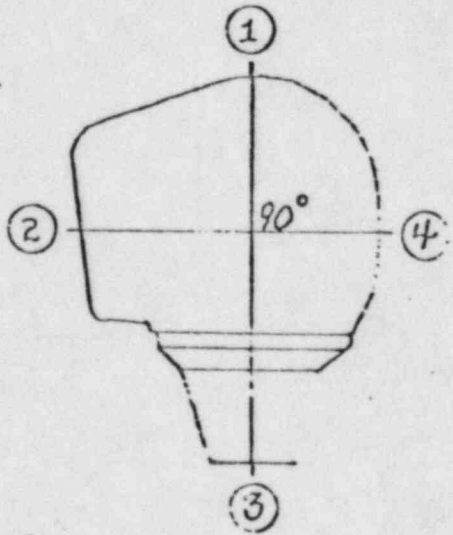
Location: Baystate Medical Center: SH-WW Unit
Springfield, Massachusetts 01107

Survey Done By: Suresh M. Brahmavar, Ph.D.

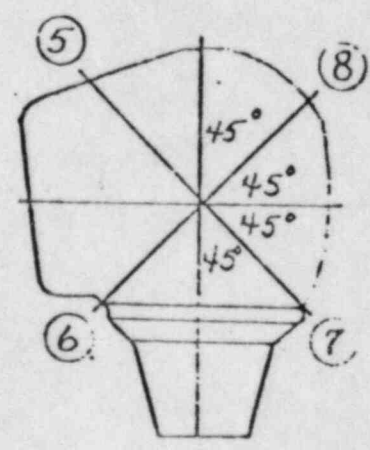
Rear



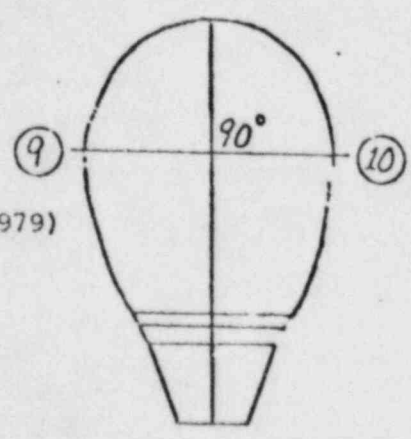
View A - Vertical from left side



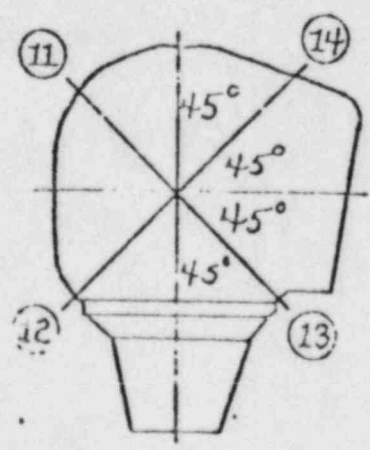
View B - Vertical from left-front



View C - Vertical from front



View D - Vertical from right-front



RADIATION SURVEYS OF RESTRICTED AND UNRESTRICTED AREAS.

- I. Cobalt-60 Room (Ground Level)
- II. Basement Room (B-Level)
- III. Patient Rooms (First Floor)

Unit: Theratron 780 (AECL)

Location: Baystate Medical Center: SH-WW Unit
 759 Chestnut Street
 Springfield, Massachusetts 01107

License No.: 20-01412-03. Date of Expiration: July 31, 1984

Source: Cobalt-60; 1.5 cm; AECL type C-146; S2969

Nominal Loading Capacity of the Co-60 Facility: 6000 Curies

Present Loading: 5365 Curies as of May 8, 1979

Survey Instrument: Victoreen Panoramic: Model 470 A; S225

Date of Survey: July 6, 1979

Method: The radiation levels were measured (in mr/hr) on the most sensitive range of the above survey meter. Repeated measurements were made at the locations indicated by numerals on the enclosed floor plans. The measurements were repeated to include all the routine treatment conditions with the beam "CN" and with the phantom. During these measurements the Cobalt-60 machine was operated in 360° rotational mode; fixed distances and with the source head rotated to 60° and 89° to direct the primary beam to wall "A" (see the enclosed diagram).

