MAINE RADIATION PHYSICS, INC.
P.O. Box 664
Portland, Maine 04104

REPORT OF COBALT-60 RADIATION PROTECTION SURVEY
GOULD DIVISION
THE AROOSTOOK MEDICAL CENTER
151 ACADEMY STREET
PRESQUE ISLE, MAINE 04769

I. Date of Survey

April 20, 1985

II. Reason for Survey

To ensure compliance with license conditions subsequent to installation of a new Cobalt-60 unit.

III. Name and Address of Institution

Gould Division
The Aroostook Medical Center
151 Academy Street
Presque Isle, Maine 04769

IV. Name and Address of Surveyor

Joseph S. Blinick, Ph.D.
Maine Radiation Physics, Inc.
P.O. Box 664
Portland, Maine 04104

V. Therapy Equipment

Therapy Unit: AECL Model GS2200C (Theratron 780), S/N 431.

Source: AECL Type C-146 Co-60 source, S/N S3716, This source is 1.5 cm diameter, and is certified by AECL to have had an activity of 5590 Ci on 2/20/85.

VI. License

The use of this material is authorized by NRC license 18-07032-01, which expires on March 31, 1986. It authorizes the possession of not more than 12,000 Ci of Cobalt-60 (two sources of not more than 6,000 Ci each) in the unit described above. It authorizes the use of this material by or under the supervision of William A. O'Brien, M.D.

VII.Measuring Equipment

The environmental survey and head leakage measurements were made with a Ludlum Model 3, survey meter (S/N 12660). It was last calibrated on March 22, 1985 against Cs-137 (Ref: Calibration procedures contained in license 18-00648-01 issued to Maine Medical Center, Portland, ME 04102).

Output measurements were made with a Baldwin-Farmer Model 2570 secondary standard dosemeter, S/N 326, equipped with a Model 2571 0.6 cc chamber, S/N 546. A delrin buildup cap was used to produce a total wall thickness of 0.5 cm. The system was last calibrated at the AAPM Accredited Dosimetry Calibration Laboratory at K & S Associates, Nashville, TN, on August 23, 1984.

A water phantom 30x30x30 cm was used to provide scatter radiation for the environmental survey.

VIII.Introductory Remarks

As explained in the application for amendment of NRC License 18-07032-01, this unit was used to replace an old Picker C-3000, which needed to be removed from service quickly because of the possibility of catastrophic mechanical failure. In order to accomodate the increased activity desired in the new unit, additional shielding was required. Normally this would have been accomplished before the unit was installed, but due to prior committments by both the therapy equipment supplier, and the shielding company, it was necessary to install the machine and then put the additional shielding in. The sequence of events was as follows.

March 7 & 8	Remove old Picker C-3000 (performed by X-ray Equipment Co., of Fort Worth, TX, under license Texas 5-1485)
March 18-22	Install new AECL Theratron 780
April 9-13	Install additional shielding

April 19 Install lasers

April 20 Perform survey

During the period of installation of the therapy unit, the beam was only turned on three or four times to check operation of the source mechanism and rotation. During this time (which amounted to less than two minutes cumulative beam-on time) care was taken to ensure that no hospital personnel, or members of the general public were in any of the areas adjacent to the cobalt room.

Following the installation of shielding, several short exposures were made by hospital personnel to allow the shielding company to check the installation.

Other than these exposures, the beam was not turned on until the day of the survey, and the key to the console was kept in the possession of the chief technologist.

IX. Preliminary Inspection

A preliminary inspection was performed, and the following points were noted.

a. A "Caution-High Radiation Area" sign was conspicuously posted on the entrance door to the therapy room. Two other signs were conspicuously posted on the southwesterly and southeasterly side of the fence on the roof.

b. A copy of emergency procedures to be followed in the event that the source does not return to the off position were posted by the operating console. These instructions include a warning to the operator to stay out of the direct beam.

c. A red light was located above the entrance to the room. It was lit whenever the source was turned on. A red light was also located adjacent to the gate on the fence on the roof. It also was lit whenever the source was on.

d. Green and red indicators were located on the control panel. The green indicator was lit whenever power was applied to the unit and the source was off. The green light went out, and the red light came on whenever the source was turned on.

e. A mechanical pointer was located in the head of the unit. The pointer was retracted when the source was off. When the source was turned on, the pointer was clearly visible.

f. A cumulative timer was located on the control panel. At the end of a preset time, the source automatically returned to the off position.

g. In order to turn the source on, the timer must be set, a reset button pushed, and a "beam-on" button pushed. If the door to the treatment room was opened, the gate on the fence on the roof was opened, the emergency off button pushed, the main power removed, or the timer turned off, the source immediately returned to the off position. The source would not return to the on position when any of the above were returned to their normal settings, unless the operator repeated the operating cycle.

h. Electrical interlocks (mercury switches) were set to prevent irradiation whenever the head swiveled more than 2^{o} from a point on the center of the backstop. The interlock feature was tested at gantry angles of 0, 90, 180, and 270 degrees, and was found to be working correctly.

i. A closed circuit television system was available to view the patient during treatment. If the system fails, it is the policy of the department to suspend treatment until repair or replacement is effected.

j. An intercom system was available to provide voice communication with the patient. If it fails, it is the policy of the department to suspend treatments until repair or replacement is effected.

K. A name plate was affixed to the side of the unit which displayed the source type, activity, and date of calibration.

l. A Nuclear Associates Model 05-433 (Primalert 10) monitor was installed in the room where it could easily be seen by anyone entering the room. A Nuclear Associates Model 05-440 (Primapack) battery pack served to provide power should the primary power fail. Both units were working satisfactorily.

X. Workload

Based on prior experience, it is estimated that a maximum of 20 patients will be treated daily (no more than three in any one hour), and the average treatment time per patient will be 4 minutes. Thus, the beam will be on approximately 12 minutes in any one hour or 6.67 hours per week.

XI. Housing Leakage

A survey of the housing was made with the source off. Thirty points, approximately 1 meter from the source were surveyed following the recommendations of NCRP report 33. The highest reading was 0.9 mR/hr, and the average of all readings was 0.5 mR/hr. (See figure 1).

XII.Wipe Tests

A wipe test of the source was performed by AECL on March 6, 1985, prior to installation of the source. The results were negative. A copy of their certificate is enclosed.

In addition, a wipe test of the inner surface of the collimator jaws, and the light and mirror assembly was made using a moistened swab on April 20, 1985 following installation of the source. The sample activity was measured on a well-type scintillation detector, and was found to be well under the allowable limit of 0.05 uCi (see enclosed report).

XIII.Verification of Light and Radiation Field Congruence

Films were taken at 80.0 cm SSD using RP/TL films for 5x5, 10x10, 20x20, and 35x35 cm field sizes. These films show the light and radiation field congruence to be within 2 mm in all cases. Films will be kept by TAMC for their records.

XIV.Field Flatness

Flatness films for 15x15 cm fields at 80.0 cm SSD with 0.5 cm lucite buildup were made for gantry angles of 0 (down), 90 (right-to-left), 180 (up), and 270 (left-to-right) degrees. The films were scanned with a densitometer, in two directions, and the resultant desity profiles were plotted (see Figs 2-9). The profiles indicate that the flatness and symmetry are satisfactory.

XV. Exposure Rate at One Meter

Exposure measurements in air were made for a 35.4x36.6 cm field at 80.0 cm using the Baldwin-Farmer system. At the time of measurement, the ambient air temperature was 22.2°C, and the air pressure was 746 mm Hg, yielding a temperature-pressure correction factor of 1.019 (to 22.0°C, and 760 mm Hg). The calibration factor for Co-60 for this instrument is 0.992. The average reading for a one minute exposure was 154.2. The inverse square law was used to find the exposure rate at one meter.

$$X = 154.2 \times 1.019 \times 0.992 \times (80/100)^2 = 99.8 \text{ RMM}$$

This value is within 2% of the value predicted by AECL on the basis of measurements in their test cell on February 20, 1985 (see enclosed report), if allowance is made for the decay of the source since that time.

