

ST. LUKE'S HOSPITAL OF KANSAS CITY

Application for Renewal of NRC Teletherapy License No. 24-00889-02

1. Name and Address of Licensee:

St. Luke's Hospital of Kansas City  
Radiology Department  
Wornall Road at Forty-fourth  
Kansas City, Missouri 64111

2. License Number to be renewed: 24-00889-02

3. Names of Individual Users:

Joe Lee Rector, M.D.  
Gerhard W. Schottman, M.D.  
Donald R. Germann, M.D.  
(Same as listed in item 12 of the license)

4. The Manufacturer's name and model number of the teletherapy unit and source are the same as listed in item 9A of amendment No. 2 and item 7A of amendment No. 5 to our license; that is: AECL Theratron 80 Teletherapy Unit and Teletherapy sealed sources AECL C-146 or C-151 or Neutron Products, Inc. Model NPI-20-6000W.

5. The possession limit is the same as listed in item 8 of amendment No. 5 to our license; that is: 13,400 curies (2 sources of not more than 6,700 curies each).

6. The mechanical and/or electrical beam stops that are operational and restrict beam orientation are reviewed in Annex A.

7. Patient Viewing System:

A closed circuit television system is in position to view the patient during treatment. As a backup system, there is a mirror and a viewing window in the therapy room door. With maze shielding in the treatment room, only photons scattered at least twice could reach the door. While the actual thickness and density of the glass is not readily apparent, the room survey, done in 1970 after the source change, demonstrated that radiation levels on the exit side of the viewing window were acceptable.

7905300643

12 pp Release From hold

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## 8. Personnel Monitoring Devices:

Searle Diagnostics, Inc., Health Physics Services, provides clip-on film badges for all occupationally exposed personnel to determine "whole body and skin" x-, gamma and beta dose. Badges are changed and reported monthly.

## 9. Radiation Survey and Monitoring Instruments:

The Radiation Therapy Section has two portable radiation survey meters which are located within the area.

- a) Victoreen Model 490 Thyac III with Model 489-35 GM Probe which is capable of detecting Alpha, Beta, Gamma and X-ray with a window thickness of  $1.4 \text{ mg/cm}^2$ . This meter has the following ranges:

- |      |                 |   |
|------|-----------------|---|
| i)   | 0 - 800 cpm     | (0 - 0.2 mR/hr)                               |
| ii)  | 0 - 8,000 cpm   | (0 - 2.0 mR/hr)                               |
| iii) | 0 - 80,000 cpm  | (0 - 20 mR/hr)                                |
| iv)  | 0 - 800,000 cpm | - not accurate for exposure rate measurements |

- b) Victoreen Model 470 Panoramic Survey Meter with unsealed air ionization chamber which is capable of detecting Alpha (greater than 8 MeV), Beta (greater than 120 KeV), Gamma and X-ray with a window thickness of  $17 \text{ mg/cm}^2$ . This meter has both a rate and integrate mode and has the following exposure rate ranges:

- |      |          |       |     |      |
|------|----------|-------|-----|------|
| i)   | 0 - 3    | mR/hr | and | R/hr |
| ii)  | 0 - 10   | mR/hr | and | R/hr |
| iii) | 0 - 30   | mR/hr | and | R/hr |
| iv)  | 0 - 100  | mR/hr | and | R/hr |
| v)   | 0 - 300  | mR/hr | and | R/hr |
| vi)  | 0 - 1000 | mR/hr | and | R/hr |

Both survey meters are calibrated annually and each is equipped with a long-lived check source which is read:

- i) Before each use
- ii) After each maintenance and/or battery change
- iii) At least quarterly

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## 10. Calibration of Survey Meters:

The two radiation survey meters will be calibrated annually in accordance with Appendix D, Section I, "Methods for Calibration of Survey Meters, Including Procedures, Standards and Frequency", which was provided with "Licensing Guide for Teletherapy Programs". A known gamma radiation field produced by radium needles manufactured by Radium Chemical Company or cesium-137 tubes manufactured by 3M Company will be used to calibrate the meters. Source strengths and distances will be varied to provide readings at approximately 1/3 to 2/3 of full scale for both instruments on all mR/hr scales up to and including 0 - 1000 mR/hr scale for the Model 470 Panoramic Survey Meter. It has been determined that the 0 - 200 mR/hr scale for the Thyac III is not really dependable - probably due to G-M tube dead time. This scale has been marked out of service with a note to use the Model 470 survey meter should exposure rates exceed 20 mR/hour. Typical known gamma radiation fields range from 0.067 mR/hr at 350 cm from a 1 mg Ra-226 needle to 627 mR/hr at 50 cm from 190 mg Ra-226. The annual calibrations are performed by the hospital radiation physicist (who is designated the radiation safety officer):

Peter J. Debus, M.S.  
Certified in Radiological Physics  
By the American Board of Radiology  
December, 1978

As mentioned in item 9, each instrument is equipped with an operational check source, which is to be used before each use. After each maintenance and/or battery change and at least quarterly, the instrument will be checked with its source. If any subsequent check source readings are not within  $\pm 20\%$  of the check source reading obtained at the time of annual calibration, that instrument will be recalibrated.

## 11. From time to time, this annual calibration may be performed by:

Frank Comer, Consulting Physicist  
Pharmaco Nuclear, Inc. License No. 24-16617-01 MD  
1734 East 63rd Street, Suite 214  
Kansas City, Missouri 64110

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## 12. Semi-annual Leak Test of the Teletherapy Source:

The Co-60 teletherapy source is tested for leakage every six months by the hospital radiation physicist, Peter J. Debus, whose office is located in the radiation therapy section of the hospital.

A cotton swab is rubbed along the walls of chamber through which the source drawer rides and against the collimator jaws. The cotton swab is then placed in a test tube and counted in a Picker Spectroscaler IIA with well counter (2804) containing a 2" by 1 3/4" sodium iodide crystal. The Gain is set at 1, the lower level discriminator is set at 650 and the window is NOT set (OUT). A Cesium-137 source from Picker (0.8 - 1.0 uCi in 1969) is used as a standard and is currently giving approximately 100,000 counts per minute. While it is recognized that the counting efficiency of the spectroscaler will be different for the Co-60 gamma rays, the open window in the discriminator circuit assures adequate sensitivity to detect 0.005 uCi, let alone the allowable limit of 0.05 uCi contamination.

## 13. Emergency Procedures:

A copy of the emergency procedures, which are posted at the console, is enclosed as ANNEX B.

## 14. Conditions 18 and 19 of our teletherapy license have been noted and survey reports have been and will continue to be submitted in accordance with those conditions and the guidance provided by Appendix A "Teletherapy Survey Reports".

Applicant or Certifying Official (Signature)