The survey points were very close to the walls and at a height of 4 feet from the floor for the Cobalt-60 Room (Ground Level). For the Basement Room, the survey points were very close to the wall and about 4 feet from the ceiling. For the Patient Rooms (First Floor), these points were close to the walls on either side and close to the floor of the rooms. The collimeters were opened to give a field size of 25 x 25 cm at 80 cm SSD.

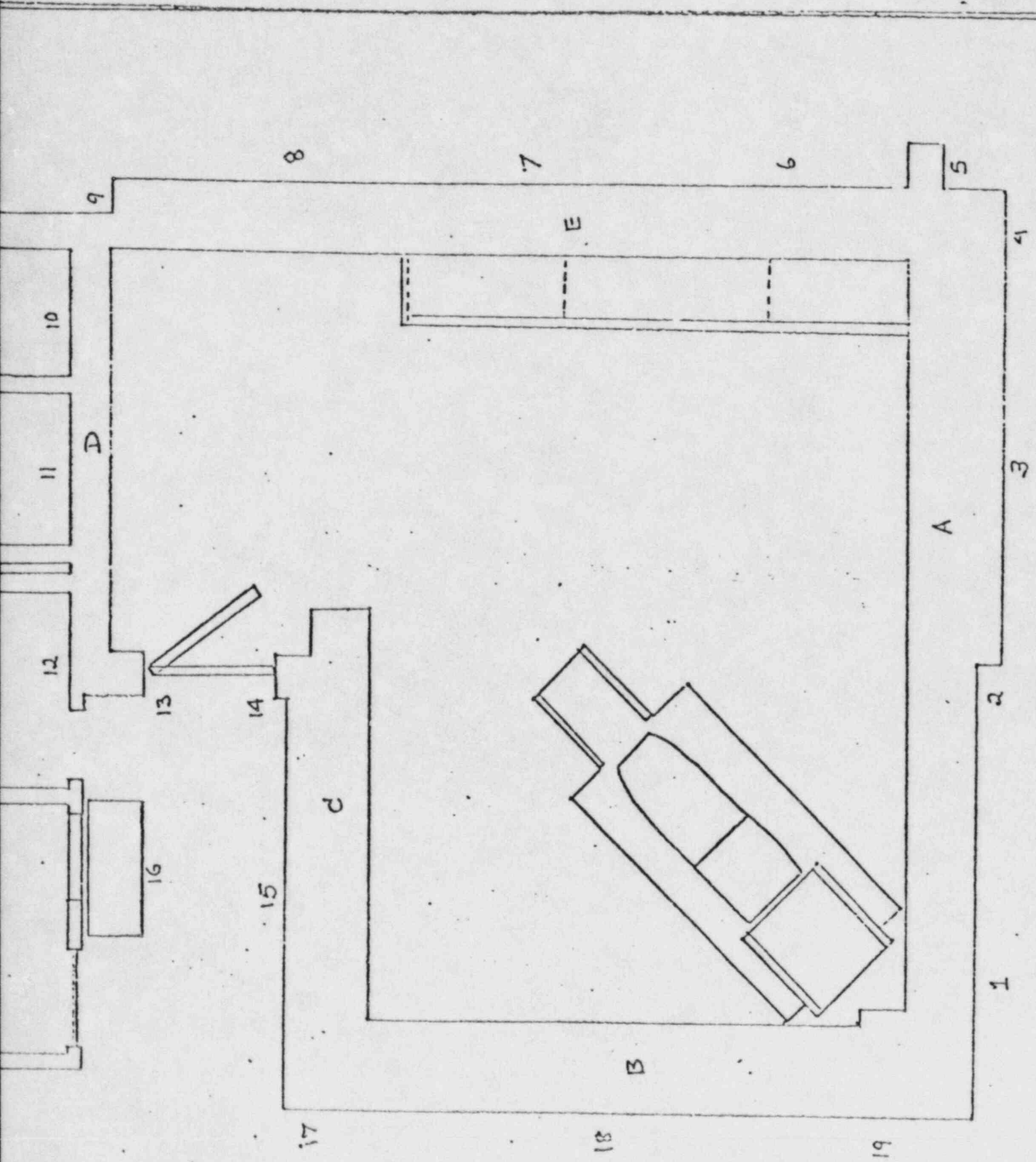
Results:

LOCATION	SURVEY POINTS	ESTIMATED EXPOSURE
I <u>Cobalt-60 Room:</u> (Ground Level)	All the survey points from 1 through 20 in rotational mode and fixed mode. Survey points 2, 3 & 4 when the source-head was rotated 60° & primary beam directed to wall "A". Estimated operation in this mode is <u>2 hr/wk</u>	No measurable radiation levels detected. pt: 2:0.5 mr/hr pt: 3:0.9 mr/hr pt: 4:0.3 mr/h The max. exposure would be <u>1.8 mr/wk.</u>

LOCATION	SURVEY POINTS	ESTIMATED EXPOSURE
II <u>Basement Room:</u> (Basement)	Survey points 21 through 28 in all three modes.	No measurable radiation levels detected.
III <u>Patient Rooms:</u> (First Floor)	Survey points 29 through 55 in all three modes.	No measurable radiation levels detected.

Results: The radiation levels do not exceed the limits specified in Section 20.101, and 20.105(b), Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation" (10CFR20).

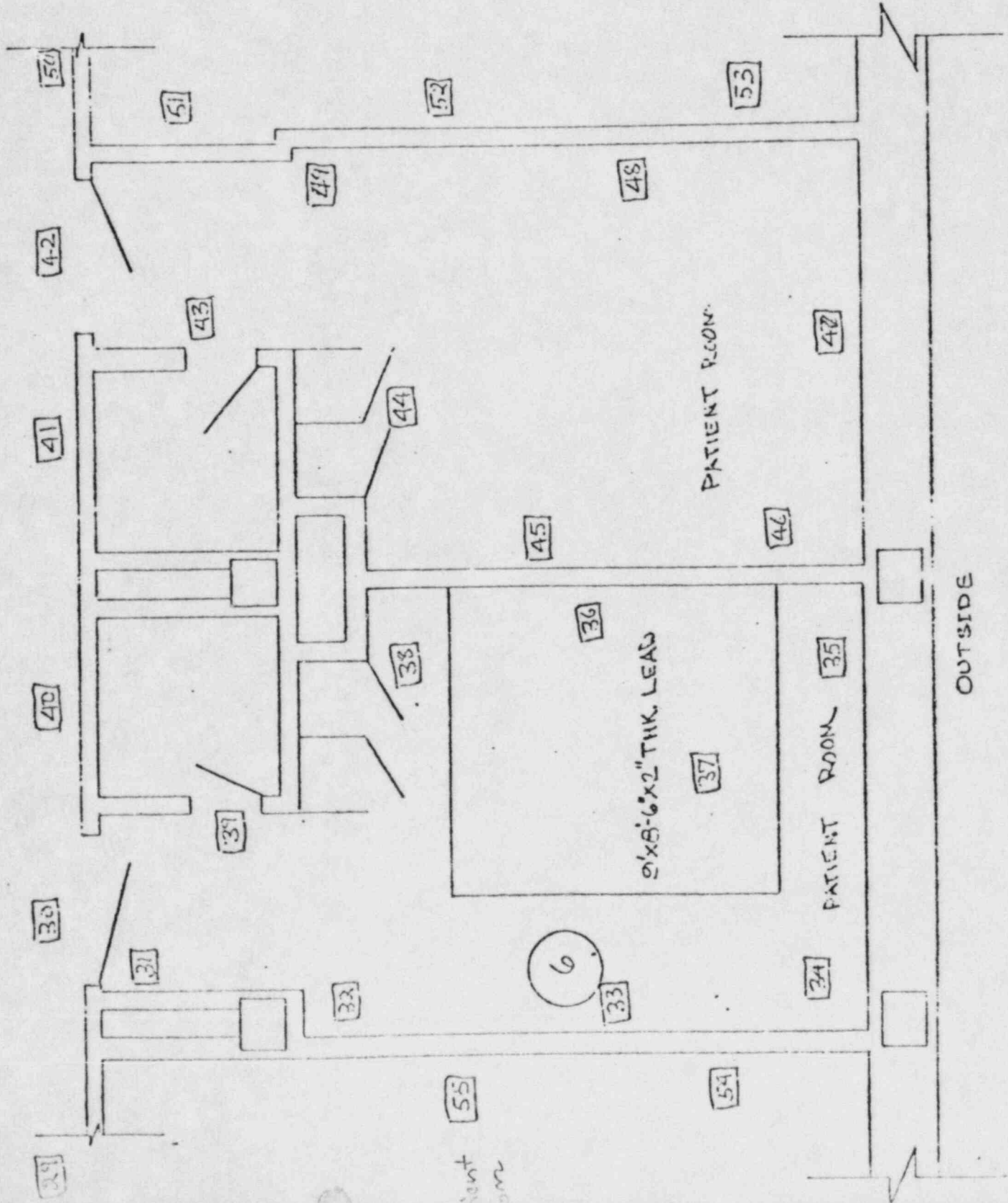
Survey By: Suresh M. Brahmavar, Ph.D.
Director
Medical Physics and Radiation Safety