XVI. Environmental Survey

A survey of the environs of the therapy room was made with the Ludlum Model 3 survey meter. In all cases, the 30x30x30 cm water phantom was placed in the beam with its center at the isocenter of the machine (80 cm SAD). The beam was directed at the center of the beamstop at all times. A field size of 30x30 cm was used. Measurements were taken at each point as the unit was rotated at a rate of approximately one revolution every two minutes. The appropriate area was scanned with the meter during this rotation, and the maximum value recorded. These levels are shown in TABLE I, along with the maximum expected exposure in any one hour, and the maximum expected exposure per week. These are based on an average beam-on time of 12 minutes in any one hour, and 6.67 hrs per week (see Section X-Workload).

The therapy room is located on the ground floor at the north end of the hospital. The northwest wall is an exterior wall and is approximately eight feet from a parking area. The northeast wall is also an exterior wall and is approximately 12 feet from a driveway leading to the main entrance of the hospital. Both these areas are unrestricted. The southwest wall divides the therapy room from an orthovoltage treatment room. The south wall is adjacent to the control area. Both these areas are restricted. The southeast wall seperates the therapy room from two dressing rooms and a toilet. These areas are unrestricted.

The therapy unit is set on a concrete slab, on solid earth, and there is no possibility of occupancy below the unit.

The area above the therapy room is the roof of this section of the hospital, which is unoccupied. The nearest occupied area is a one story addition located about 64′ is a southerly direction, and 76′ in a southwesterly direction. Radiation passing above the walls of the therapy room would pass well above these areas.

Because of the high radiation levels expected directly above the unit, this area was made into a restricted area. A six foot high fence approximately 30x30 feet was erected in a square above the unit. The northwesterly and northeasterly sides of the fence extend along lines directly above the exterior walls, while the southwesterly and southeasterly walls extend along lines well beyond the interior therapy room walls. "Caution-High Radiation Level" signs were posted on these two sides of the fence. A gate is located midway in the southwesterly side of the fence. It is kept locked with a padlock. The only keys are maintained by the therapy technologist. In addition, a red light adjacent to the gate lights whenever the source is on. The gate is interlocked so that if it is opened, the source will immediately return to the off position, and a visual signal on the control panel will indicate to the operator that the gate is open. As with the entrance door interlock, the source will not turn on again after the gate is closed, unless the operator reactiviates the control sequence.

Figures 10 and 11 show plan and elevation drawings of the facility, and also show the points at which the measurements shown in TABLE I were taken. Circled letters refer to points on the ground level, while letters surrounded by a square refer to points on the roof.

The data indicate that the exposure levels in all areas satisfy the requirements of 10 CFR 20.101 and 20.105.

XVII.Calibration

Additional calibration data required by 10 CFR 35 is contained in a seperate report, entitled "Report of Cobalt-60 Calibration", a copy of which is enclosed.

XVIII.Conclusion

The observations and measurements described above indicate that this new installation satisfies all the license and regulatory conditions for this facility.

This report is submitted by the undersigned consultant physicist on behalf of The Aroostook Medical Center, Presque Isle, Maine.

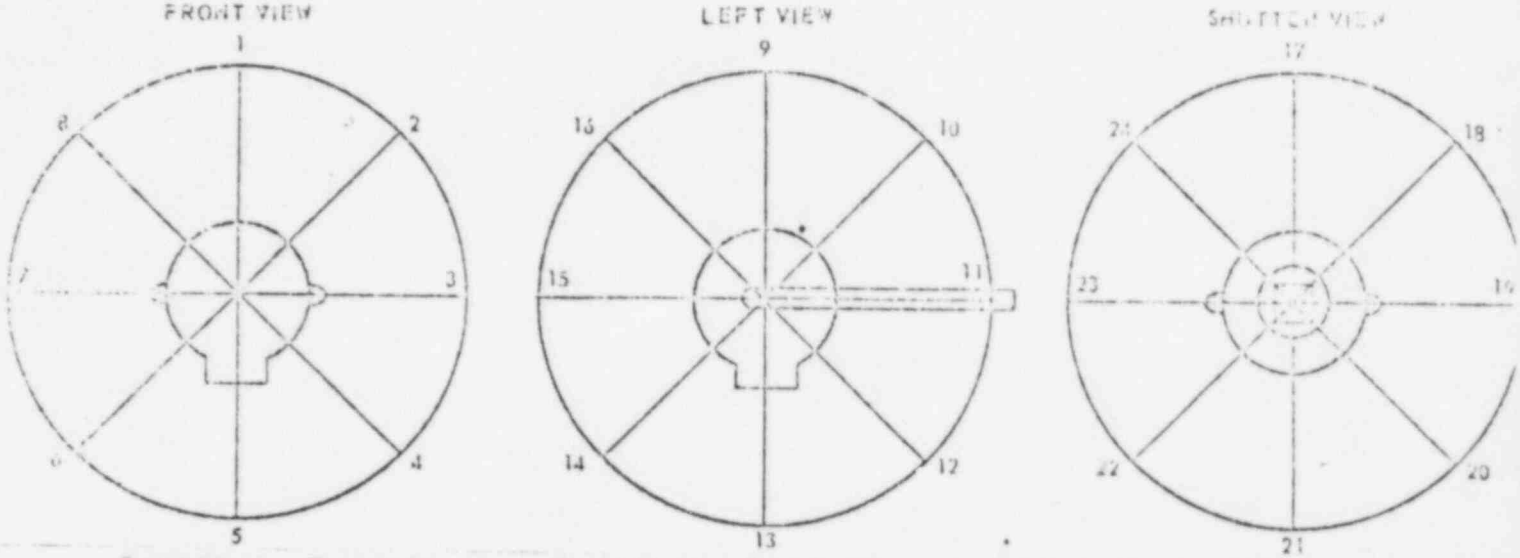
Joseph S. Blinick, Ph.D.
Certified Radiological Physicist

MAINE RADIATION PHYSICS, INC.
P.O. Box 664
Portland, Maine 04104

THE AROOSTOOK MEDICAL CENTER
PRESQUE ISLE, MAINE
APRIL 20, 1985

FIGURE 1

MEASUREMENTS OF SOURCE HOUSING LEAKAGE IN OFF POSITION
SHUTTER POSITION DOWNWARD



Position	Reading (mR/hr)	Position	Reading (mR/hr)	Position	Reading (mR/hr)
1	0.7	9	0.7	17	0.8
2	0.3	10	0.4	18	0.2
3	0.35	11	inaccessible	19	0.35
4	0.4	12	0.7	20	0.5
5	0.6	13	0.6	21	inacc.
6	0.5	14	0.8	22	0.5
7	0.35	15	0.8	23	0.35
8	0.4	16	0.1	24	0.1

Position	Reading (mR/hr)
Left upper front	0.2
Left upper back	0.5
Left lower front	0.3
Left lower back	0.6
Right upper front	0.2
Right upper back	0.5
Right lower front	0.2
Right lower back	0.9

Average of 30 Measurements

0.46 mR/hr

Joseph S. Blinick, Ph.D.
Certified Radiological Physicist

26 APR 85 CAD CUR ID: CAD.PSG(RTP 2.5A) PAGE 1

DENSITOMETER STUDY

PLOT SCALE= 1.00
FILE ID: TAMC
STUDY ID: X1
NORMALIZATION MODE: C
CENTRAL AXIS MAX=1162
GLOBAL MAXIMUM=1160
SAMPLED VALUE=0

