FORM NRC-313M (8-78) 10 CFR 35	U.S. NUCLEAR REGULATORY COMMISSION APPLICATION FOR MATERIALS LICENSE – MEDICAL	Approved: GAO R0557

INSTRUCTIONS – *Complete Items 1 through 26 if this is an initial application or an application for renewal of a license. Use supplemental sheets where necessary. Item 26 must be completed on all applications and signed. Retain one copy. Submit original and one copy of entire application to: Director, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Upon approval of this application, the applicant will receive a Materials License. An NRC Materials License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Parts 19, 20 and 35 and the license fee provision of Title 10, Code of Federal Regulations, Part 170. The license fee category should be stated in Item 26 and the appropriate fee enclosed.*

1.a. NAME AND MAILING ADDRESS OF APPLICANT *(Institution, firm, clinic, physician, etc.)* INCLUDE ZIP CODE

Howard University Hospital-Department of Radiotherapy
Washington, D.C. 20060
c/o Howard University Radiation Safety Comm.

TELEPHONE NO.: AREA CODE (202) 636 7216

1.b. STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED *(If different from 1.a.)* INCLUDE ZIP CODE

Howard University Hospital
Department of Radiotherapy
2041 Georgia Avenue, N.W.
Washington, D.C. 20060

2. PERSON TO CONTACT REGARDING THIS APPLICATION

George A. Ferguson, Ph.D., Chairman
Howard University Radiation Safety Comm.

TELEPHONE NO.: AREA CODE (202) 636 7216

3. THIS IS AN APPLICATION FOR: *(Check appropriate item)*

a. ☐ NEW LICENSE
b. ☐ AMENDMENT TO LICENSE NO.
c. ☒ RENEWAL OF LICENSE NO. 08-03075-07

4. INDIVIDUAL USERS *(Name individuals who will use or directly supervise use of radioactive material. Complete Supplements A and B for each individual.)*

Alfred L. Goldson, M.D.
Ebrahim Ashayeri, M.D.
Chitti Moorthy, M.D.

5. RADIATION SAFETY OFFICER (RSO) *(Name of person designated as radiation safety officer. If other than individual user, complete resume of training and experience as in Supplement A.)*

J. Rao Nibhanupudy (Medical Physicist)
Gregory B. Talley (Radiation Safety Officer)

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
10 CFR 31.11 FOR IN VITRO STUDIES		
10 CFR 35.100, SCHEDULE A, GROUP I		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP II		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP III		
10 CFR 35.100, SCHEDULE A, GROUP IV	x	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V	x	AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI	x	35,000

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS *(In millicuries)*
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM	x	50
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES	x	50
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.	x	100
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA	x	500
XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.		

6.b. RADIOACTIVE MATERIAL FOR USES NOT LISTED IN ITEM 6.a. *(Sealed sources up to 3 mCi used for calibration and reference standards are authorized under Section 35.14(d), 10 CFR Part 35, and NEED NOT BE LISTED.)*

ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	MAXIMUM NUMBER OF MILLICURIES OF EACH FORM	DESCRIBE PURPOSE OF USE
Uranium (Depleted in Uranium-235) Californium-252	Cadmium Plated Metal Sealed Source (Savannah River Type ALC-P4C	400 kilogram 22 Micrograms	As shielding in Varian Clinac-4 Linear Accelerator To be used in Remote After-loader technique

License Fee Information
on Reverse Side

07433

FORM NRC-313M (8-78)

INFORMATION REQUIRED FOR ITEMS 7 THROUGH 23

For Items 7 through 23, check the appropriate box(es) and submit a detailed description of all the requested information. Begin each item on a separate sheet. Identify the item number and the date of the application in the lower right corner of each page. If you indicate that an appendix to the medical licensing guide will be followed, do not submit the pages, but specify the revision number and date of the referenced guide: Regulatory Guide 10.8 , Rev. 1 Date: 10/80

7. MEDICAL ISOTOPES COMMITTEE	
x	Names and Specialties Attached; and
x	Duties as in Appendix B; or *(Check One)*
	Equivalent Duties Attached
8. TRAINING AND EXPERIENCE	
x	Supplements A & B Attached for Each Individual User; and
	Supplement A Attached for RSO.
9. INSTRUMENTATION *(Check One)*	
	Appendix C Form Attached; or
x	List by Name and Model Number
10. CALIBRATION OF INSTRUMENTS	
x	Appendix D Procedures Followed for Survey Instruments; or *(Check One)*
	Equivalent Procedures Attached; and
	Appendix D Procedures Followed for Dose Calibrator; or *(Check One)*
	Equivalent Procedures Attached
11. FACILITIES AND EQUIPMENT	
x	Description and Diagram Attached
12. PERSONNEL TRAINING PROGRAM	
x	Description of Training Attached
13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL	
x	Detailed Information Attached
14. PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS *(Check One)*	
x	Appendix F Procedures Followed; or
	Equivalent Procedures Attached

