

November 4, 1982

Region III, Office of Inspection and Enforcement, USNRC
799 Roosevelt Road
Glen Ellyn, Illinois 60137



RE: Replacement of Cobalt-60
source and teletherapy
radiation survey report
as outlined in appendix f
of regulations.

- 1a. Name, address and license number of organization possessing
teletherapy unit and source:

Radiation Therapy Department
Methodist Hospital
1604 North Capitol Avenue
Indianapolis, IN 46202

- b. Names and addresses of persons conducting the survey:

Ronald Berg, John Kent and Stephanie Frost
Radiation Therapy Department
Methodist Hospital
1604 North Capitol Avenue
Indianapolis, IN 46202

- c. Reason for survey:

Installation of new source

- d. Date on which work in item c was completed:

October 7, 1982

- e. Date on which survey was conducted:

October 8, 1982

- f. Radiation detection instrument used for survey measurements:

- (1) Manufacturer's name and model number:

Ludlum Geiger Counter, model 14C

11/15/82
Nov 8 Amend.
Brown
11/16/82
t.t. Report

8601210558 851231
REC3 LIC30
13-02063-02

PDR

COPIES SENT TO OFF. OF
INSPECTION AND ENFORCEMENT

13018

- (2) Date of last calibration prior to use in making these measurements:

January 25, 1982

- (3) Standards and procedures used in calibration:

These are presently on file under
NRC License # 13-02063-01

- g. Manufacturer's name and model number of teletherapy unit:

Atomic Energy of Canada, Limited, model #780

- h. Manufacturer's name and model number of teletherapy source:

Atomic Energy of Canada, Limited, type C146 C060C

- i. Activity of source on date of installation:

6860 curies

- j. Intensity of the primary beam at a specified distance as measured after the source was installed and the date that this intensity was certified:

On October 8, 1982, at 80.5 cm from the source the dose rate was measured as 173.1 Rads/min. This was the dose rate to a small volume of tissue just large enough to establish electronic equilibrium and does not include backscatter. The field size was 10.0 x 10.0 cm as specified at 80.0 cm. The dose rate was measured at the point of maximum build up, i.e. 80.5 cm from source to ion chamber center. The transmission factor for the 1/4 inch plexiglass blocking tray is 0.958 and is included in the value of 173.1 Rads/min.

- k. Maximum and average radiation levels measured at one meter from the source in the "off" position:

Maximum = 2.5 mR/h,
Average = 0.8 mR/h, see enclosed Radiation Survey Report
as completed by Atomic Energy of Canada, Limited on
October 6, 1982

- l. Beam orientation limits:

This is a rotational unit without an integral beam absorber. The teletherapy head may be rotated either clockwise or counter-clockwise in a vertical plane about a horizontal axis through a full 360 degrees. 0 degrees is vertical toward the floor, 270 degrees is horizontal toward the east wall, 90 degrees is horizontal toward the west wall and 180 degrees is vertical toward the ceiling.

m. Measurements of radiation levels in adjacent areas:

- (1) The phantom used was constructed of polystyrene and of dimensions 30 x 30 cm.
- (2) The source to phantom distance was 80.0 cm to the base of the phantom.
- (3) Field size: 30 x 30 cm at 80 cm from source.

n. Plan and elevation drawings:

See enclosed drawings

o. Rotational unit with integral beam absorber:

Not applicable

p. Maximum radiation level and associated orientation:

(1) Vertical, 0 degrees

| | |
|---|--------------|
| (a) Viewing Window | 0.8 mR/Hour |
| (b) Controls | 0.2 mR/Hour |
| (c) Door | 0.5 mR/Hour |
| (d) South Wall (outside) | 0.02 mR/Hour |
| (e) North Wall (office) | 0.15 mR/Hour |
| (f) East Wall (linear accelerator room) | 0.02 mR/Hour |
| (g) West Wall (outside) | 0.02 mR/Hour |

(2) East Wall, 270 degrees

| | |
|---|-------------|
| (a) East Wall (linear accelerator room) | 2.0 mR/Hour |
| (b) Door | 1.9 mR/Hour |
| (c) Viewing Window | 0.5 mR/Hour |

(3) West Wall, 90 degrees

| | |
|------------------------------|--------------|
| (a) West Wall | 0.1 mR/Hour |
| (b) Viewing Window | 0.05 mR/Hour |

(4) Ceiling, 180 degrees

| | |
|---|---------------|
| (a) Roof Area (18" above surface) | 150.0 mR/Hour |
|---|---------------|

- q. In item p for the 180 degree ceiling orientation the roof area has a radiation level of 150.0 mR/Hour. This is a non-controlled and essentially non-occupied area with access only by ladder. This area is chained off beyond the 2.0 mR/Hour region and posted with radiation warning signs.

r. Tests for proper operation of safety systems:

(1) Teletherapy treatment room door interlock:

The treatment unit was turned on, the door was opened and the interlock caused the unit to return to the "off" status.