NAME James H. TaylorTITLE Assistant DirectorDATE April 26, 1979



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ANNEX A

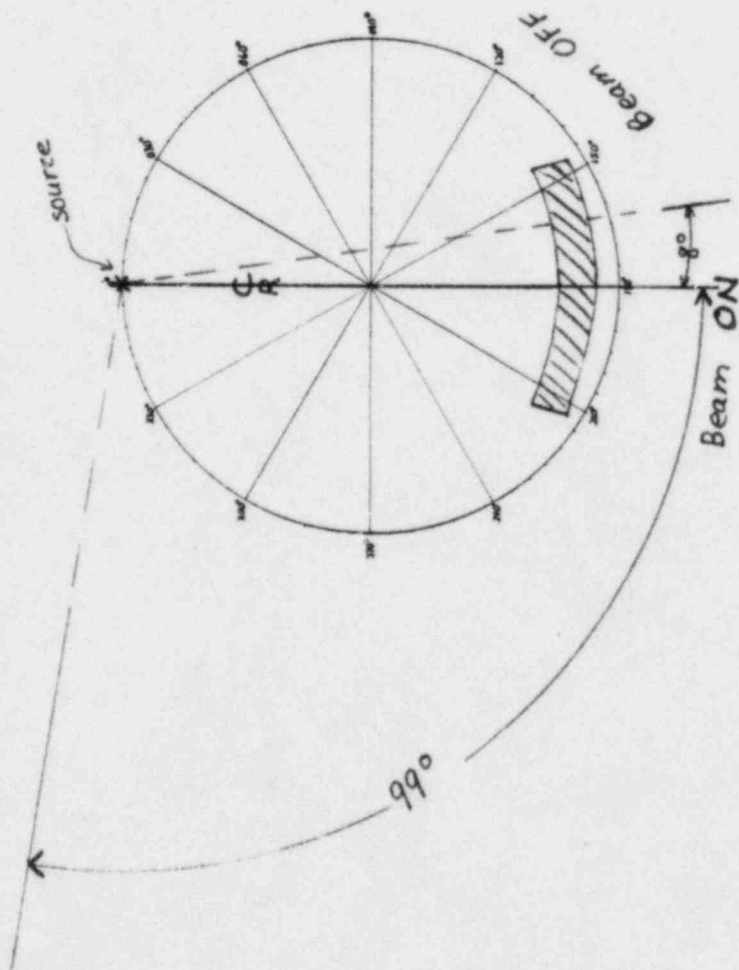
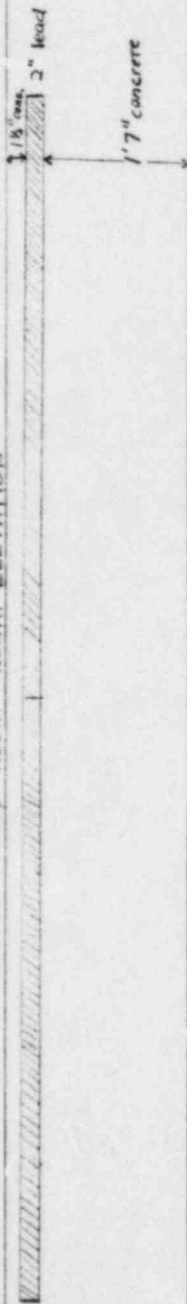
Item 6. The Mechanical and Electrical Beam Stops that are operational and restrict beam orientation.

The mechanical beam stop is integral with the Theratron-80 and is designed to intercept the primary beam and subtends an angle of  $31^{\circ}$  ( $15.5^{\circ}$  either side of the central ray when the head swivel angle is  $0^{\circ}$ ). The beam stop would intercept the entire primary beam for a collimator setting of 30 cm x 30 cm even if the head were swiveled  $5^{\circ}$  either side of center. The position of the beam stop is such that it would intercept scattered radiation emerging from the isocenter at  $35^{\circ}$  either side of the central ray when the head swivel angle is  $0^{\circ}$ .

Enclosure 1, containing 4 pages, demonstrates several beam orientations and the limits of the electrical beam stops. The primary beam is limited to the beam stop with provision for OFF beam stop radiation only when the primary beam is directed to the floor (vertical) or toward the WEST wall (which is well shielded by 40 inches of concrete) at various angles up to  $100^{\circ}$  from vertical ( $10^{\circ}$  above horizontal when the source head is closest to the West Wall).

Enclosures 2 and 3, which had been included in our report of survey dated June 18, 1978, are attached to help clarify location and orientation of our teletherapy unit.