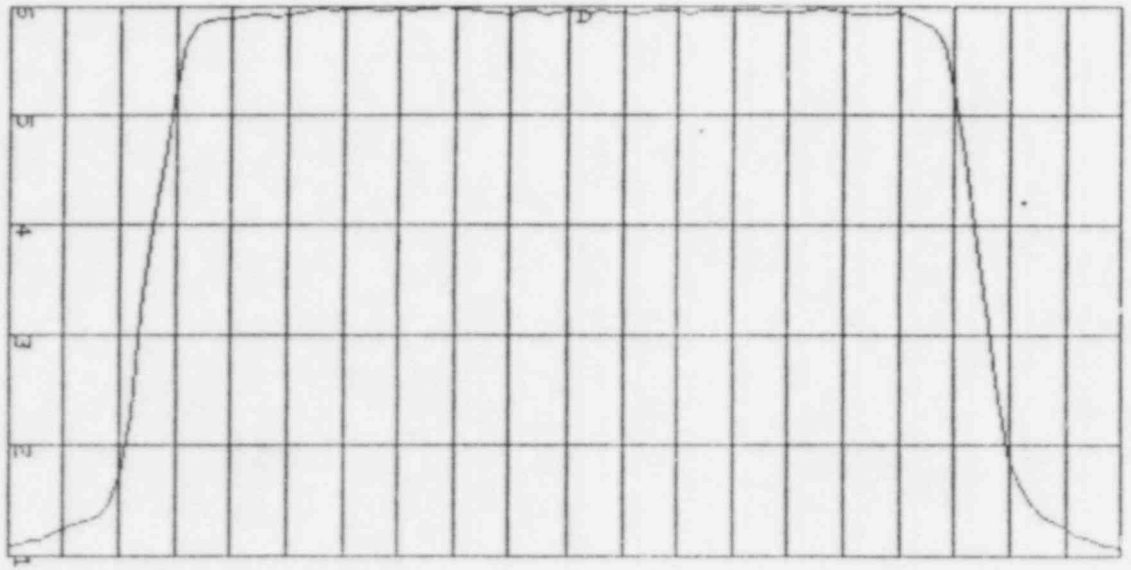
SCAN: 1
SCAN MAX=1160
DATA TYPE: RAW

Gantry = 0°

X-PLANE

FAST SCAN AXIS: X
SLOW SCAN AXIS: Y

LEFT
(Control Room)



RIGHT

-100.00 0 100.00

1 2 3 4 5 6
0.00 % 20.00 % 40.00 % 60.00 % 80.00 % 100.00 %
A -0 SCAN 1

DENSITOMETER STUDY

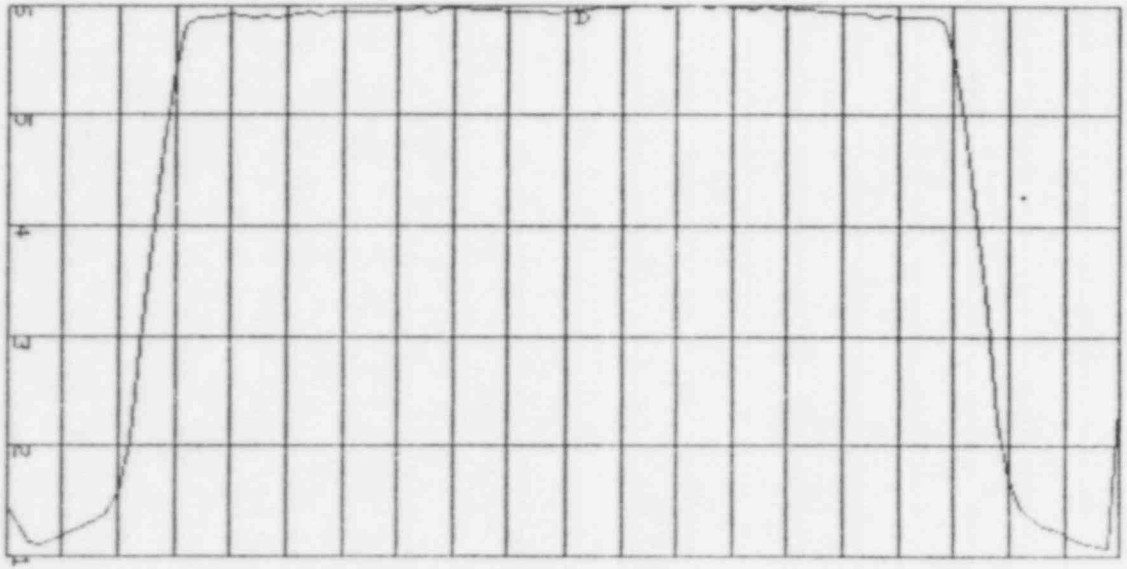
PLOT SCALE= 1.00
FILE ID: TAMC
STUDY ID: X1
NORMALIZATION MODE: C
CENTRAL AXIS MAX=1162
GLOBAL MAXIMUM=1160
SAMPLED VALUE=0

SCAN: 0
SCAN MAX=1162
DATA TYPE: RAW

GANTRY = 0°

INPLANE

FAST SCAN AXIS: X
SLOW SCAN AXIS: Y



-100.00 0 100.00

Gantry →

1 2 3 4 5 6
0.00 % 20.00 % 40.00 % 60.00 % 80.00 % 100.00 %
A -> SCAN 0

DENSITOMETER STUDY

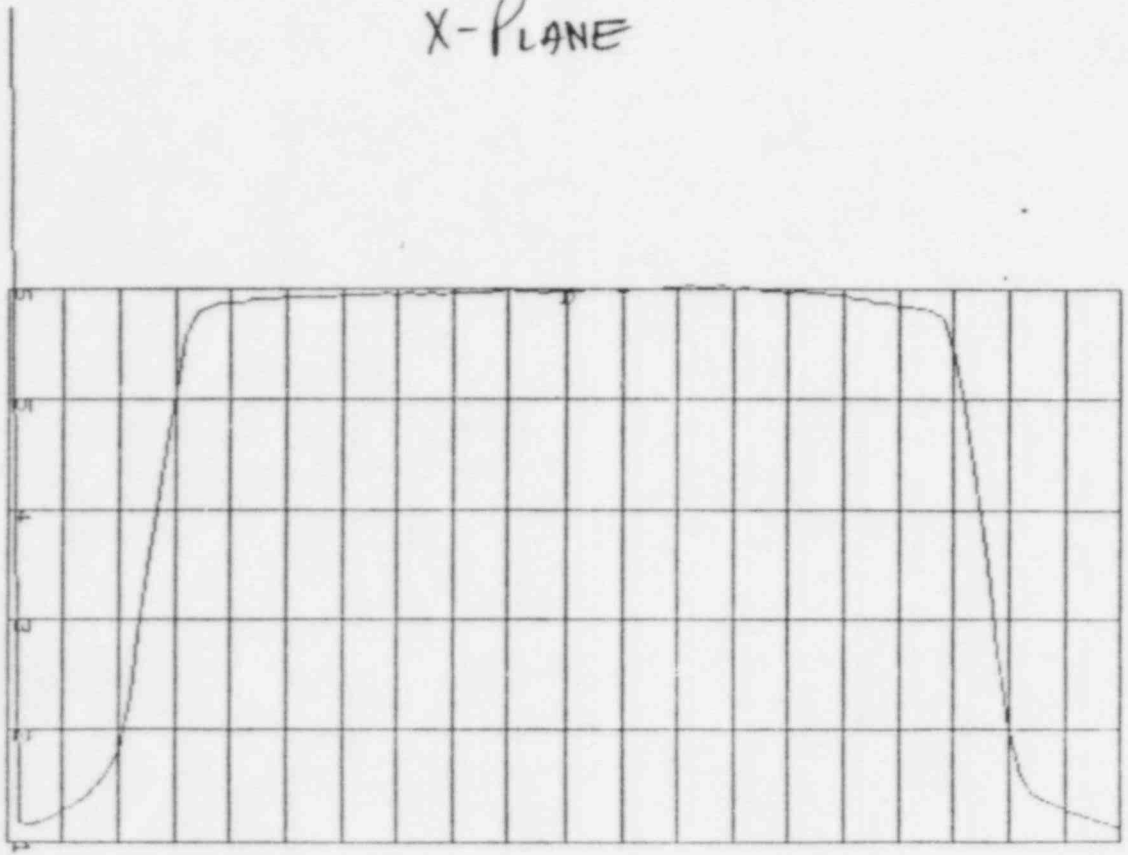
PLOT SCALE= 1.00
FILE ID: TAMC
STUDY ID: X2
NORMALIZATION MODE: T
CENTRAL AXIS MAX=1676
GLOBAL MAXIMUM=111C
SAMPLED VALUE=0