15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL *(Check One)*	
x	Appendix G Rules Followed; or
	Equivalent Rules Attached
16. EMERGENCY PROCEDURES *(Check One)*	
x	Appendix H Procedures Followed; or
	Equivalent Procedures Attached
17. AREA SURVEY PROCEDURES *(Check One)*	
x	Appendix I Procedures Followed; or
	Equivalent Procedures Attached
18. WASTE DISPOSAL *(Check One)*	
x	Appendix J Form Attached; or
	Equivalent Information Attached
19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS *(Check One)*	
x	Appendix K Procedures Followed; or
	Equivalent Procedures Attached
20. THERAPEUTIC USE OF SEALED SOURCES	
x	Detailed Information Attached; and
x	Appendix L Procedures Followed; or *(Check One)*
	Equivalent Procedures Attached
21. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES (e.g., Xenon – 133)	
	Detailed Information Attached
22. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS	
	Detailed Information Attached
23. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b	
x	Detailed Information Attached

24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)			SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	X	FILM	R.S. Landauer Jr. and Co.	Monthly
		TLD		
		OTHER (Specify)		
b. FINGER	X	FILM	R.S. Landauer Jr. and Co.,	Monthly
		TLD		
		OTHER (Specify)		
c. WRIST		FILM	None	
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

Applicant
Check No. 31666 $150 - MB
Amount/Fee Category
Type of Fee Renewal
Date Check Rec'd 4/29/81
Received By BROWN

RECEIVED BY LFMB
Date 4/20/81
Log APRIL PG 4 Renewal Amend.
By Brown
Orig To
Action Compl 4/30/81

25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL

NAME OF HOSPITAL

MAILING ADDRESS

CITY | STATE | ZIP CODE

b. ATTACH A COPY OF THE AGREEMENT LETTER SIGNED BY THE HOSPITAL ADMINISTRATOR.

c. WHEN REQUESTING THERAPY PROCEDURES, ATTACH A COPY OF RADIATION SAFETY PRECAUTIONS TO BE TAKEN AND LIST AVAILABLE RADIATION DETECTION INSTRUMENTS.

26. CERTIFICATE

(This item must be completed by applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 1a certify that this application is prepared in conformity with Title 10, Code of Federal Regulations, Parts 30 and 35, and that all information contained herein, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

a. LICENSE FEE REQUIRED *(See Section 170.31, 10 CFR 170)*

(1) LICENSE FEE CATEGORY: 7.B.

(2) LICENSE FEE ENCLOSED: $ 150.00

b. APPLICANT OR ~~CERTIFYING OFFICIAL~~ *(Signature)* A. Goldson MD

(1) NAME *(Type of Print)* ALFRED L. GOLDSON, M.D.

(2) TITLE CHAIRMAN, RADIOTHERAPY DEPT

c. DATE MARCH 13, 1981

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on Form NRC-313M. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S)** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30-36 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES** The information may be used: (a) to provide records to State health departments for their information and use; and (b) to provide information to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for a NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you. A copy of the license issued will routinely be placed in the NRC's Public Document Room, 1717 H Street, N.W., Washington, D.C.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed.

5. **SYSTEM MANAGER(S) AND ADDRESS** Director, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

ATTACHMENT I

ITEM 6-A CONTINUED

ITEM: 6-A

Isotope	Physical/Chemical Form	Maximum Possession Limit
Cs-137	Seald Sources (3M Company Model Nos. 6D6C and 6B6G or Amersham/Searle Model CDCH, or Nuclear Associates)	2200 mCi
I-125	Sealed Sources (Standard seeds from 3M Company, Minnesota)	700 mCi
I-131	as iodide	500 mCi
P-32	as soluble phosphate	50 mCi
	as colloidal chromic phospate	100 mCi
Sr-90	Sealed Source (Tracer lab)	100 mCi
Ir-192	Sealed Sources (Rad/Irid, Inc.)	15 Ci
Co-60	Sealed Sources (type C-303 or C-304 of Atomic Energy of Canada, Ltd., or Neutron Products, Maryland), for intracavitary treatment by Remote Afterloading technique.	14 Ci

ATTACHMENT II

HOWARD UNIVERSITY HOSPITAL RADIATION
PROTECTION COMMITTEE

HOWARD UNIVERSITY HOSPITAL
RADIATION PROTECTION COMMITTEE

Pongrac N. Jilly, M.D. (Chairman)
Pathologist/Hematologist
Clinical Laboratories

Tom Nowlin
Howard University Hospital
Administrator

Gregory B. Talley
Howard University Radiation
Safety Officer

Willie L. Ruff, Ph.D.
Biochemist
Clinical Laboratories

Javan E. Anderson, M.D.
Radiologist
Department of Radiology

Edith A. Higginbotham, M.D.
Nuclear Radiologist
Division of Nuclear Medicine

Alfred Goldson, M.D.
Radiation Therapist
Department of Radiotherapy

J. Rao Nibhanupudy
Radiation Physicist
Department of Radiotherapy

Gwendolyn C. King
Radiation Physicist
Department of Radiotherapy

George A. Ferguson, Ph.D., Chairman
Howard University Radiation Safety
Committee

Meeting Frequency: Quarterly

HOWARD UNIVERSITY RADIATION SAFETY
COMMITTEE

Dr. Javan Anderson
Department of Radiology
Howard University Hospital
745-1536

Mr. Warren Ashe
Assistant Dean for Research
College of Medicine
636-7818

Dr. Allen Calvert
Department of Pediatrics
College of Medicine
636-6340

Dr. Melvin Drummond
Department of Medicine
Hematology Division
Howard University Hospital
745-1511