COBALT-60 RGN - GROUND LEVEL

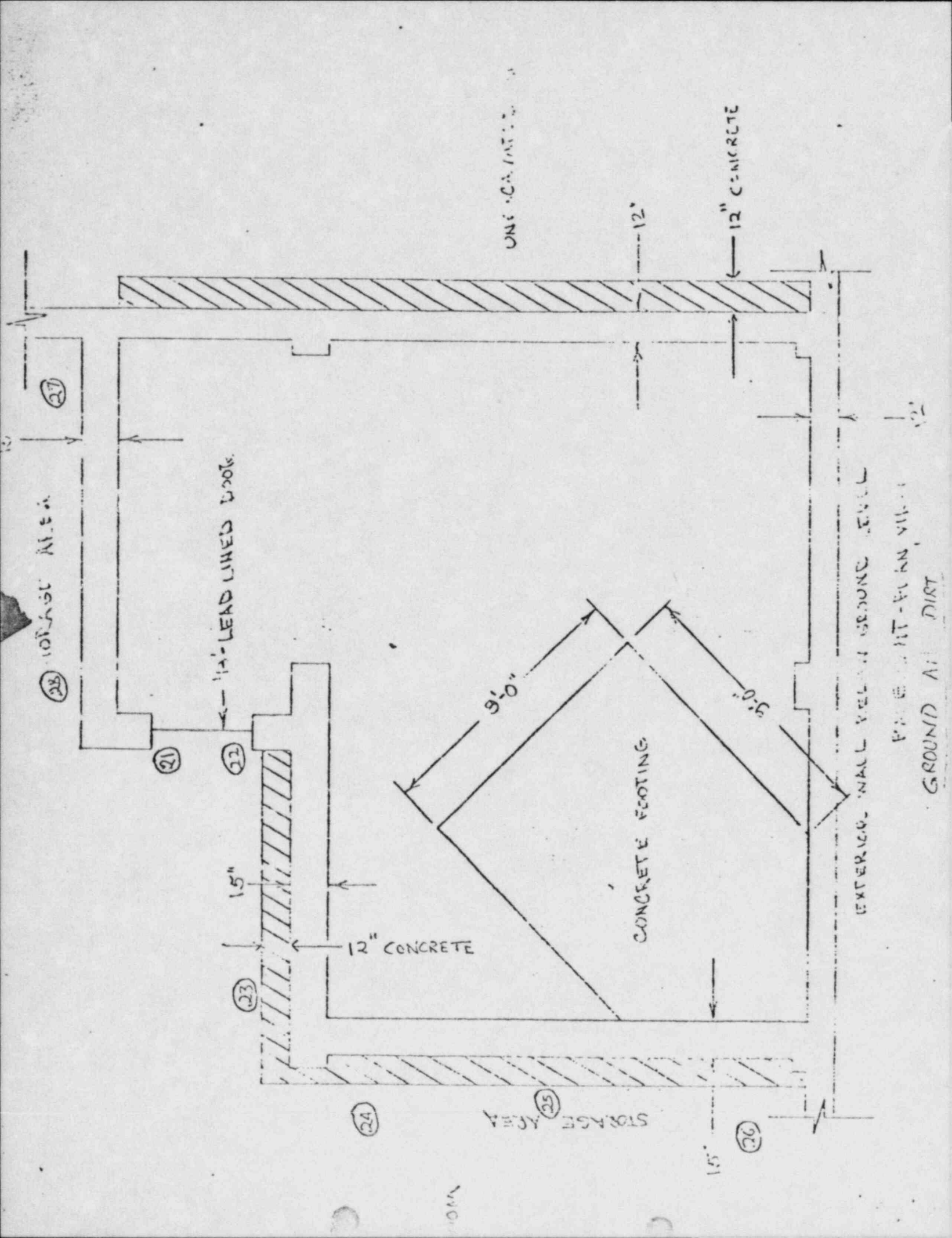
CORRIDOR

Patient Rooms



OUTSIDE

1ST FLOOR - PLAN VIEW



BAYSTATE MEDICAL CENTER

INTERLOCK TESTS: COBALT-60 FACILITY

SH-WW Unit WM Unit NRC License No.: 20-01412-03 Machine: Theratron-780
 New Source: July 5, 1979

The following interlock tests are done periodically (every month) and report entry made for record keeping:

1. THE DOOR-INTERLOCK TEST:

If the entrance door is opened during the exposure when the beam condition is "ON" (as indicated by red-light above the entrance door and the control console outside the door), the source returns to "OFF" position and exposure is terminated (as indicated by the safe-light above the entrance door and on the control console outside the door).

2. THE SOURCE-INTERLOCK TEST:

The exposure can be terminated manually at any time during the exposure. The exposure is automatically terminated at the end of pre-set time on the control console. The beam "ON" condition can be achieved only after the unit is "RESET" at the control console. The light indicators are in normal operation.

3. THE WARNING INTERLOCK TEST:

A radiation monitor is installed inside the room. This radiation monitor gives a warning audio signal and red-light when the radiation level in the area of the monitor (in the room) goes above 5 mR/hr. This system warns the personnel of existence of radiation area in the event the source stays out because of some malfunction in the source mechanism. This system is tested by a vial of Tc-99m activity (borrowed from Nuclear Medicine) carried in a lead container.

All the three (3) interlock tests are conducted by RSO or his Designee.

DATE OF TEST	TEST I.D.			RESULTS and REMARKS	SIGNATURE
	1	2	3		
Jan. 26, 1979	X	X	X	Normal operation	<i>[Signature]</i>
Feb. 22, 1979	X	X	X	Normal operation	<i>[Signature]</i>
Mar. 23, 1979	X	X	X	Normal operation. 5 year inspection.	<i>[Signature]</i>
Apr. 25, 1979	X	X	X	Normal operation	<i>[Signature]</i>
May 25, 1979	X	X	X	Normal operation	<i>[Signature]</i>
June 28, 1979	X	X	Adj	Normal operation after adjustment of 3	<i>[Signature]</i>
July 9, 1979	X	X	X	Normal operation. New Source	<i>[Signature]</i>