SCAN: 0
SCAN MAX=1676
DATA TYPE: RAW

FAST SCAN AXIS: X
SLOW SCAN AXIS: Y

Rt. Lat. (Gantry = 90°)

X-Plane



1 2 3 4 5 6
0.00 % 20.00 % 40.00 % 60.00 % 80.00 % 100.00 %
A -> SCAN 0

26 APR 85 CAD CUR ID:CAD.PSG(RTP 2.5A) PAGE 4

DENSITOMETER STUDY

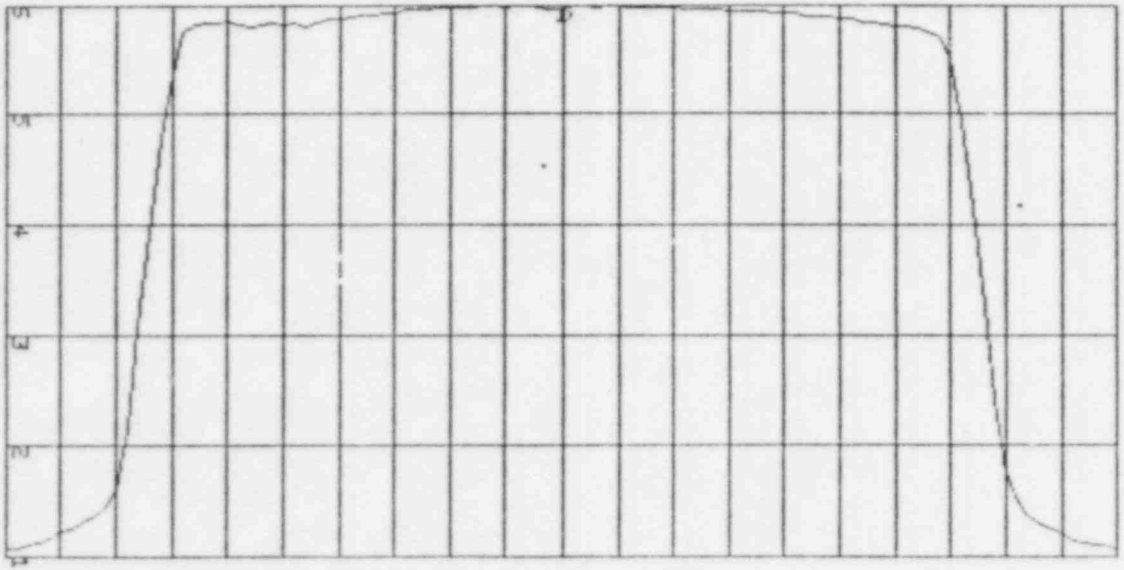
PLOT SCALE= 1.00
FILE ID: TAMC
STUDY ID: X2
NORMALIZATION MODE: T
CENTRAL AXIS MAX=1676
GLOBAL MAXIMUM=1110
SAMPLED VALUE=0

SCAN: 1
SCAN MAX=1110
DATA TYPE: RAW

Rt LAT (Gantry = 90°)

INPLANE

FAST SCAN AXIS: X
SLOW SCAN AXIS: Y



-100.00 0 100.00

Gantry →

1 2 3 4 5 6
0.00 % 20.00 % 40.00 % 60.00 % 80.00 % 100.00 %
A -> SCAN 1

DENSITOMETER STUDY

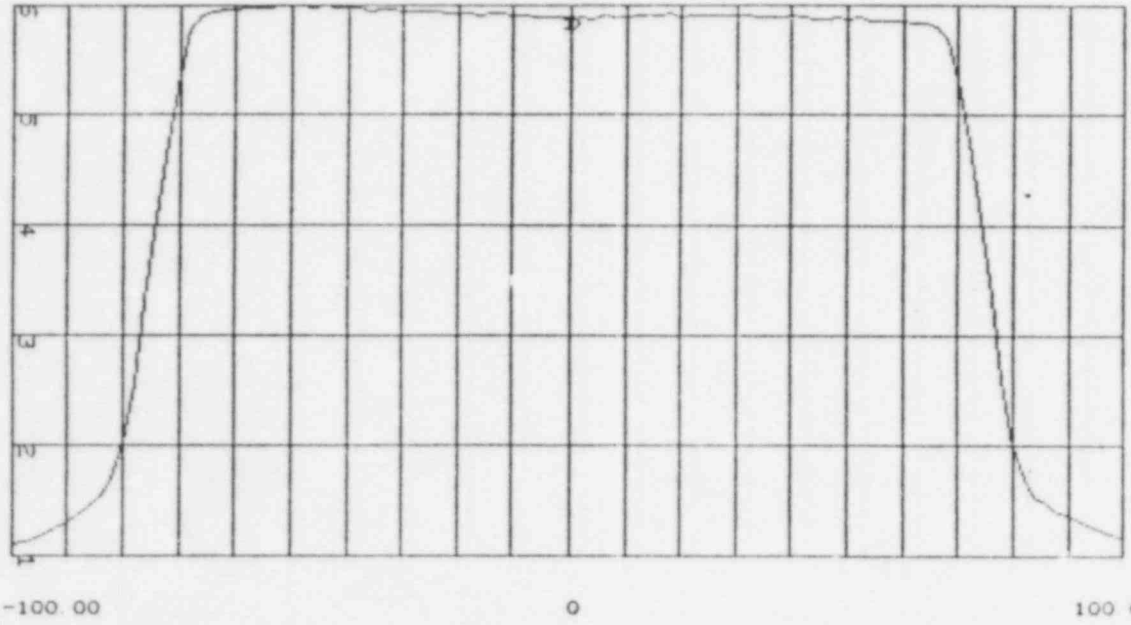
PLOT SCALE= 1.00
FILE ID: TAMC
STUDY ID: X3
NORMALIZATION MODE: C
CENTRAL AXIS MAX=1110
GLOBAL MAXIMUM=1095
SAMPLED VALUE=0

SCAN: 0
SCAN MAX=1110
DATA TYPE: RAW

LEFT LAT (Gantry = 270°)
X-PLANE

FAST SCAN AXIS: X
SLOW SCAN AXIS: Y

LEFT



RIGHT

1 2 3 4 5 6
0.00 % 20.00 % 40.00 % 60.00 % 80.00 % 100.00 %
A -0 SCAN 0

DENSITOMETER STUDY

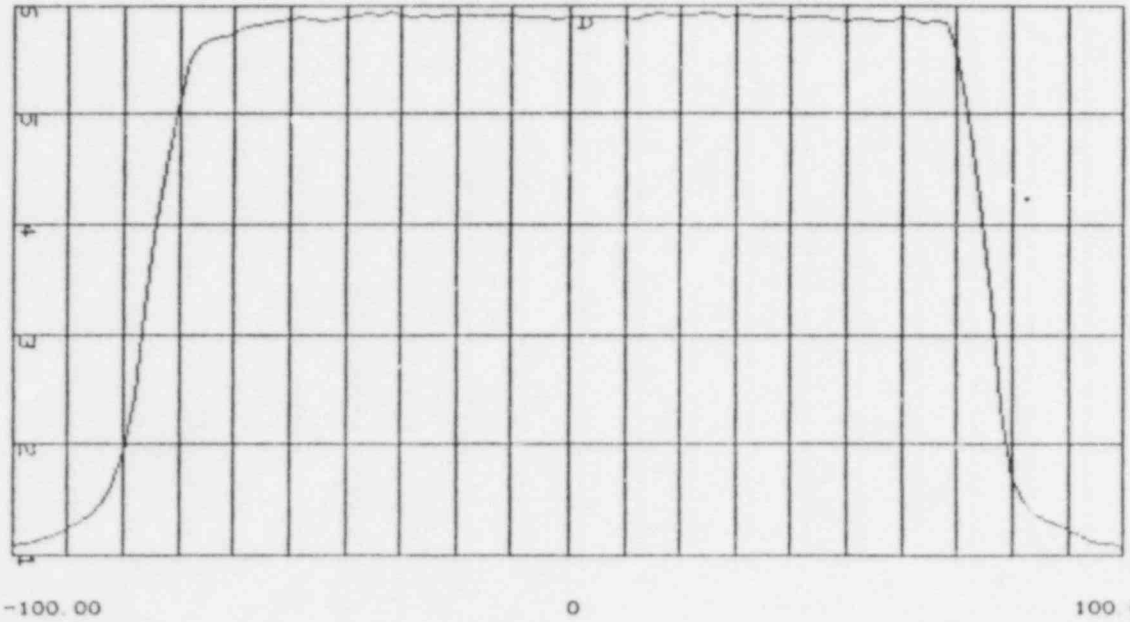
PLOT SCALE= 1.00
FILE ID: TAMC
STUDY ID: X3
NORMALIZATION MODE: C
CENTRAL AXIS MAX=1110
GLOBAL MAXIMUM=1095
SAMPLED VALUE=0