Dr. George A. Ferguson (Chairman)
Nuclear Engineering Program
Downing Hall of Engineering
636-6605/7216

Dr. Edith Higginbotham
Nuclear Medicine Division
Howard University Hospital
745-1391

Dr. Marvin A. Jackson
Department of Pathology
College of Medicine
636-6309

Dr. William Jackson
Department of Chemistry
636-6900

Dr. Pongrac Jilly, Chairman
Howard University Hospital Radiation
Protection Committee
745-1511

Mr. J. Rao Nibhanupudy
Department of Radiotherapy
Howard University Hospital
745-1421

Dr. Coleman R. Tuckson (Vice Chairman)
College of Dentistry
636-6442

Dr. William West, Chairman
College of Medicine Radiation Protection
Committee
636-6311

Gregory B. Talley
Radiation Safety Officer
636-7216

Howard University Office of Radiation Safety
Freedmen's Square - Annex II, Room 211
636-7216

Meeting Frequency: Monthly

ATTACHMENT III

TRAINING & EXPERIENCE

SUPPLEMENT 4- A

Dr. Alfred L. Goldson's experience and training

FORM NRC-313M-SUPPLEMENT A (8-78)

U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE
Alfred L. Goldson, MD	Washington, DC

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Therapeutic Radiology	Dec. 1976

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Memorial Sloan-Kettering Hospital New York - Nov. 1974 Howard Univ. Hospital-Since 1972	80	80
b. RADIATION PROTECTION	" "	80	50
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	" "	50	50
d. RADIATION BIOLOGY	" "	50	50
e. RADIOPHARMACEUTICAL CHEMISTRY	Memorial Sloan-Kettering Hospital New York - Nov. 1974	20	20

5. EXPERIENCE WITH RADIATION. *(Actual use of Radioisotopes or Equivalent Experience)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
I-131.	150 mCi.	Howard University Hospital, Washington, DC and Memorial Hospital, New York	Since July, 1972 to present	Therapy and diagnosis
I-125.	100 mCi.			
P-32.	200 mCi.			
Tc-99m.	Diagnostic Only			
Au-198.	300 mCi.			
Co-60.	3000 mCi.			
Cs-137.	300 mCi.			
Ir-192.	200 mCi.			
Sr-90.	50 mCi.			

ML10

FORM NRC-313M-SUPPLEMENT B
(3-78)

U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each.

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME
Alfred L. Goldsen

STREET ADDRESS
Chairman, Radiotherapy Department
2041 Georgia Avenue, N. W.

CITY | STATE | ZIP CODE
Washington, DC | 20060

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.

2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.

3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION	15	
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Se-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc-99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			

PRECEPTOR STATEMENT *(Continued)*

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN *(Continued)*

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
P-32 *(Soluble)*	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES	3	
P-32 *(Colloidal)*	INTRACAVITARY TREATMENT	3	
I-131	TREATMENT OF THYROID CARCINOMA	3	
	TREATMENT OF HYPERTHYROIDISM	15	
Au-198	INTRACAVITARY TREATMENT	4	
Co-60 or Cs-137	INTERSTITIAL TREATMENT	2	
	INTRACAVITARY TREATMENT	60	
I-125 or Ir-192	INTERSTITIAL TREATMENT	30 40	
Co-60 or Cs-137	TELETHERAPY TREATMENT	653	
Sr-90	TREATMENT OF EYE DISEASE	2	
	RADIOPHARMACEUTICAL PREPARATION	-	
Mo-99/ Tc-99m	GENERATOR	-	
Sn-113/ In-113m	GENERATOR	-	
Tc-99m	REAGENT KITS	-	
Other			

3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING

At Howard University Hospital, since July, 1972

At Memorial Hospital, New York, 1974-1975

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:

a. NAME OF SUPERVISOR
Dr. U. K. Henschke

b. NAME OF INSTITUTION
Chairman, Department of Radiotherapy
(July, 1970 to July, 1979)

c. MAILING ADDRESS
Howard University Hospital
2041 Georgia Avenue, N. W.

d. CITY
Washington, DC 20060

5. MATERIALS LICENSE NUMBER(S)

6. PRECEPTOR'S SIGNATURE

Dr. Henschke is deceased.

7. PRECEPTOR'S NAME *(Please type or print)*
Dr. Ulrich K. Henschke

(Expired 6/29/80)

8. DATE
December 17, 1979

FORM NRC-313M-SUPPLEMENT B
(8-78)

FORM NRC-313M-SUPPLEMENT A (8-78) U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE
Ebrahim Ashayeri, M.D.	Washington, D.C.

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Therapeutic Radiology	December 1978

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Temple University Hospital	More than 300	
b. RADIATION PROTECTION	Temple University Hospital	30 hours + more in Physics and Radiobiology	
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	Temple University Hospital	30 hours	
d. RADIATION BIOLOGY	Temple University Hospital	More than 100 hours	
e. RADIOPHARMACEUTICAL CHEMISTRY	Temple University Hospital	5 hours	

5. EXPERIENCE WITH RADIATION. *(Actual use of Radioisotopes or Equivalent Experience)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	10,000. Curies	Temple University Hospital and Howard University Hosp.	5 years	External Human Use
Co-60	4 Curies	Howard University Hospital	2 years	Intracavitary Remote Afterloader
Cs-137	250 mCi	Temple University Hospital and Howard University Hosp.	5 years	Intracavitary
I-125	600 mCi	Temple University Hospital	3 years	Interstitial Implant

ML10

Supplement A
Training & Experience (Cont'd)

Ebrahim Ashayeri, M.D.