13018

(2) Teletherapy "on-off" indicators:

The lights on the head of the unit, over the door to the room and at the console were observed with the unit in both the "on" and "off" status and found to be functioning properly. The mechanical indicator via the rod protruding from the treatment head during "on" status was also observed to be functioning properly.

(3) There are no mechanical or electrical stops installed to limit use of the primary beam of radiation.

(4) Teletherapy timing device:

The timer was tested with a Casio digital stopwatch for 0.5, 1.0 and 2.0 minute settings and was found to be accurate and to terminate the exposure after completion of the preset time. The source was found to not return to the "on" position until the reset button was depressed and the on-off button was turned on.

s. Removal of the old source:

(1) Date of removal:

October 6, 1982

(2) Name, address, and license number of the firm taking possession of the old source:

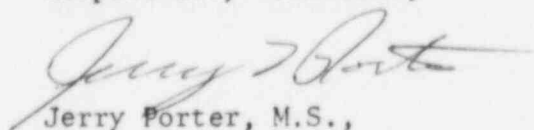
Atomic Energy of Canada, Limited
P.O. Box 6300
Ottawa, Canada K2A 3W3

License # 54-00300-04

t. Recommended changes:

None

Respectfully submitted,



Jerry Porter, M.S.,
Assistant Vice-President for Operations
1604 North Capitol Avenue
Methodist Hospital of Indiana
Indianapolis, IN 46202

REB:fs

cc: Material Licensing Branch,
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

13018



ATOMIC ENERGY OF CANADA LIMITED • COMMERCIAL PRODUCTS

RADIATION SURVEY REPORT

Teletherapy Head - Beam Off

P&S 42617

Customer Methodist Hospital of Ind. Inc.Location 1500 Stadium Drive, Indianapolis, Indiana. 46202Model Theratron 780Serial Number 05

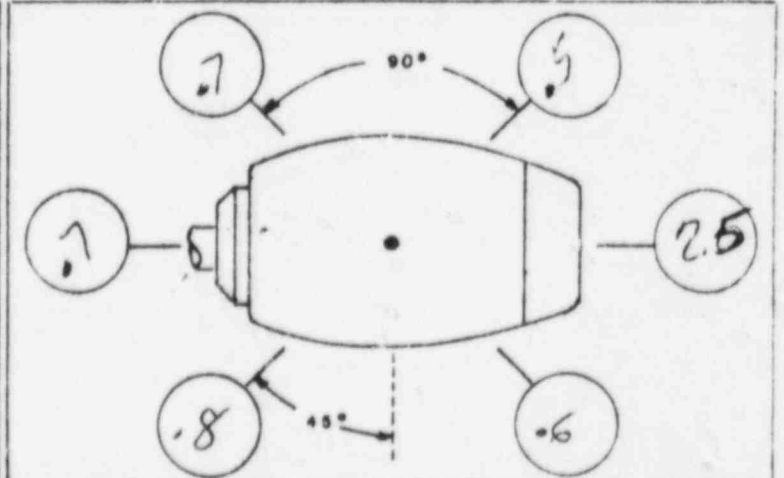
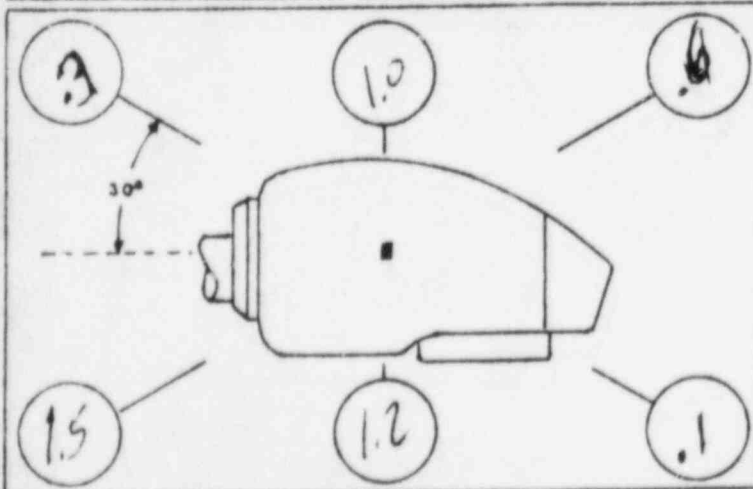
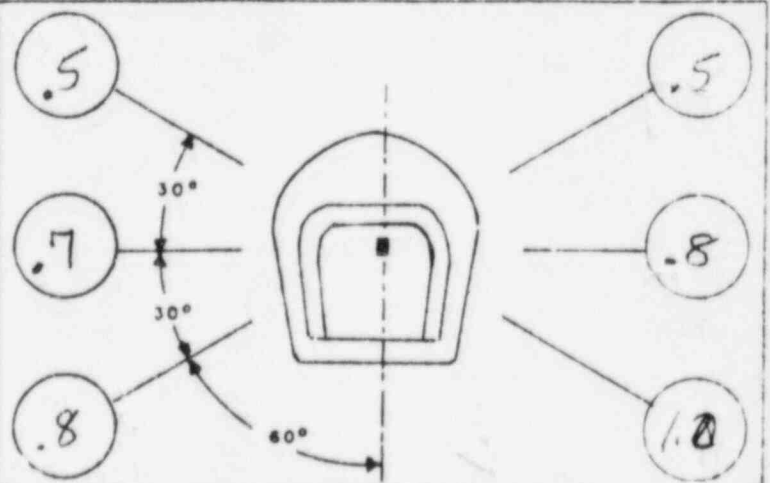
SOURCE DATA