SCAN: 1
SCAN MAX=1095
DATA TYPE: RAW

Lt. Lat (G=270°)

INPLANE

FAST SCAN AXIS: X
SLOW SCAN AXIS: Y



-100.00 0 100.00

Gantry →

1 2 3 4 5 6
0.00 % 20.00 % 40.00 % 60.00 % 80.00 % 100.00 %
A =0 SCAN 1

DENSITOMETER STUDY

PLOT SCALE= 1.00
FILE ID: TAMC
STUDY ID: X4
NORMALIZATION MODE: C
CENTRAL AXIS MAX=1040
GLOBAL MAXIMUM=1038
SAMPLED VALUE=0

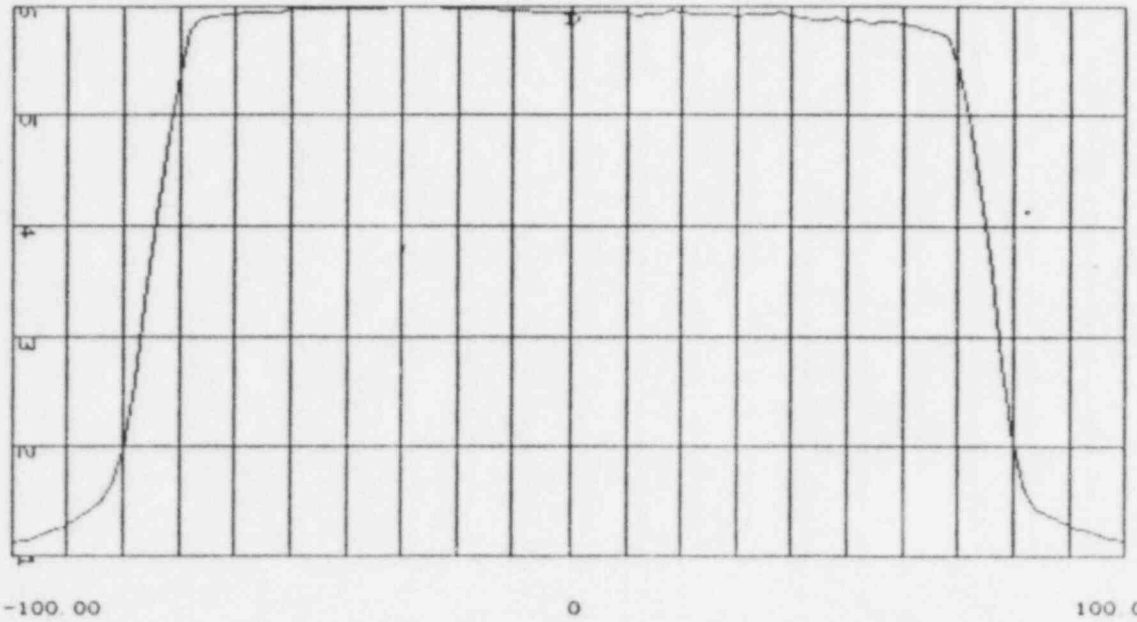
SCAN: 0
SCAN MAX=1040
DATA TYPE: RAW

POSTERIOR (Gantry=180°)

X-PLANE

FAST SCAN AXIS: X
SLOW SCAN AXIS: Y

LEFT



RIGHT

1 2 3 4 5 6
0.00 % 20.00 % 40.00 % 60.00 % 80.00 % 100.00 %
A -> SCAN 0

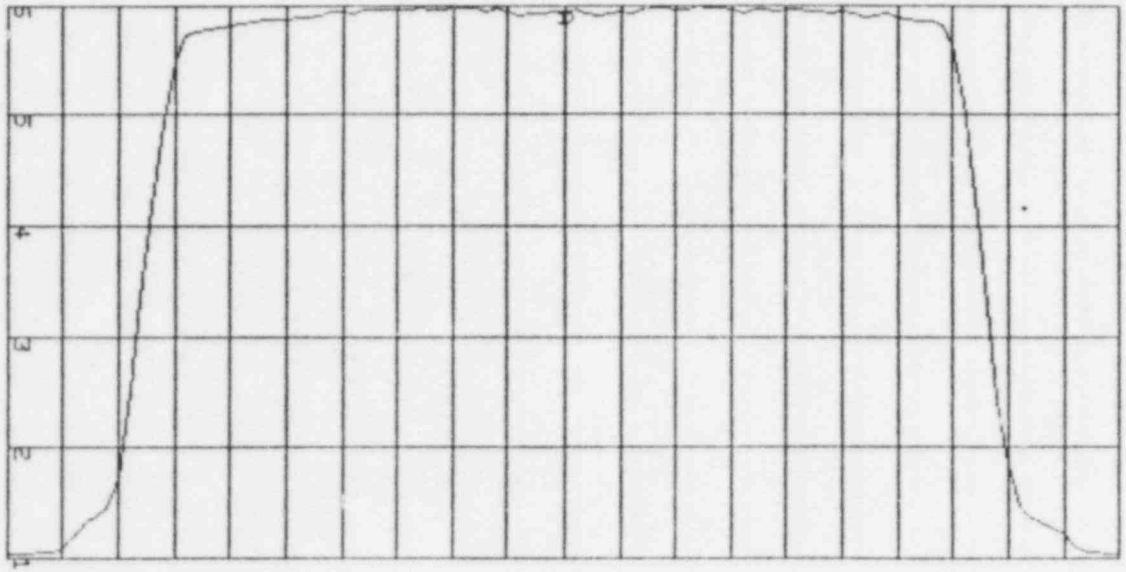
DENSITOMETER STUDY

PLOT SCALE= 1.00
FILE ID: TAMC
STUDY ID: X4
NORMALIZATION MODE: C
CENTRAL AXIS MAX=1040
GLOBAL MAXIMUM=1038
SAMPLED VALUE=0

SCAN: 1
SCAN MAX=1038
DATA TYPE: RAW

POSTERIOR (G=180°)
INPLANE

FAST SCAN AXIS: X
SLOW SCAN AXIS: Y



Gantry →

1 2 3 4 5 6
0.00 % 20.00 % 40.00 % 60.00 % 80.00 % 100.00 %
A -> SCAN 1

LEAK TEST CERTIFICATE
ATTESTATION D'ÉTANCHÉITÉ

ORDER No. 43233 **DATE** 1985 March 6
Nº DE COMMANDE

DESCRIPTION OF SOURCE TESTED
DESCRIPTION DES SOURCES VÉRIFIÉES

One Cobalt-60 Teletherapy Source 1.5 CM. Active Diameter, AECL Type C 146
Une source de téléthérapie au Cobalt-60, *CM de diamètre actif, ÉACL, Type C*