COBALT 60 TELETHERAPY ROOM NORTH ELEVATION



← WEST WALL  
← To Corridor to Cafeteria

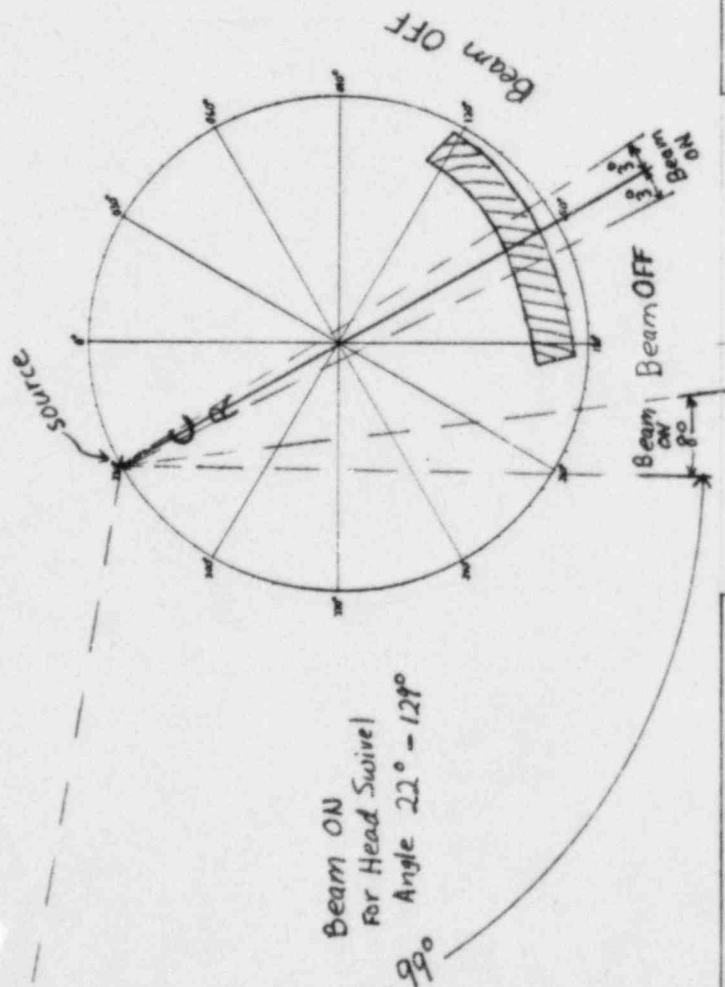
→ EAST WALL  
→ To Radium Storage Room  
(Hot Lab)

Approximate Scale: 1.0 cm = 250 cm



ENCLOSURE 1 TO ANNEX A

COBALT 60 THERAPY ROOM NORTH ELEVATION



WEST WALL  
To Corridor to Cafeteria

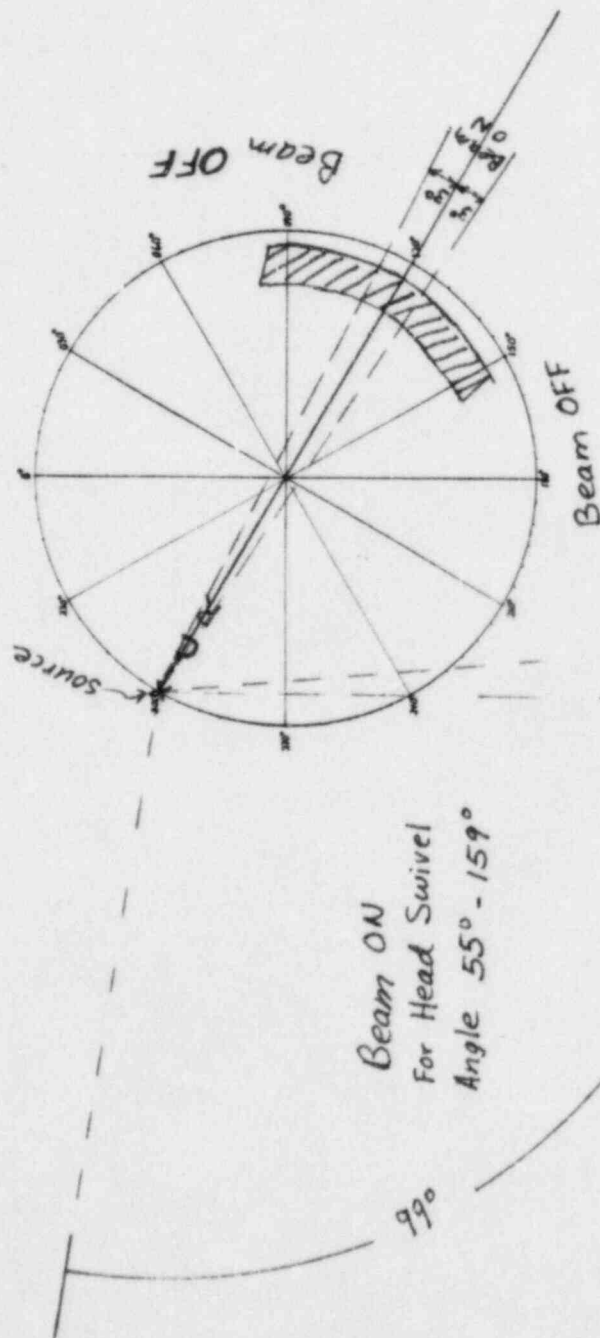
EAST WALL  
To Radium Storage Room  
(Hot Lab)