Serial No. S-3411 Diameter 1.5 cm Curies 6927 Cobalt 60
Measured Output 114.3 ($\pm 3\%$) Rmm(ICRU) Measurement Date 9 Sept. 1982
Maximum Unit Output 131.8 ($\pm 5\%$) Rmm Rated Capacity _____ Rmm(ICRU)

Survey Meter BERTHOUDModel RATU-FSerial No. 1611Calibration Date 7-21-82Supplementary Shielding: Donut ☐Air Cylinder End ☐Other ☐Facility Survey Performed by Dan TagmeyerDate 10/6/82

Comments

Measurements in mR/h at 1 metre from the source.

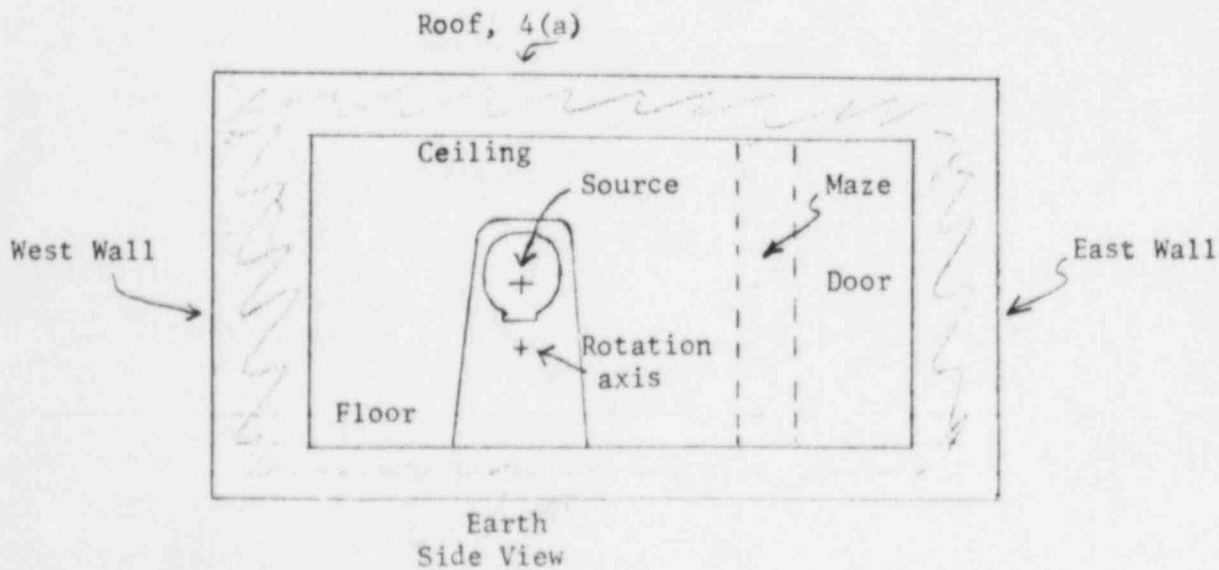
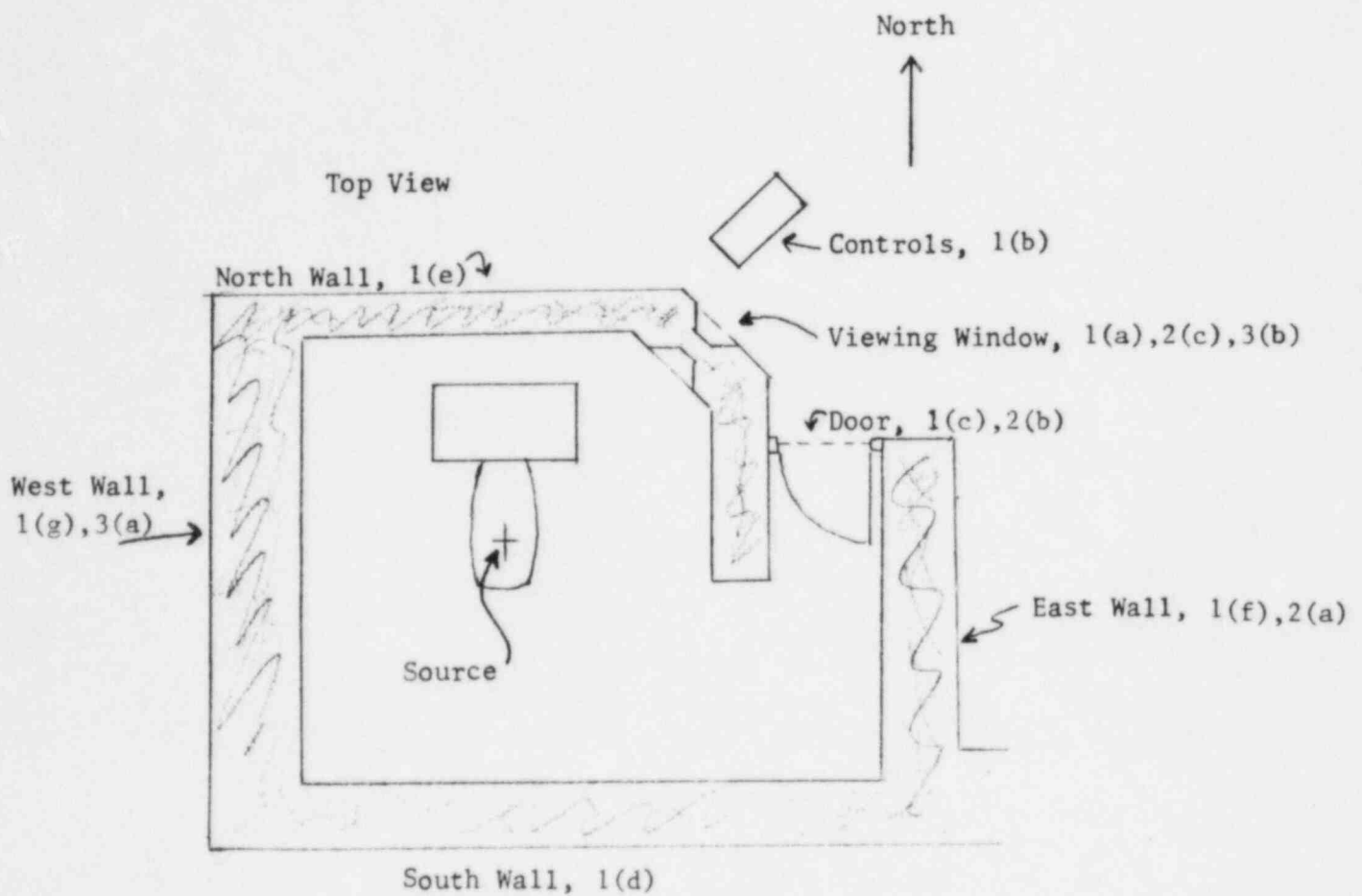


QQA-039-1

ORIGINAL - CUSTOMER, COPY - C.P. UNIT HISTORY FILE

Cobalt-60 Teletherapy Facility and Points of Measurement

Scale: 1/8" = 1'