Serial No. S-3716 Other
Nº de série *Autre*

LEAK TESTS PERFORMED
ÉPREUVES D'ÉTANCHÉITÉ EFFECTUÉES

(See reverse for description of tests)
(Description des épreuves au verso)

RESULTS OF TESTS
RÉSULTATS DES ÉPREUVES

☒ 1. THE DRY WIPE TEST, PROCEDURE DG-0065 — NEGATIVE
ÉPREUVE PAR FROTTEMENT À SEC, PROCÉDÉ DG-0065

☐ 2. OTHER TESTS (AS DESCRIBED BELOW)
AUTRES ÉPREUVES (DÉCRITES CI-APRÈS)

DATE OF COMPLETION OF TESTS
ÉPREUVES TERMINÉES LE

1985 March 6

FOR THE COMPANY
POUR LA SOCIÉTÉ

Source Production Department
Service de la production des sources

Atomic Energy of Canada Limited
Radiochemical Company
P.O. Box 13500
Kanata, Ontario
Canada
K2K 1X8

L'Énergie Atomique du Canada, Limitée
Société Radiochimique
C.P. 13500
Kanata, Ontario
Canada
K2K 1X8

ISO-091

Pink/Rose — Central Records/Richier Central
Yellow/Jaune — Unit History File/Dossier de l'historique des appareils
Blue/Bleu — Industrial Products/Produits industriels
Green/Vert — Quality Assurance/Assurance de la qualité

ATOMIC ENERGY OF CANADA LIMITED • COMMERCIAL PRODUCTS

REPORT OF ROUTINE WIPE TEST FOR CONTAMINATION

P&S 43233

IMPORTANT:
Sources shall be tested for leakage at intervals not to exceed six months. Records of test results shall be kept in units of microcuries and maintained for inspection by the appropriate Licensing Authority.

CUSTOMER LOCATION: THE AROOSTOOK MEDICAL CENTRE PRESQUE ISLE MAINE

MODEL & SERIAL NO. 780 #431

DATE OF TEST(S): 22 MAR 85

DESCRIPTION OF SOURCE(S) TESTED:

Source in Rack ☐
Drawer hole ☒
Collimator ☐

for ^{60}Co ☒ , ^{137}Cs ☐ , ^{238}U ☐ .

Survey Meter Used: Berthold RATO/F Serial No. 056996

Instrument Sensitivity:

A		B		
400 c/min	=	0.05 µCi	^{60}Co	☐
1000 c/min	=	0.05 µCi	^{137}Cs	☐
350 c/min	=	0.005 µCi	^{238}U	☐

Calibration Date: 3 JAN 85

Leak Test(s) Performed:

☒ 1. Routine wipe contamination test as detailed in the Facility Instruction and Maintenance Manual or Field Service Instructions.

☐ 2. Other test(s) as described on reverse side.

Gross Wipe Reading = N.C. c/min
Background Reading = N.C. c/min

Net Wipe Reading = N.C. c/min x (B)/(A) _____ µCi/c/min = _____ µCi

Test Evaluation:

☒ 1. NEGATIVE - Test showed less than reportable limit.

☐ 2. POSITIVE - Readings and initial corrective action to be detailed on reverse side.

It is hereby certified that the test(s) indicated above have been carried out under the supervision of the undersigned.
Conversion to S.I. Radiological Units 0.05 µCi = 1.85 kBq and 1 mrem = 10 µSv.

Signed [signature]

Date 22 MAR 85 *Title* Senior Rep.

MAINE RADIATION PHYSICS, INC.
P.O. Box 664
Portland, Maine 04104

REPORT OF COBALT-60 WIPE TEST
THE AROOSTOOK MEDICAL CENTER
PRESQUE ISLE, MAINE

I. Date of Check

Performed 4/20/85, Read 4/24/85

II. Procedure

Moistened swabs were used to wipe the inner collimator and jaws of the unit. The activity of the swabs was subsequently measured on a well-type scintillation counter by comparison with a known source of Co-60 (0.05 uCi on June 1, 1975: Present activity 0.013 uCi).

III. Results

The following gross counts were recorded for a one minute counting period.

Background	35	cpm
Co-60 Standard	4019	cpm
Control	35	cpm
Test Sample	49	cpm

These results indicate that the removable activity is below the acceptable limit of 0.05 uCi.

IV. Recommendations

None

Joseph S. Blinick, Ph.D.
Certified Radiological Physicist

Certificate Of Measurement

of

TELETHERAPY SOURCE S-3716

for

CUSTOMER THE AROOSTOOK MEDICAL CENTER
PRESQUE ISLE MAINE

AECL ORDER No. P&S 43233

THERAPY UNIT OUTPUT When installed in THERATRON 780#431 (at maximum field size) the exposure rate will be 104.0 Rmm (±5%) based on the source measurement (below), and the equipment conversion ratio described on sheet 3.

MEASUREMENT OF SOURCE Source S-3716 is a 1.5 cm diameter standard source, type C-146, containing 5590 curies cobalt 60. The source exposure rate was 90.0 Rmm (±3%) at the one metre position of the measurement cell.

DATE OF MEASUREMENT 1985 FEBRUARY 20

MEASUREMENT METHOD

The source exposure rate was measured in the cell described on the following sheet (Form QC 9 Sheet 2). The exposure rate was measured with an air wall cavity ionization chamber having a volume of 0.6 cm^3 and fitted with a 4.6 mm lucite equilibrium cap. The instrument is calibrated in a cobalt-60 exposure rate certified by the National Research Council of Canada.

ACCURACY

The uncertainty in the source exposure rate applies only to measurement of this source in the AECL Measurement Cell. It represents the maximum total uncertainty due to all causes including the calibration of the Council's primary exposure rate, the calibration of their instrumentation and the precision of measurement in the Measurement Cell. Additional uncertainty due to the comparative measurements involved, has been included in the statement of unit output.

EXCERPT FROM THE RECOMMENDATIONS OF THE INTERNATIONAL COMMISSION ON RADIATION UNITS & MEASUREMENTS, REPORT ICRU-18, OCTOBER 1970. "It must be emphasized the measurement of exposure rate and/or absorbed dose for treatment purposes should be made locally by the user himself. The statement of equipment conversion ratio by the manufacturer should not be regarded as a substitute for this."

ISSUED 1985 MARCH 6

APPROVED P.D. Lanoue
Measurement

G.R. Malkoske
Authorization

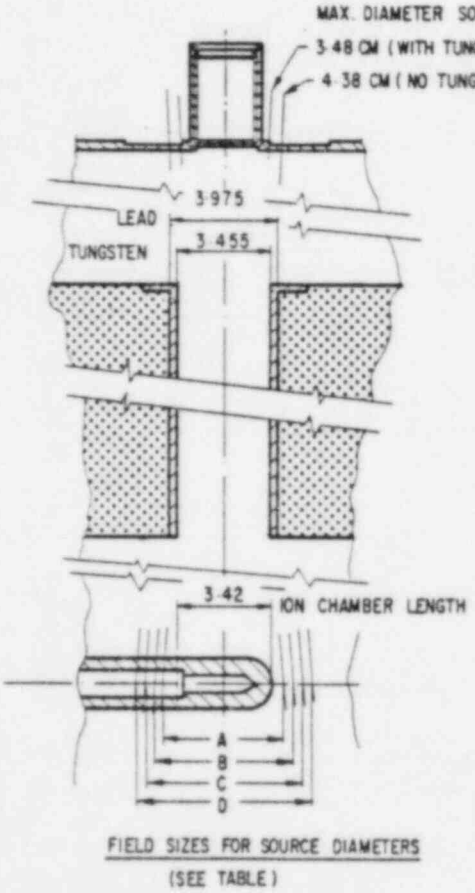
Atomic Energy of Canada Limited • Radiochemical Company
Kanata • Ontario

NOTE: Rmm stands for roentgens per minute at one metre.