Return this form to: SURESH M. BRAHMAVAR, PH.D.
 Director
 Medical Physics & Radiation Safety Service

WIPE TEST: COBALT-60 UNIT

SH-WV Unit License No. 20-01412-03 Machine Theratron-780: Cobalt 60 WM Unit
New Source: July 5, 1979

Location: 759 Chestnut Street, Springfield, Mass. 01107

Date of Test: July 12, 1979

Method: Cotton swabs were moistened with EDTA solution and areas as described below were wiped for removal of any possible activity in the surrounding areas of Cobalt-60 unit and the room. These wipes were then counted in a well-counter (NaI) coupled to automatic gamma counting system. The various area wipe counts were compared with counts due to a known activity of Cobalt-60 standard. The following are the data and results.

WIPE AREA	DESCRIPTION OF AREA	COUNTS/ <u>4</u> MIN.	ACTIVITY IN μ CI
1	Room background (counting system)	10	Background
2	Collimators and Trimmers inside of collimators	8	None
3	Collimator control knobs	8	"
4	Source port area	9	"
5	Treatment table surface	13	"
6	Floor area at the Tech's location	4	"
7	Lead blocks and shield plate	12	"
8	Treatment table controls	16	"
9	Entrance door knobs, etc.	6	"
10	Cobalt-60 unit console knobs (outside the room)	8	"
11	Technician's desk area	10	"
12	Activity of Cobalt-60 std.	62448	0.101 uci as of 4-19-78

RESULTS Negative, No leakage of source.

DATE OF NEXT TEST: January 12, 1980 TEST DONE BY: Dr. Brahmavar

Radiation Safety Officer:  Date: July 16, 1979

Return this form to: SURESH M. BRAHMAVAR, PH.D.
Director
Medical Physics & Radiation Safety Service

00686

Baystate Medical Center: SH-WW Unit, Dis # 20-01412-03

RAIPE TEST COBALP-60 TEST SOURCE JULY 12, 1979

Theratom - 780 : AECL C-146

RAIPE TEST	COBALP-60	TEST SOURCE	JULY 12, 1979
196	400	62443	324252
197	400	10	349
173	400	9	346
192	400	8	340
	400	9	331
1	400	13	339
2	400	4	317
3	400	12	336
4	400	16	317
5	400	6	355
6	400	8	342
7	400	10	326

Co 60 STD : 0.101 μ Ci : 4-19-78
1 Background

S-2969 (15cm)
5365 Ci as of
May 8, 1979

Date Installed: July 5, 1979

Date of Test: July 12, 1979

Result: Negative.