5. Experience With Radiation

I-131	640 mCi	Howard University Hospital and Temple University Hospital	2½ years	Oral Administration
Ir-192	300 Mci	Howard University Hospital and Temple University Hospital	3 years	Interstitial Implant

FORM NRC-313M-SUPPLEMENT B
(8-78)

U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each.

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME
Ebrahim Ashayeri, M.D.

STREET ADDRESS
Howard University Hospital
2041 Georgia Avenue, N.W.

CITY	STATE	ZIP CODE
Washington	D.C.	20060

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.

2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.

3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION	NA	
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME	NA	
	LIVER FUNCTION STUDIES	NA	
	FAT ABSORPTION STUDIES	NA	
	KIDNEY FUNCTION STUDIES	NA	
	IN VITRO STUDIES	NA	
OTHER			
I-125	DETECTION OF THROMBOSIS	NA	
I-131	THYROID IMAGING	NA	
P-32	EYE TUMOR LOCALIZATION	NA	
Se-75	PANCREAS IMAGING	NA	
Yb-169	CISTERNOGRAPHY	NA	
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES	NA	
OTHER			
Tc-99m	BRAIN IMAGING	NA	
	CARDIAC IMAGING	NA	
	THYROID IMAGING	NA	
	SALIVARY GLAND IMAGING	NA	
	BLOOD POOL IMAGING	NA	
	PLACENTA LOCALIZATION	NA	
	LIVER AND SPLEEN IMAGING	NA	
	LUNG IMAGING	NA	
	BONE IMAGING	NA	
OTHER			

PRECEPTOR STATEMENT *(Continued)*

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN *(Continued)*

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
P-32 *(Soluble)*	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES	NA	
P-32 *(Colloidal)*	INTRACAVITARY TREATMENT	8	3 OIC
I-131	TREATMENT OF THYROID CARCINOMA	6	W
	TREATMENT OF HYPERTHYROIDISM	8	10
Au-198	INTRACAVITARY TREATMENT	NA	
Co-60 or Cs-137	INTERSTITIAL TREATMENT	-	
	INTRACAVITARY TREATMENT	25	
I-125 or Ir-192	INTERSTITIAL TREATMENT	15	
Co-60 or Cs-137	TELETHERAPY TREATMENT	200	
Sr-90	TREATMENT OF EYE DISEASE	5	
	RADIOPHARMACEUTICAL PREPARATION		
Mo-99/ Tc-99m	GENERATOR	NA	
Sn-113/ In-113m	GENERATOR	NA	
Tc-99m	REAGENT KITS	NA	
Other			

3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING

Between January 1976 and December 1979, more than 50 hours

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:

a. NAME OF SUPERVISOR Dr. R. Robbins (out of Dr. Alfred Goldson town)

b. NAME OF INSTITUTION
Howard University Hospital

c. MAILING ADDRESS
2041 Georgia Avenue, N.W.

d. CITY
Washington, D.C. 20060

5. MATERIALS LICENSE NUMBER(S)

6. PRECEPTOR'S SIGNATURE

7. PRECEPTOR'S NAME *(Please type or print)*

Alfred L. Goldson, M.D.

Alfred L. Goldson

8. DATE

March 8, 1981

FORM NRC-313M-SUPPLEMENT B
(8-78)

FORM NRC-313M-SUPPLEMENT A (8-78) U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE
Chitti R. Moorthy, M.D.	Illinois Nebraska Washington, D.C.

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Borad of Radiology	Therapeutic Radiology	July 1979

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
		LECTURE/ LABORATORY COURSES (Hours) C	SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Michael Reese Hospital Medical Center, Chicago, Ill. Sloan Kettering Memorial Cancer Center - N.Y. and Howard University Hospital	200 weeks 2-3 hrs/wk	
b. RADIATION PROTECTION		60 Hrs.	
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY		20 hrs.	
d. RADIATION BIOLOGY		200 weeks 1 hr/wk	
e. RADIOPHARMACEUTICAL CHEMISTRY		20 hrs.	

5. EXPERIENCE WITH RADIATION. *(Actual use of Radioisotopes or Equivalent Experience)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	10,000 Ci	Sloan Kettering & Howard University Hospital	2 years	External Radiation
Co-60	4 Ci	" "	2 years	Intracavitary
I-125 I-131 Ir-192 Cs-137 P-32		Michael Reese Hospital, Sloan Kettering, Howard University Hospital	5 years	Remote Afterloader Interstitial &

FORM NRC-313M-SUPPLEMENT B
(8-78)

U. S. NUCLEAR REGULATORY COMMISSION

PRECEPTOR STATEMENT

Supplement B must be completed by the applicant physician's preceptor. If more than one preceptor is necessary to document experience, obtain a separate statement from each.

1. APPLICANT PHYSICIAN'S NAME AND ADDRESS

FULL NAME

Chitti R. Moortty, M.D.

STREET ADDRESS

9152 Edmonston Road

CITY	STATE	ZIP CODE
Greenbelt	MD	20770

KEY TO COLUMN C

PERSONAL PARTICIPATION SHOULD CONSIST OF:

1-Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation for prescribed dosage.