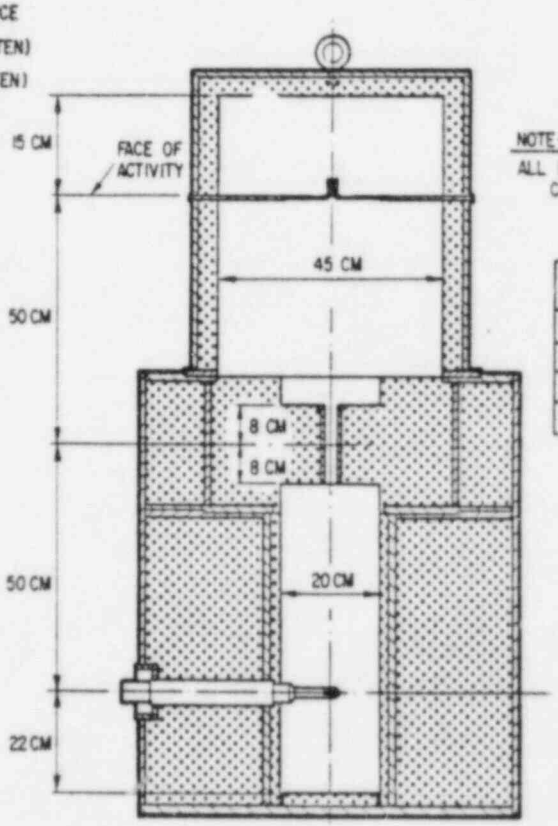
MEASUREMENT CELL FOR TELETHERAPY SOURCES

The exposure rates from these sources are measured in a cell designed and constructed for this purpose by Atomic Energy of Canada Limited and located in Kanata. It meets all the specifications laid down in report ICRU-18 (by the International Commission on Radiation Units and Measurements) issued in October, 1970. These specifications define a measurement cell contributing less than 1% additional scattered radiation to the actual radiation emitted by the source. The cell is intended for use remotely inside a hot cell. The sketches below depict the important features of the cell.

The source is placed on a light aluminum support in the upper compartment. The collimator is lead, 16 cm thick, situated midway between source and probe. The collimator may be reduced in diameter when measuring small diameter sources by inserting tungsten liners. A fixed holder is provided to locate the ion chamber in the lower compartment with its centre 1 meter below the face of the activity.



FIELD SIZES FOR SOURCE DIAMETERS
(SEE TABLE)



NOTE:-
ALL DIMENSIONS IN CENTIMETRES

	SOURCE DIA.	FIELD SIZES
A	2·5	4·36
B	2·0	4·99
C	1·5	5·69
D	1·0	6·37

Details for this sketch are taken from drawing A10801.

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EQUIPMENT CONVERSION RATIOS FOR AECL THERAPY UNITS

Equipment Conversion Ratio is the ratio of unit output at one metre to source output at one metre. It is a function of the field size setting of the collimator.

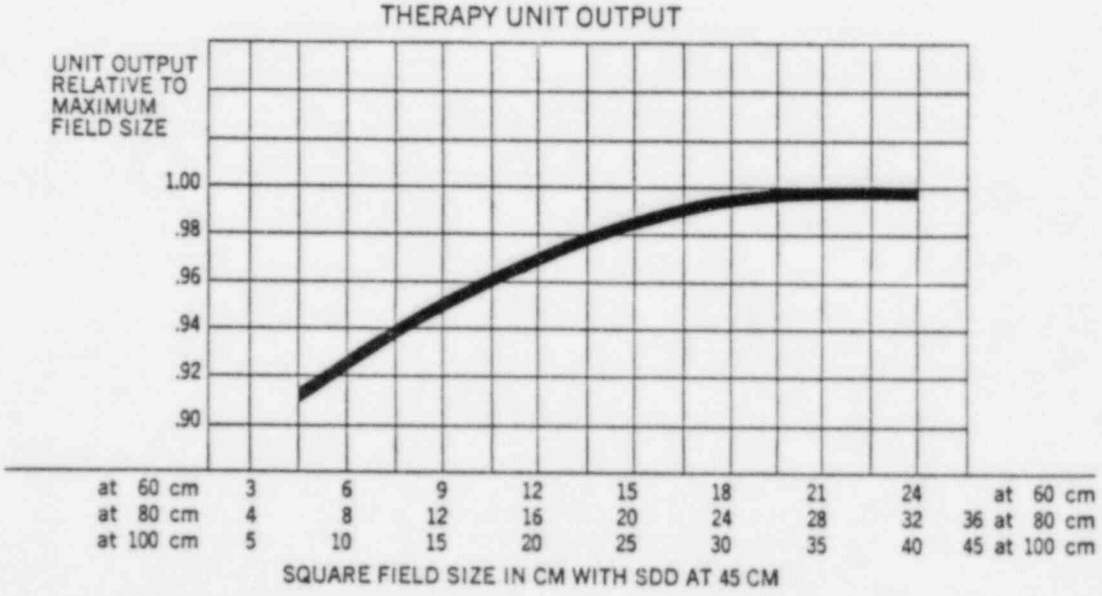
For AECL Units, Equipment Conversion Ratios are defined at maximum field size.

THERAPY UNIT	EQUIPMENT CONVERSION RATIO*
** ELDORADO A	1.15
** MODEL B, C, CII, F, G & SUPER G	1.09
***MODELS 6, 60, 8, 80, 76, 78, 765 & 780	1.15

* Equipment Conversion Ratio to convert certified source Rmm to unit output at one metre, and maximum field size.

** Older AECL units having a shutter and a source in a square drawer.

*** AECL units having an interleaved collimator and a source in a round drawer are related by the general unit output curve shown below. The square field sizes depicted for treatment distances of 100, 80 and 60 cm are geometrically related at a trimmer distance (SDD) of 45 cm.



EQUIPMENT CONVERSION RATIOS are slightly affected by active source dimensions. A correction which does not exceed ±2% will be applied to the exposure rate calculated for the customer's unit.