Approximate Scale: 1.0 cm = 25.0 cm



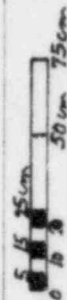
ENCLOSURE 1 TO ANNEX "A"

COBALT 60 THERAPY ROOM NORTH ELEVATION



WEST WALL  
→ Corridor to Cafeteria

EAST WALL  
→ Radium Storage Room  
(Hot Lab)

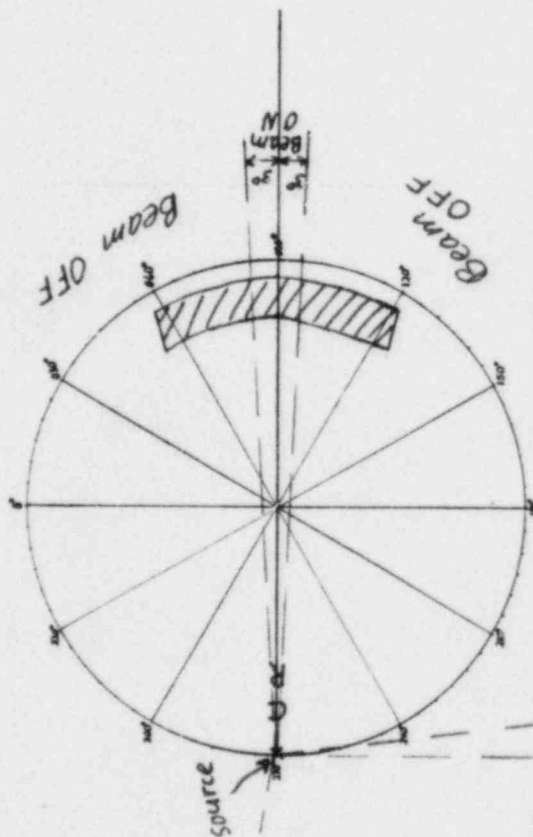
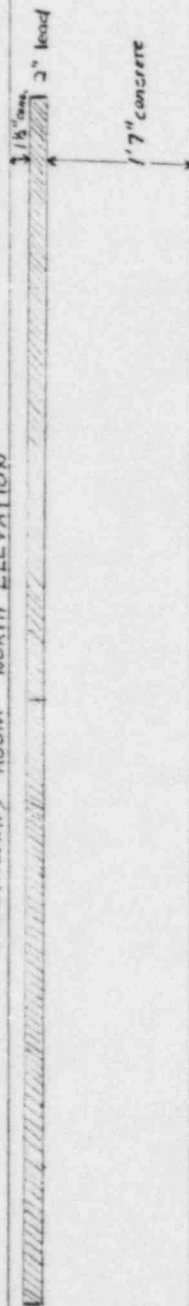


Approximate Scale: 1.0 cm = 25.0 cm

ENCLOSURE 1 TO ANNEX "A"



COBALT 60 TELETHERAPY ROOM NORTH ELEVATION



Beam ON  
For Head Swivel  
Angle 83° - 190°

EAST WALL  
→ To Radium Storage Room  
(Hot Lab)