2-Collaboration in dose calibration and actual administration of dose to the patient including calculation of the radiation dose, related measurements and plotting of data.

3-Adequate period of training to enable physician to manage radioactive patients and follow patients through diagnosis and/or course of treatment.

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
I-131 or I-125	DIAGNOSIS OF THYROID FUNCTION		
	DETERMINATION OF BLOOD AND BLOOD PLASMA VOLUME		
	LIVER FUNCTION STUDIES		
	FAT ABSORPTION STUDIES		
	KIDNEY FUNCTION STUDIES		
	IN VITRO STUDIES		
OTHER			
I-125	DETECTION OF THROMBOSIS		
I-131	THYROID IMAGING		
P-32	EYE TUMOR LOCALIZATION		
Se-75	PANCREAS IMAGING		
Yb-169	CISTERNOGRAPHY		
Xe-133	BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES		
OTHER			
Tc-99m	BRAIN IMAGING		
	CARDIAC IMAGING		
	THYROID IMAGING		
	SALIVARY GLAND IMAGING		
	BLOOD POOL IMAGING		
	PLACENTA LOCALIZATION		
	LIVER AND SPLEEN IMAGING		
	LUNG IMAGING		
	BONE IMAGING		
OTHER			

PRECEPTOR STATEMENT *(Continued)*

2. CLINICAL TRAINING AND EXPERIENCE OF ABOVE NAMED PHYSICIAN *(Continued)*

ISOTOPE A	CONDITIONS DIAGNOSED OR TREATED B	NUMBER OF CASES INVOLVING PERSONAL PARTICIPATION C	COMMENTS *(Additional information or comments may be submitted in duplicate on separate sheets.)* D
P-32 *(Soluble)*	TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA, AND BONE METASTASES	2 3	Radiation Therapy Residency July 1976-June 1979 Michael Reese Hospital Chicago, Ill Brachytherapy Fellowship Involving training in Radioiosotope implantation July 1979-June 1980 Sloan Kettering Memorial Cancer Center, NY
P-32 *(Colloidal)*	INTRACAVITARY TREATMENT	10 3	
I-131	TREATMENT OF THYROID CARCINOMA	5 3	
	TREATMENT OF HYPERTHYROIDISM	3 10	
Au-198	INTRACAVITARY TREATMENT	0	
Co-60 or Cs-137	INTERSTITIAL TREATMENT Co-60	80	
	INTRACAVITARY TREATMENT Cs-137	40	
I-125 or Ir-192	INTERSTITIAL TREATMENT	300	
Co-60 or Cs-137	TELETHERAPY TREATMENT	2,000	
Sr-90	TREATMENT OF EYE DISEASE	35	
	RADIOPHARMACEUTICAL PREPARATION	0	
Mo-99/ Tc-99m	GENERATOR	0	
Sn-113/ In-113m	GENERATOR	0	
Tc-99m	REAGENT KITS	0	
Other			

3. DATES AND TOTAL NUMBER OF HOURS RECEIVED IN CLINICAL RADIOISOTOPE TRAINING

July 1, 1976-June 30, 1980

4. THE TRAINING AND EXPERIENCE INDICATED ABOVE WAS OBTAINED UNDER THE SUPERVISION OF:

a. NAME OF SUPERVISOR
Dr. Basil Hilaris

b. NAME OF INSTITUTION
Sloan Kettering Memorial Cancer Center

c. MAILING ADDRESS
1275 York Avenue

d. CITY
New York, NY 10021

5. MATERIALS LICENSE NUMBER(S)

6. PRECEPTOR'S SIGNATURE

7. PRECEPTOR'S NAME *(Please type or print)*

Alfred L. Goldson, M.D.

Alfred L. Goldson

8. DATE

3.10.81

FORM NRC-313M-SUPPLEMENT B
(8-78)

FORM NRC-313M-SUPPLEMENT A (8-78) — U.S. NUCLEAR REGULATORY COMMISSION

TRAINING AND EXPERIENCE
AUTHORIZED USER OR RADIATION SAFETY OFFICER

1. NAME OF AUTHORIZED USER OR RADIATION SAFETY OFFICER	2. STATE OR TERRITORY IN WHICH LICENSED TO PRACTICE MEDICINE
J. Rao Nibhanupudy	N.A.

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Therapeutic Radiologic Physics	June 1976

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING: LECTURE/ LABORATORY COURSES (Hours) C	TYPE AND LENGTH OF TRAINING: SUPERVISED LABORATORY EXPERIENCE (Hours) D
a. RADIATION PHYSICS AND INSTRUMENTATION	Bhabha Atomic Research Center, India	40	32
	University of Washington, Seattle	16	12
b. RADIATION PROTECTION	Bhabha Atomic Research Center, India	30	18
	University of Washington, Seattle	16	12
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY	"	40	32
	"	16	12
d. RADIATION BIOLOGY	"	16	12
	"	8	--
e. RADIOPHARMACEUTICAL CHEMISTRY	"	16	12
	"	16	--

5. EXPERIENCE WITH RADIATION. *(Actual use of Radioisotopes or Equivalent Experience)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
Co-60	teletherapy: 3000 Ci, Brachy: 4Ci	Howard University Hospital Washington, D.C. 20060	10 years	Brachy and teletherapy
Cs-137	2000 mCi	"	10 years	Brachtherapy
Ir-192	1000 mCi	"	10 years	Brachytherapy
I-125	300 mCi	"	10 years	Brachytherapy
I-131	200 mCi	"	10 years	Hyperthyroidism and Ca of Thyroid
P-32	50 mCi		10 years	Treatment of malignant Disease

CURRICULUM VITA

Gregory B. Talley
707 Hilltop Terrace, S.E.
Washington, D.C. 20019

PERSONAL DATA

Date of Birth: June 3, 1953
Place of Birth: Washington, D.C.