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THE AROOSTOOK MEDICAL CENTER
PRESQUE ISLE, MAINE
APRIL 20, 1985

TABLE I
ENVIRONMENTAL SURVEY

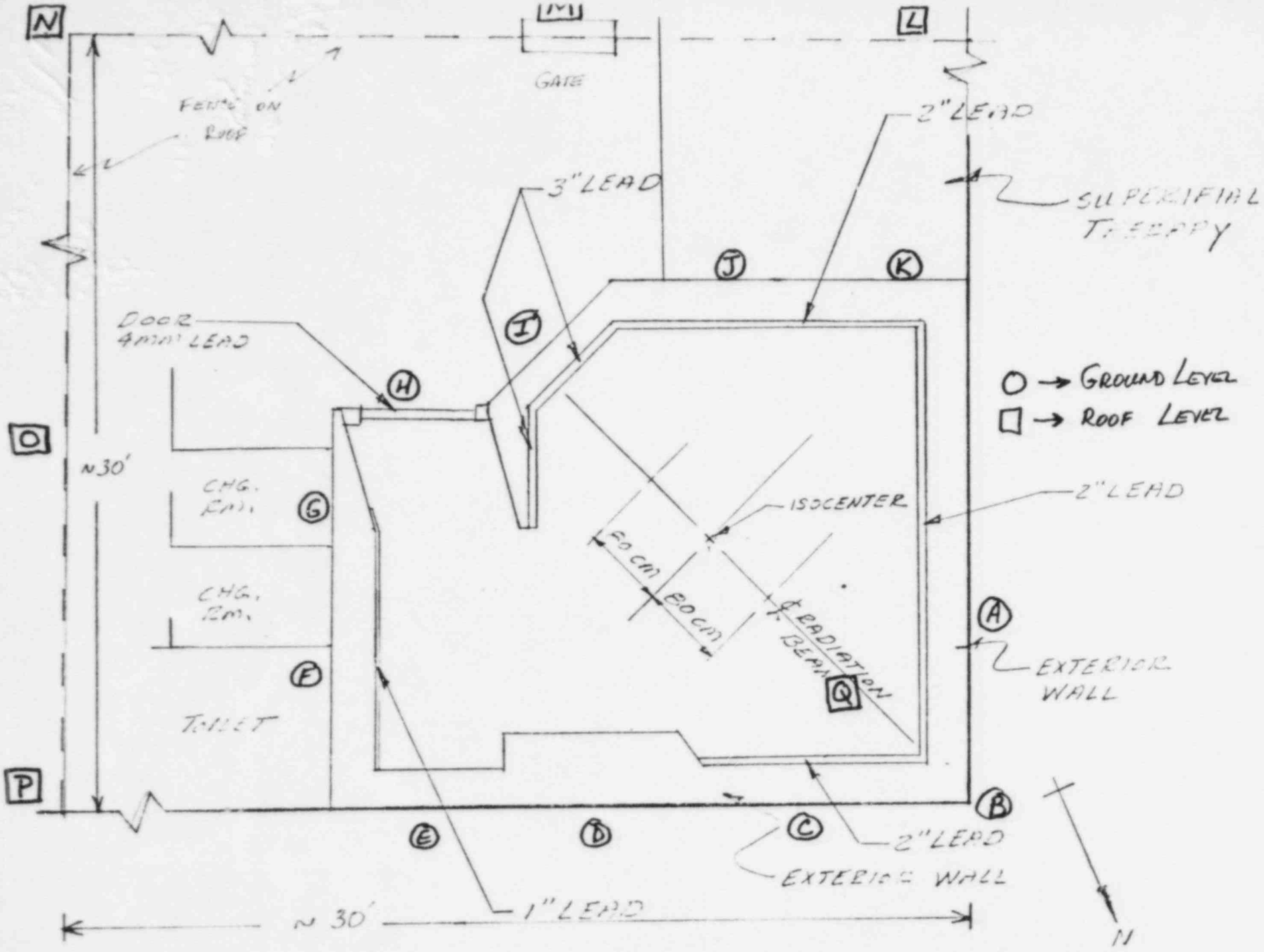
LOCATION	POSITION ON FIG.	MAXIMUM READING (mR/hr)	MAXIMUM EXPECTED EXPOSURE IN ONE HOUR (mR)	MAXIMUM EXPECTED EXPOSURE PER WEEK (mR)
Background		0.02		
Outside	A	0.3	0.1	2.0
Outside	B	0.5	0.1	3.3
Outside	C	0.9	0.2	6.0
Outside	D	0.4	0.1	2.7
Outside	E	0.3	0.1	2.0
Toilet	F	2.0	0.4	13
Changing Room	G	6.0	1.2	40
Entranceway	H	7.0	1.4	48
Control Area	I	7.0	1.4	48
Orthovoltage Room	J	4.0	0.8	27
Orthovoltage Room	K	3.0	0.6	20
W Fence Corner(Roof)	L	1.2	0.2	8.0
Fence Gate (SW side)	M	1.5	0.3	10
S Fence Corner	N	0.8	0.2	5.3
SE Side of Fence	O	1.8	0.4	12
E Fence Corner	P	1.8	0.4	12
Inside Fence (max.)	Q	600+	-	-
Highest Pt. of Adjacent Bldg.	R	0.02	< 0.01	0.1

NOTES

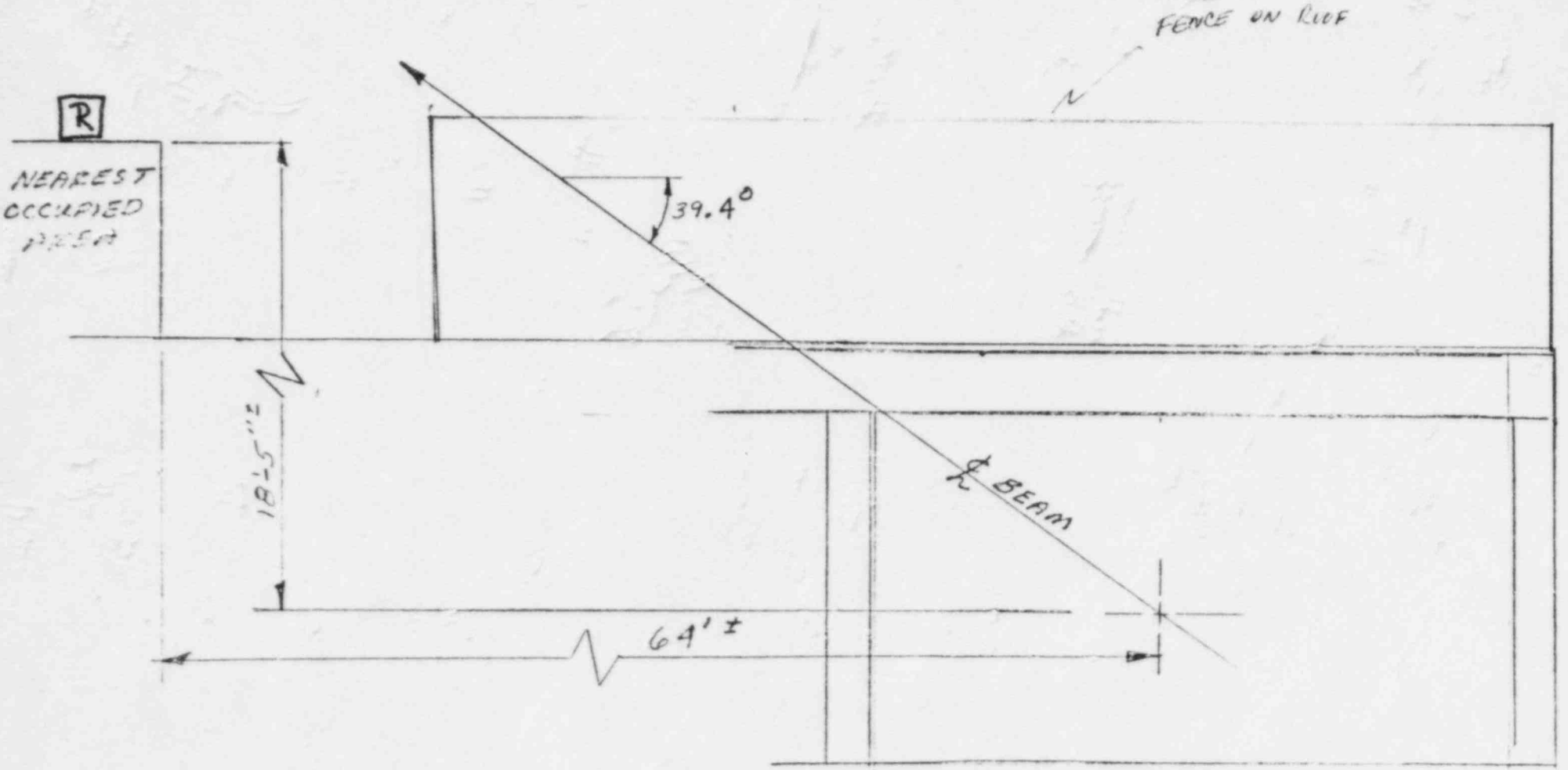
1. The maximum expected exposures in one hour and one week are based on an expected beam-on time of 12 minutes in any one hour, and 6.67 hours per week respectively (see Section X-Workload).

2. It is assumed that all areas are continuously occupied, even though this is extremely unlikely in many cases.

3. The area inside the fence is a restricted area by virtue of the control measures taken to prevent entry into this area during periods when the source is on.


N
M
L
GATE
FENCE ON ROOF
2" LEAD
3" LEAD
SUPERIFIAL TREPPY
J
K
I
DOOR 4mm LEAD
H
O → GROUND LEVEL
□ → ROOF LEVEL
O
N 30'
CHG. EQU.
G
CHG. EQU.
ISOCENTER
2" LEAD
60 CM
60 CM
RADIATION BEAM
Q
A
EXTERIOR WALL
F
TOILET
P
E
D
C
B
2" LEAD
EXTERIOR WALL
1" LEAD
N 30'
N
SCALE: 1/4" = 1'-0"

THIIC



SCALE: 1/4" = 1'-0"

TERRACE