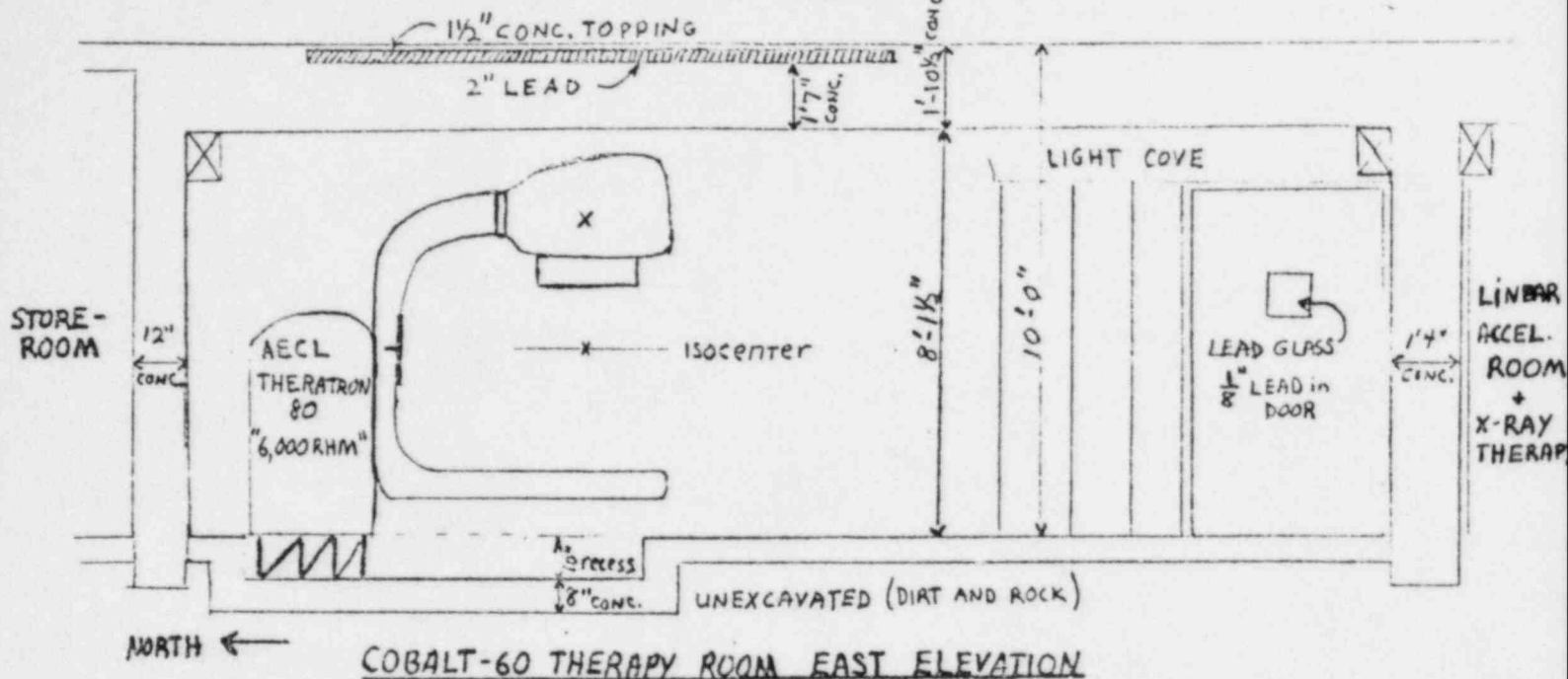
← WEST WALL  
← To Corridor to Cafeteria

ENCLOSURE 1 TO ANNEX "A"