[Signature] 7/13/79

RADIATION SAFETY OFFICER INSPECTION: RADIATION THERAPY

SH-WW Unit
 WM Unit
 Machine: Theratron-780: Co-60
 NRC License No. 20-01412-03

ITEM	DESCRIPTION OF ITEMS INSPECTED BY RSO	YES	NO	N.A.
A	Source condition indicated at control console	x		
B	Variable field-size available	x		
C	Field collimation and trimmers accurate	x		
D	Electrical interlock system adequate	x		
E	Cumulative timer can be reset manually	x		
F	Timer terminates exposure	x		
G	Patient and control panel observed simultaneously	x		
H	Patient-Operator communication available	x		
I	Radiation area sign posted	x		
J	Primary beam shield available	x		
K	Control panel locked when not in use	x		
L	Therapy room locked when not in use	x		
M	Therapeutic type protective source housing	x		
N	Primary and secondary barriers adequate	x		
O	Operator protection adequate		x	
P	Beam monitoring device available	x		
Q	Radiation monitoring device available	x		
R	Emergency procedures posted for use	x		
S	Personnel radiation monitors used	x		
T	Operators instructed of emergency procedure Frequency: <u>Semi-annual</u> Date of last instruction: <u>July 11, 1979</u>	x		
U	Full calibration of therapy unit done Frequency: <u>Quarterly</u> Date of last calibration: <u>July 9, 1979</u>	x		
	Spot check of out put done Frequency: <u>Monthly</u> Date of last spot check: <u>July 16, 1979</u>	x		
V	Leak test of therapy source done Frequency: <u>Semi-annual</u> Date of last test: <u>July 12, 1979</u>	x		
W	Radiation survey of surrounding areas done Frequency: <u>Semi-annual</u> Date of last survey: <u>July 6, 1979</u>	x		
X	Dcor interlocks tested Frequency: <u>Monthly</u> Date of last test: <u>July 9, 1979</u>	x		
Y	Source interlocks tested Frequency: <u>Monthly</u> Date of last test: <u>July 9, 1979</u>	x		
Z	Integrity of shielding blocks tested Frequency: <u>Semi-annual</u> Date of last test: <u>June 28, 1979</u>	x		

Items of Non-Compliance: None
 Date of Corrective Action: _____ Date of RSO Inspection: July 16, 1979
 Date of Last NRC Inspection: March 6, 1979 Date of Next Inspection: August 16, 1979
 Date of Last DPH Inspection: January 27, 1978 Remarks: _____
 Date of Last JCAH Inspection: April 3, 1979

Radiation Safety Officer: *Suresh M. Brahmavar* Date: July 17, 1979

Return this form to: **SURESH M. BRAHMAVAR, PH.D.**
 Director
 Medical Physics & Radiation Safety Service

EMERGENCY INSTRUCTIONS TO OPERATOR

IN CASE OF POWER FAILURE OR IN THE EVENT THE SHUTTER FAILS TO CLOSE AT THE END OF A TREATMENT OR ANY MALFUNCTION OF THIS MACHINE FOLLOW THE FOLLOWING PROCEDURES.