EDUCATIONAL BACKGROUND

Eastern High School
Washington, D.C. (June 1971)

Howard University
Washington, D.C.
B.A., Sociology (1975)

Prince George's Community College
Largo, Maryland (8 hours - Physics)
September-December 1976
January-May 1977

University of the District of Columbia
Washington,D.C. (12 hours - Physics)
June-August 1977
September-December 1977

SPECIALIZED TRAINING

Nationwide Evaluation of X-Ray Trends and Radiation Protection Course
U.S. Department of Health, Education and Welfare
Bureau of Radiological Health (1977)

Level II Compliance Testing Course
U.S. Department of Health, Education and Welfare
Bureau of Radiological Health (1977)

Health Physics and Radiation Protection Course
U.S. Nuclear Regulatory Commission
Oak Ridge Associate Universities
(January 1978)

Radiological Emergency Response Course
Nuclear Regulatory Commission
Nevada Nuclear Test Site (1979)

Management & Disposal of Hazardous & Chemical Wastes
J.T. Baker Chemical Co. (1980)

PROFESSIONAL EXPERIENCE

D.C. Department of Environmental Services
Environmental Health Administration
Community Hygiene Division
July 1975-July 1976

The duties of the incumbent in this position involved investigating and counseling of citizens of proper community and personal hygiene practices. Various means of communication to the public were utilized, from community meetings, and seminars with adult citizens, to demonstrations, puppet shows, and health fair exhibitions geared to the younger citizens of the District of Columbia. In addition, the Health Education Aide provided the proper accountability and justification of all actions and expenditures related to complying with the yearly contract awarded by the Department of Health, Education and Welfare for funding of the project.

D.C. Department of Environmental Services
Environmental Health Administration
Radiological Health Division
July 1976-January 1980

The duties of the incumbent in this position involved participation in all the daily activities related to the routine performance of the District of Columbia's Division of Radiological Health. These activities included reviewing, calculating, and monitoring shielding plans for all facilities in the District of Columbia for proper radiation protection, the surveying and inspecting of all dental and medical facilities in addition to hospitals and clinics in the city for proper operating procedures and working conditions involving ionizing radiation sources in accordance with the Distict of Columbia's and U. S. Nuclear Regulatory Commission's Radiation Protection Standards. Other activities involved the inspection of proper maintenance and accountability practices of facilities using radioactive materials to ascertain compliance with guidelines specified by the U.S. Nuclear Regulatory Commission. All instrumentation used by the District of Columbia's Division of Radiological Health was calibrated to specific accuracy requirements set forth by the Nuclear Regulatory Commission, the quality assurance procedures for the instrumentation as well as accuracy was my responsibility. Swipe and leak tests were conducted routinely on all calibration equipment in addition to other various radiation protection procedures. I conducted radiation air monitoring activities for the Environmental Protection Agency, which included the preparation and calibration of equipment, the collection of data and the evaluation and interpretation of the samples. I also collected and analyzed water and milk samples for radiation contamination during "alerts" for the Center for Disease Control, the Environmental Protection Agency, and the U.S. Nuclear Regulatory Commission. I participated in periodic inspections with members of the U.S. Nuclear Regulatory Commission to become familiar with how new enforcement procedures were implemented as well as to coordinate the two programs. I reviewed and commented on all new Nuclear Regulatory Commission proposals and proposed amendments to existing standards. The District of Columbia Division of Radiological Health received all correspondence from the N.R.C.,

the Bureau of Radiological Health and related agencies regarding health physics and radiation protection, giving me an up-date background on Education and Welfare's Bureau of Radiological Health Nationwide Evaluation of X-ray Trends tests and the Level II Compliance Tests on all diagnostic X-ray machines registered in the District of Columbia since May 1976.

I monitored and inspected all nuclear medicine facilities in the District of Columbia for accurate inventory procedures, proper waste disposal activities and proper utilization of isotopes in accordance to D.C. and N.R.C. regulations. I monitored and maintained records of all radiation dosimeters for persons employed by the District of Columbia Government that required them. My duties also included laser device inspections, microwave surveys and color television set inspections. In addition, I supervised the waste disposal procedures for radioactive wastes in the District of Columbia. The proper procedures require strict adherence with the Nuclear Regulatory Commission standards. I conducted training to x-ray technicians, nurses, sanitarians and physicians on the aspects of health physics and radiation protection. I have served in the capacity of Acting Division Chief on several occasions in the absence of the Division Chief.

Additional professional experience included a 120 day detail to the Consumer Health Division of the Environmental Health Administration. Duties included the inspection of all food establishments in the District of Columbia for sanitary conditions and the proper preparation and handling of food. I was also detailed to the Institutional Hygiene Division. This involved the inspection of all health care facilities, including all hospitals in the District of Columbia Day Care facilities, for proper food handling procedures and proper sanitary procedures in their routine activities.