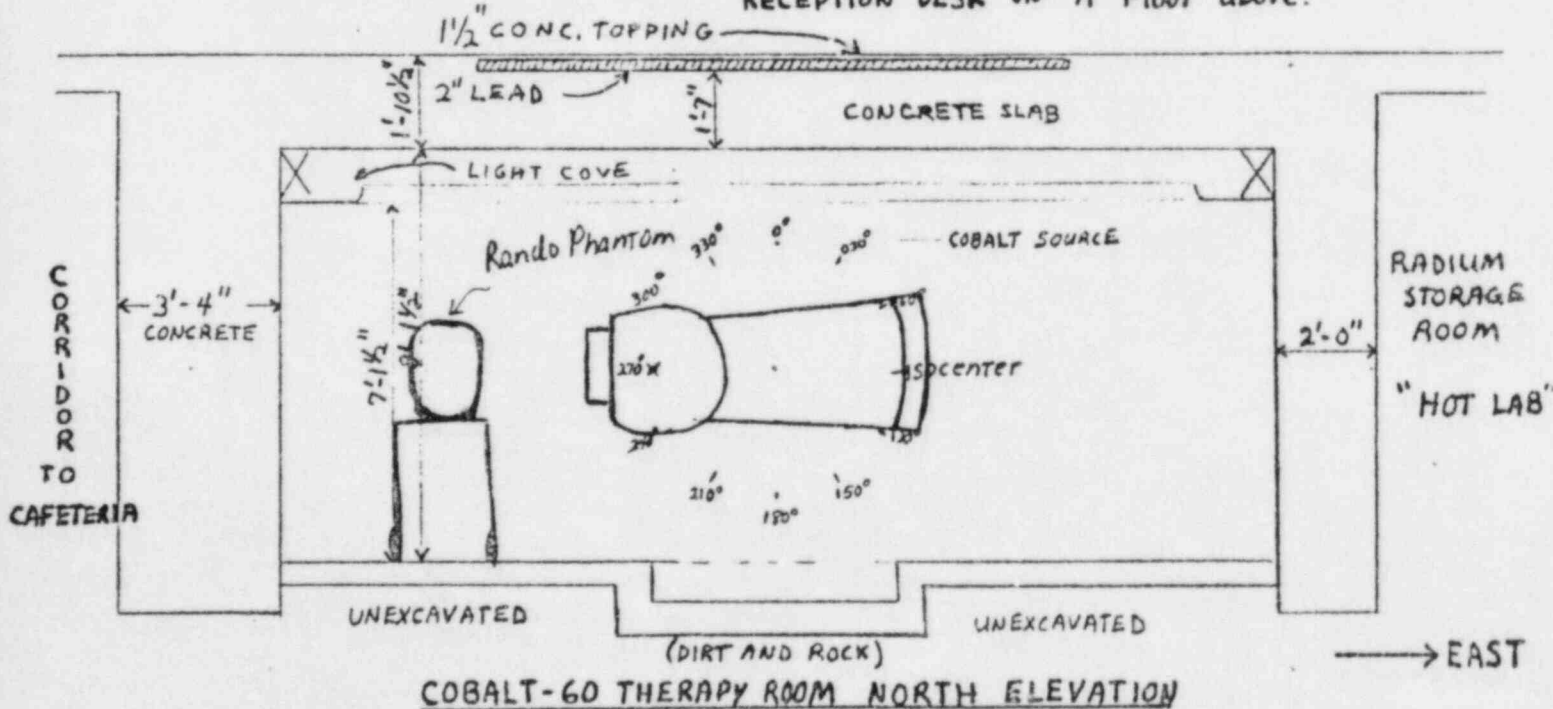


Approximate Scale: 1.0 cm = 25.0 cm

St. Luke's Hospital of Kansas City  
 4400 Wornall Road  
 Kansas City, Mo. 64111  
 "B" FLOOR - COBALT THERAPY



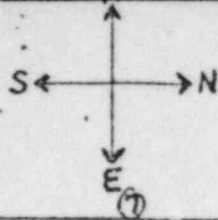
X-RAY INFORMATION AND  
 RECEPTION DESK ON "A" Floor above.