13018



RECEIVED
METHODIST HOSPITAL
OF INDIANA, INC. JUN 27 AM 11 41

June 23, 1980

DEPARTMENT OF RADIOLOGY
PHYSICS SERVICES DIVISION

U.S. NUCLEAR REG
COMMISSION
NMSS MAIL STATION

Materials Branch
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

The following information (in the format suggested in your document "Information Required for Renewal of Teletherapy Licenses") is submitted in order to renew our Co-60 teletherapy license:

1. Methodist Hospital of Indiana, Inc.
1604 North Capitol Avenue
Indianapolis, Indiana 46202
2. 13-02063-02
3. Newell O. Pugh, Jr., M.D.
John F. Dillon, M.D.
David B. Ross, M.D.
4. Same as listed in Items 7 and 9 of license.
5. Same as listed in Item 8 of license.
6. The teletherapy head can be rotated 360° in one plane.
7. The patient is continuously viewed through a lead glass window as well as with a T.V. monitor.
8. Whole body film badges from Landauer and TLD wrist badges from Eberline Corp. are worn by all appropriate personnel and are changed monthly.
9. There are three (3) Ludlum Model 14C GM survey meters and one (1) Victoreen Model 660 Digital Radiation Survey Meter with a 660-5 probe. These survey meters are calibrated at least annually.

A Keithley 35020 electrometer with a .6cc Capintec probe is used for routine monthly output checks. This system is checked against a Keithley 35025 electrometer with .6cc Nuclear Enterprises system that is calibrated every two years by the Regional Calibration lab in Houston.

RECEIVED BY LFMB
Date: JUL 10 1980
Log: July PG 3 Ren.
By: BROWN
Orig. To:
Action Compl. 7/10/80

Applicant:
Check No.: 04-2876
Amount/Fee Category: 1240 (7A)
Type of Fee: Renewal
Date Check Reg. 10/1980
Received By: BROWN

1604 NORTH CAPITOL AVENUE COPIES SENT TO OFF. OF INSPECTION AND ENFORCEMENT TEL. (317) 924-8579

4pp

Materials Branch

June 23, 1980

Continuous evaluation of radiation levels in the Co-60 room is provided by a Nuclear Associates PRIMALERT 10 Radiation Level Monitor (Model 05-433) and a Model 05-434 Remote Alarm Module. Two Model 05-440 Battery Back-up Power Supplies have been ordered for these units.

10. The Ludlum Model 14C and Victoreen Model 660 survey meters are calibrated using the Cs-137 and Ra-226 sealed sources shown on the enclosed inventory sheet.

The calibration procedure is performed in the linear accelerator room. The source or sources to be used for a particular meter are selected and distances are calculated to provide exposure rates at 25% and 75% of full scale on each range. The survey meter is placed on a cart and positioned at the distance calculated to give a reading 25% of maximum on the lowest scale. The appropriate source is brought from the storage room in a lead shield and is placed (using remote handling tongs) in a test tube held in a ring stand such that the source is suspended on the same level as the detector. The reading on the survey meter is observed and recorded. If no source change is required, the cart is moved to the distance corresponding to 75% of maximum on the lowest scale. This process is continued, with source changes when necessary.

Survey meter calibrations are performed by or under the supervision of Robert T. Anger, Jr., M.S., the Radiation Safety Officer, Ronald Berg, Ph.D., Radiation Physicist, or John Kent, M.S., Radiation Physicist.

11. Not applicable.
12. Semi-annual leak testing is performed by a staff radiation physicist. Q-tips dipped in alcohol are used to wipe the exterior of the head and the exterior and interior surfaces of the collimator.

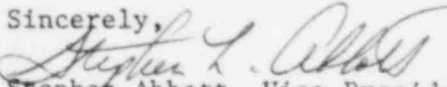
The wipes are assayed using a calibrated NaI(Tl) crystal and Canberra Model 30 multichannel analyzer. The minimum detectable activity for this system for Co-60 is .001 uCi.

13. Enclosed is a copy of the emergency procedures to be followed in the event that the operator is unable to turn off the teletherapy unit at the console.

We are also enclosing a check for \$270 as required by 10 CFR Part 170.7A.

Thank you for your consideration of this request. If you have any questions, please let me know.

Sincerely,


Stephen Abbott, Vice President
Operations

Enc.