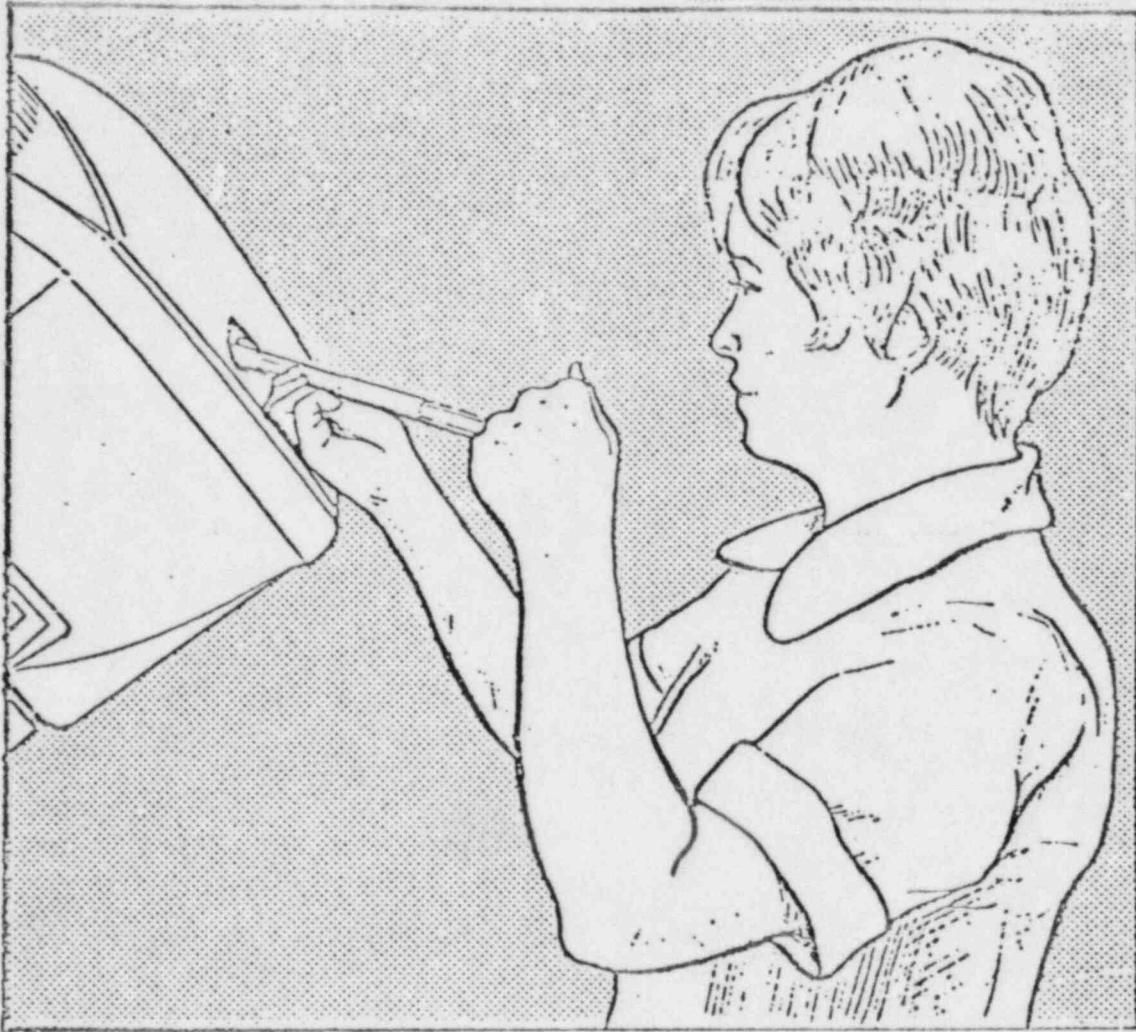
1. TURN "OFF" THE MACHINE AT THE CONTROL.
2. IF THE SOURCE IS STILL "ON" AND THE PATIENT IS AMBULATORY OPEN THE TREATMENT ROOM AND DIRECT THE PATIENT TO LEAVE THE ROOM.
3. IF THE PATIENT IS NOT AMBULATORY, ENTER THE ROOM AND RETURN THE SOURCE TO THE "OFF" POSITION BY MEANS OF THE EMERGENCY T-BAR. BE SURE TO AVOID THE PRIMARY BEAM OF RADIATION. REMOVE THE PATIENT FROM THE TREATMENT ROOM.
4. CLOSE AND LOCK THE TREATMENT ROOM DOOR. CALL RADIATION SAFETY OFFICER.
5. POST A LEGIBLE AND CLEARLY VISIBLE SIGN WARNING OTHERS OF THE EXISTING EMERGENCY CONDITIONS.
6. NOTIFY R. A. GRUGAN, M.D. OR WON C. PARK, M.D. OR SURESH M. BRAHMAVAR, PH.D.

DO NOT ATTEMPT TO CORRECT OR INVESTIGATE ANY MALFUNCTION OF THE UNIT.

WON C. PARK, M.D.
DIRECTOR
RADIATION THERAPY SERVICE

SURESH M. BRAHMAVAR, PH.D.
RADIATION SAFETY OFFICER

USE OF EMERGENCY T-BAR



This bar is kept near the control panel outside the treatment room and can be used to push the source drawer back into the retracted, safe position. To manually retract the source drawer, use the following procedure:

1. Obtain the emergency T-bar from its location.
2. Insert the end of the T-bar over the red beam condition indicator rod and through the source-head cover.
3. Apply firm pressure to the T-bar and push the source drawer back into the safe position.

NOTE:

1. The source is not in the fully safe condition unless the amber coloured portion of the T-bar is entirely inside the source-head cover. In the fully safe condition, the external radiation fields are at normal levels and repairs can be carried out. The source can be considered relatively safe if none of the red portion of the T-bar is visible.