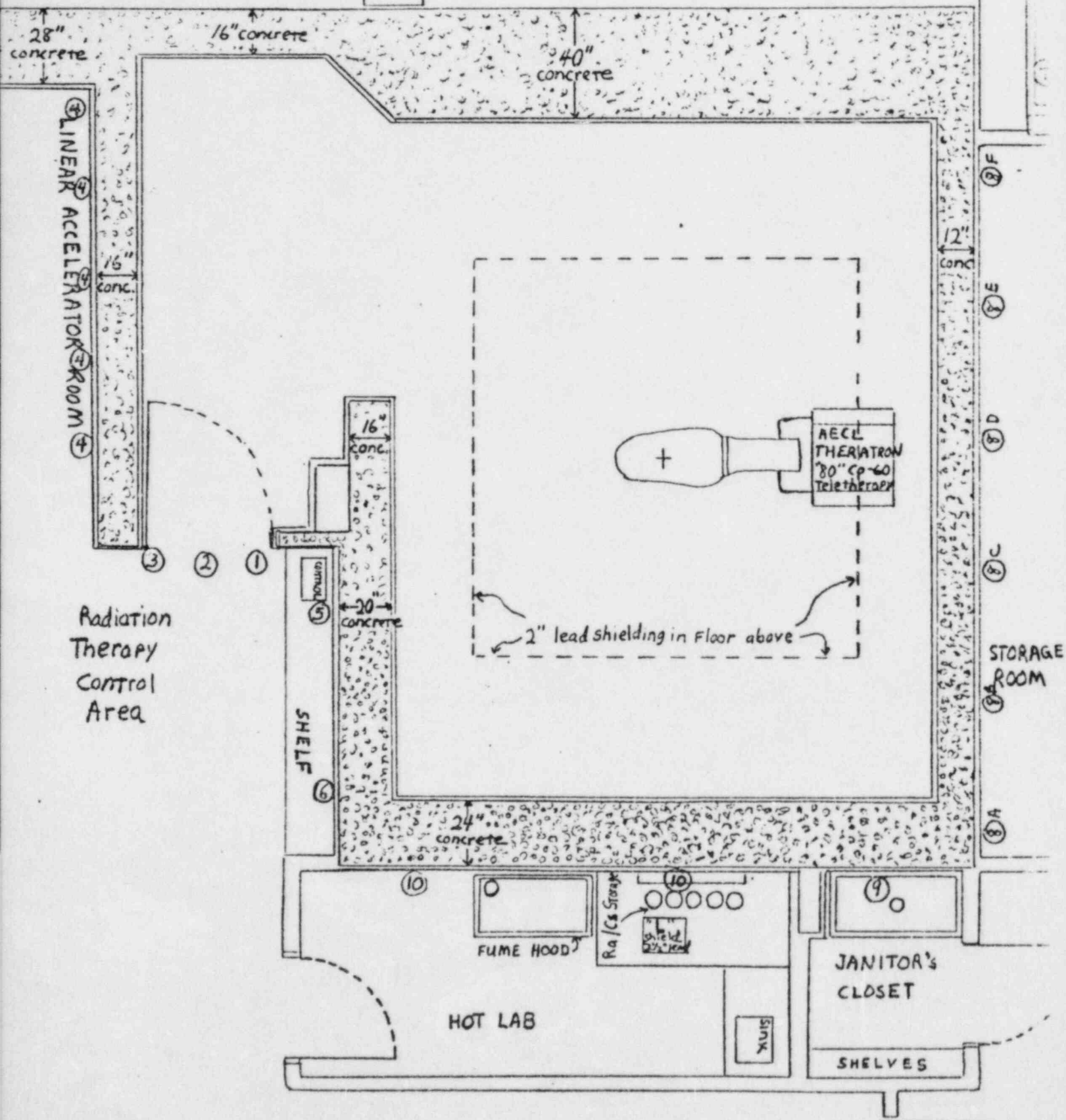
SCALE:  $\frac{1}{4}" = 1'-0"$

ENCLOSURE 2 TO ANNEX "A"

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CORRIDOR TO CAFETERIA



CORRIDOR TO RADIATION THERAPY  
and Nuclear Medicine  
ENCLOSURE 3 TO ANNEX "A"

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ANNEX B

Item 13 - Emergency Procedures

IN THE EVENT OF EQUIPMENT FAILURE

RESULTING IN THE SOURCE REMAINING

'ON' IMMEDIATELY ENTER THE

TREATMENT ROOM AND:

- Step 1. Close adjustable field definer.
- Step 2. Remove patient from treatment room.
- Step 3. Close, lock and post treatment room.
- Step 4. Notify the Radiation Therapist:

Joe L. Rector, M.D.	HOME	432-5922
Alternate: G. W. Schottman, M.D.	PHONE	642-6526

and/or the Radiation Protection Officer: Peter Debus	HOME	432-7031
	PHONE	

To manually turn the source "OFF":

1. Take red 'T' rod kept at the control panel and enter treatment room.
2. Insert 'T' rod into hole in white front head trim cover and push source drawer to 'OFF' position.

CAUTION: STAY OUT OF DIRECT BEAM

AT ALL TIMES

For Service: Call General Electric Company at: 888-4890

NOTE: Notify the Radiation Therapist, Joe L. Rector, M.D., and/or Radiation Protection Officer, Peter Debus, if any malfunction of the machine is detected, not just failure of the source to return to the fully-shielded position.