RADIUM NEEDLE INVENTORY - MAY, 1980

CESIUM TUBES - Activity as of May, 1980

Length: Total - 20 mm., Active - 14 mm.

| QUANTITY | LENGTH | ACTIVE | MILLIGRAMS | STRENGTH |
|----------|--------|--------|------------|-----------|
| 3 | 60 mm. | 45 mm. | 3.0 | Full-Gold |
| 16 | 60 mm. | 45 mm. | 1.5 | Half |
| 10 | 44 mm. | 30 mm. | 2.0 | Full-Gold |
| 24 | 44 mm. | 30 mm. | 1.0 | Half |
| 5 | 28 mm. | 15 mm. | 1.0 | Full-Gold |
| 6 | 28 mm. | 15 mm. | 0.5 | Half |

RADIUM TUBES

10 21.7 mm. 15 mm. 10.0

*Note: Conversion factor = 8.25/3.2

Reference: NCRP Report No. 41, April, 1974

| Serial No. | 3M ASSAY DATE | | | Mg. Ra. Eq. | Average | Millicurie | Average |
|---------------|-------------------|---------|---------|----------------|---------|------------|---------|
| | 9-17-68 | 12-4-72 | 2-13-76 | | | | |
| | Original Activity | | | | | | |
| 0023 | 4.8 | | | 3.68 | | 9.46 | |
| 0025 | 4.9 | | | 3.67 | | 9.65 | |
| 0026 | 4.8 | | | 3.68 | | 9.47 | |
| 0035 | 5.3 | | | 4.06 | 3.77 | 10.45 | 9.76 |
| 1241 | | 10.4 | | 8.77 | | 22.6 | |
| 1246 | | 10.4 | | 8.77 | | 22.6 | |
| 1251 | | 10.4 | | 8.77 | | 22.6 | |
| 1253 | | 10.4 | | 8.77 | | 22.6 | |
| 1865 | | | 11.4 | 10.32 | | 26.7 | |
| 1913 | | | 11.4 | 10.32 | | 26.7 | |
| 1946 | | | 11.3 | 10.22 | | 26.4 | |
| 1948 | | | 11.4 | 10.32 | 9.53 | 26.7 | 24.6 |
| 0039* | 14.5 | | | 11.08* | | 28.7* | |
| 0047* | 14.5 | | | 11.08* | | 28.7* | |
| 0532 | | 15.6 | | 12.88 | | 33.9 | |
| 0533 | | 15.8 | | 13.37 | | 34.4 | |
| 0561 | | 15.8 | | 13.37 | | 34.4 | |
| 0572 | | 15.9 | | 13.37 | | 34.4 | |
| 1071 | | | 17.0 | 15.47 | | 40.0 | |
| 1083 | | | 16.4 | 14.90 | | 38.4 | |
| 1091 | | | 16.9 | 15.38 | | 39.7 | |
| 1097 | | | 16.8 | 15.28 | 14.25 | 39.4 | 36.8 |
| 0765 | | | 22.8 | 20.73 | | 53.4 | |
| 0767 | | | 23.0 | 20.92 | 20.83 | 53.9 | 53.7 |
| 0301 | | | 28.3 | 25.69 | | 66.4 | |
| 0305 | | | 28.3 | 25.69 | 25.69 | 66.4 | 66.4 |

* Stored in safe but not used as part of 15 mg Ra equ complement of Cesium stock - not included in the average.

04332

EMERGENCY OPERATING PROCEDURES

In the event the source does not return to the "OFF" position:

1. Enter Cobalt room to remove patient.
2. AVOID primary beam at ALL times.
3. If patient is ambulatory, instruct patient to get off treatment table and leave room.
4. If patient is not ambulatory, move patient out of beam and from treatment room. Avoid beam at ALL times.
5. Lock door and keep locked until authorized personnel are on hand to correct problem.
6. Inform:
 - A. Newell O. Pugh, M.D. (HOME PHONE: 251-4763)
 - B. David Ross, M.D. (HOME PHONE: 844-1725)
 - C. John F. Dillon, M.D. (HOME PHONE: 253-8322)
 - D. Ronald Berg, Physicist (HOME PHONE: 924-4496)
 - E. Bob Anger, Physicist, (HOME PHONE: 253-0443)
 - F. Stephanie Frost, Physicist (HOME PHONE: 255-2098)
 - G. John Kent, Physicist (HOME PHONE: 253-6255)
 - H. Richard Tanker, AECL (PHONE: 312-593-3242)