I co-authoried a paper entitled, "The Use and Misuse of Lasers in the Medical Practice in the District of Columbia" (May 1979). This was presented at the June session of the Bureau of Radiological Health Region I,I Program Directors' Conference, Harrisburg, Pennsylvania.

Howard University
Radiation Safety Office
Washington, D.C
January 1980-Present

The duties of the incumbent in this position involves the assurance that the central facility of the University for the receipt of radioactive materials are properly supervised and maintained in compliance with Federal regulations, protection standards and policies, and that any reported or suspected radiation hazard, over-exposure or accident in areas under supervision are properly investigated and reported.

The incumbent is responsible for assuring that records are properly maintained for all radioactive materials received, distributed and disposed of; assures that radioactive materials ordered by any authorized user does not exceed licensed limits and that policies regarding radioactive wastes are enforced. Plans and conducts radiation safety studies; reviews plans for research and test

programs where radioactive materials are to be used to ascertain that proper precautions will be observed; advises professional personnel in the application of radioactivity calculations to shielding and decontamination procedures to be followed in handling radioactive materials. Tests newly developed techniques and/or implementation to solve the problems of accurately measuring, recording and analyzing data for various types of radioactivity to specific degrees of sensitivity including the use of biological subjects, unique radiation sources, etc.; pursues radiation safety research when necessary.

PROFESSIONAL MEMBERSHIPS

Member - Hazardous Waste Emergency Response Team
Member - Environmental Protection Agency Emergency Monitoring Network
Associate Member - Health Physics Society
Former Member - Board of Directors, National Day Care Association
Former Member - Executive Committee, Department of Human Resources Parent Policy Committee of the National Child Day Care Association
Former Vice Chairman - Department of Human Resources Parent Policy Committee of the National Day Care Association
Former Member - District of Columbia Department of Environmental Services Advisory Board
Member - Howard University Alumni Association

OAK RIDGE ASSOCIATED UNIVERSITIES

This is to certify that

GREGORY B. TALLEY

has completed

A TEN-WEEK HEALTH PHYSICS COURSE

conducted by Manpower Education, Research,
and Training Division of
Oak Ridge Associated Universities
Operating under contract with the Department of Energy

14th day of April, 1978

at Oak Ridge, Tennessee

Roger J. Cloutier

Director, Professional Training Programs

J. T. Baker
Chemical Co.

ADVANCED
ENVIRONMENTAL
TECHNOLOGY
CORPORATION

awards this certificate to

Gregory B. Talley

for participation in

The Management and Disposal of Hazardous and Chemical Wastes

AETC

Paul Klaas
President, J.T. Baker

R. W. Landmesser
President, A.E.T.C.

NOV 21 1980
Certified

Lori P. Spencer
Instructor

Warren A. Norris Jr.
Instructor

J.T.Baker
CHEMICALS

DOES 740

APPENDIX IV

INSTRUMENTATION

ITEM - 9

INSTRUMENTATION

Name	Model Number	Range
Eberline Instrument Company	Model E-520 and Model E-120	0-200 mr/hr
Victoreen Company	Model 440 Survey Meter	0-300 mr/hr
Capintec	Pocket Dosimeters	0-200 mr
Victoreen R-meter	Model 570	0-100 r

ATTACHMENT IV

CALIBRATION OF INSTRUMENTS

APPENDIX D

CALIBRATION OF INSTRUMENTS

Section 1

METHODS FOR CALIBRATION OF (X- AND GAMMA-RAY) SURVEY METERS, INCLUDING PROCEDURES, STANDARDS, AND FREQUENCY

A. Calibration of survey meters shall be performed with radionuclide sources.

1. The sources shall be approximate point sources.

2. The source activities or exposure rates at given distances shall be traceable by documented measurements to a standard source certified within 5 percent accuracy to the U.S. National Bureau of Standards (NBS) calibrations.

3. The frequency shall be at least annually and after servicing.

4. Each scale of the instrument shall be calibrated at least at two points located at approximately 1/3 and 2/3 of full scale.

5. The exposure rate measured by the instrument shall differ from the true exposure rate by less than 10 percent at the two points on each scale (read appropriate section of the instrument manual to determine how to make necessary adjustments to bring instrument into calibration). Readings within $\pm$20 percent will be considered acceptable if a calibration chart, graph, or response factor is prepared, attached to the instrument, and used to interpret meter readings to within 10 percent for radiation protection purposes.

Note:

Sources of Cs-137, Ra-226, or Co-60* are appropriate for use in calibrations. Since these sources emit rather high-energy photons, they are not suitable for low-energy calibrations that may be required under special circumstances (see Item C below). The activity of the calibration standard should be sufficient to calibrate the survey meters on each scale to be used for radiation protection purposes. Scales up to 1 R/hr should be calibrated, but higher-range scales above 1 R/hr need not be calibrated when they will not be needed for radiation protection surveys. If there are higher ranges, they should at least be checked for operation and approximately correct response to radiation. Otherwise, a cautionary note that they have not been checked should be placed on the instrument.

B. A reference check source of long half-life, e.g., Cs-137 or Ra D and E, shall also be read at the time of the above calibration or as soon as the instrument is received from a calibration laboratory. The readings shall be taken with the check source placed in specific geometry relative to the detector. A reading of this reference check source should be taken:

1. Before each use and also after each survey to ensure that the instrument was operational during the survey.

2. After each maintenance and/or battery change.

3. At least quarterly.

If any reading with the same geometry is not within $\pm$20 percent of the reading measured immediately after calibration, the instrument should be recalibrated (see Item A).

C. The instrument must be calibrated at lower energies if its response is energy dependent and if the instrument is to be used for quantitative measurements in the Xe-133 or Tc-99m energy ranges.

The calibration may be done either:

1. As in Item A above with calibrated standards of radionuclides at or near the desired energies, or

2. As a relative intercomparison with an energy-independent instrument and uncalibrated radionuclides.

Alternatively, the manufacturer's energy response curve(s) may be used to correct instrument readings appropriately when lower-energy radiation is monitored.

D. Records of the above Items A, B-2, B-3, and C must be maintained.

E. Use of Inverse Square Law and Radioactive Decay Law

1. A calibrated source will have a calibration certificate giving its exposure rate at a given distance.

*Minimum activities of typical sources are 85 mCi of Cs-137, 21 mCi of Co-60, and 34 mCi of Ra-226 (to give at least 700 mR/hr at 20 cm).

or its activity, measured on a specified date by the manufacturer or NBS.

a. The Inverse Square Law may be used with any point source to calculate the exposure rate at other distances.

b. The Radioactive Decay Law may be used to calculate the exposure rates or source activities at times other than the calibration date.

2. Inverse Square Law

Consider a "point"* source of radiation at position S, as shown in Figure D-1. Then, the relationship between exposure rates R_1 and R_2 at detector positions P_1 and P_2, which are at distances D_1 and D_2 from S, respectively, is given by the following equation:

$$R_2 = \frac{D_1^2}{D_2^2} \times R_1,$$

where R_1 and R_2 are exposure rates in the same units (e.g., mR/hr, R/hr), and D_1 and D_2 are the distances in Figure D-1 in the same units (e.g., m, cm, ft).

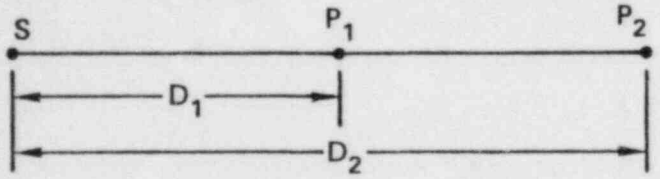


Figure D-1

3. Radioactive Decay Law

Exposure rate t units of time after specified calibration date

$$R_t = R_o \times e^{-\left[\frac{0.693}{T_{1/2}} \times t\right]}$$

where

R_o and R_t are in the same units (e.g., mR/hr or R/hr).

R_o is exposure rate on the specified calibration date.

R_t is exposure rate t units of time later.

$T_{1/2}$ and t are in the same units (years, months, days, etc.).

$T_{1/2}$ is radionuclide half-life.

t is number of units of time elapsed between calibration and present time.

4. *Example:* Source output is given by calibration certificate as 100 mR/hr at 1 foot on March 10, 1975. Radionuclide half-life is 5.27 years.

Question: What is the output at 3 feet on March 10, 1977 (2.0 years)?

a. Output at 1 foot, 2.0 years after calibration date:

$$R = 100 \text{ mR/hr} \times e^{-\frac{(0.693 \times 2.0)}{5.3}}$$

$$= 100 \times 0.77 = 77 \text{ mR/hr at 1 foot on March 10, 1977.}$$

b. Output at 3 feet, 2.0 years after calibration date:

$$R_3 \text{ feet} = \frac{(1 \text{ foot})^2}{(3 \text{ feet})^2} \times 77 \text{ mR/hr}$$

$$= \frac{1}{9} \times 77 = 8.6 \text{ mR/hr at 3 feet, 2.0 years after calibration.}$$

*A source may be considered a "point" source when the source and the radiation detector are small, in any dimension, compared to the distances at which radiation is to be measured. The center of the detector should be at distances D_1 or D_2 as shown in Figure D-1.

ATTACHMENT VI

FACILITIES & EQUIPMENT

ITEM 11: Facilities and Equipment

The isotopes are stored in room BA-22 (clinac-4 room) when not in use. They are kept in a 3' 3" high x 2' 6" x 2' 2" steel safe. Inside this steel safe the Cesium-137 sources are kept in a 8 cm diameter cylindical lead container. The Iridium-192 sources are kept in a portable lead container in the safe, before and after the irradiation. Strontium-90 eye applicator stays in the safe when not in use. A sketch of the isotope storage room is given in item 11-A. The radiation levels outside the steel safe are less than 2 mr/hr. "Caution Radioactive Materials" warning sign was attached to the door, which is open only to authorized personnel.

The storage room is located in the Radiotherapy Department, in the basement of Howard University Hospital. The Radiotherapy Department is equipped with lead storage containers, portable 1 to 2 inch thick lead bricks, stationary lead shields, work benches, sinks, waste containers and similar equipment.

The patients with implants using isotopes are placed in a shielded room on the fourth floor of Howard University Hospital. There are two rooms (4N-11 and 4N-12) always used for patients with Cs-137, Ir-192, I-131 or other isotopes. A sketch of typical shielding plan for room 4N-12

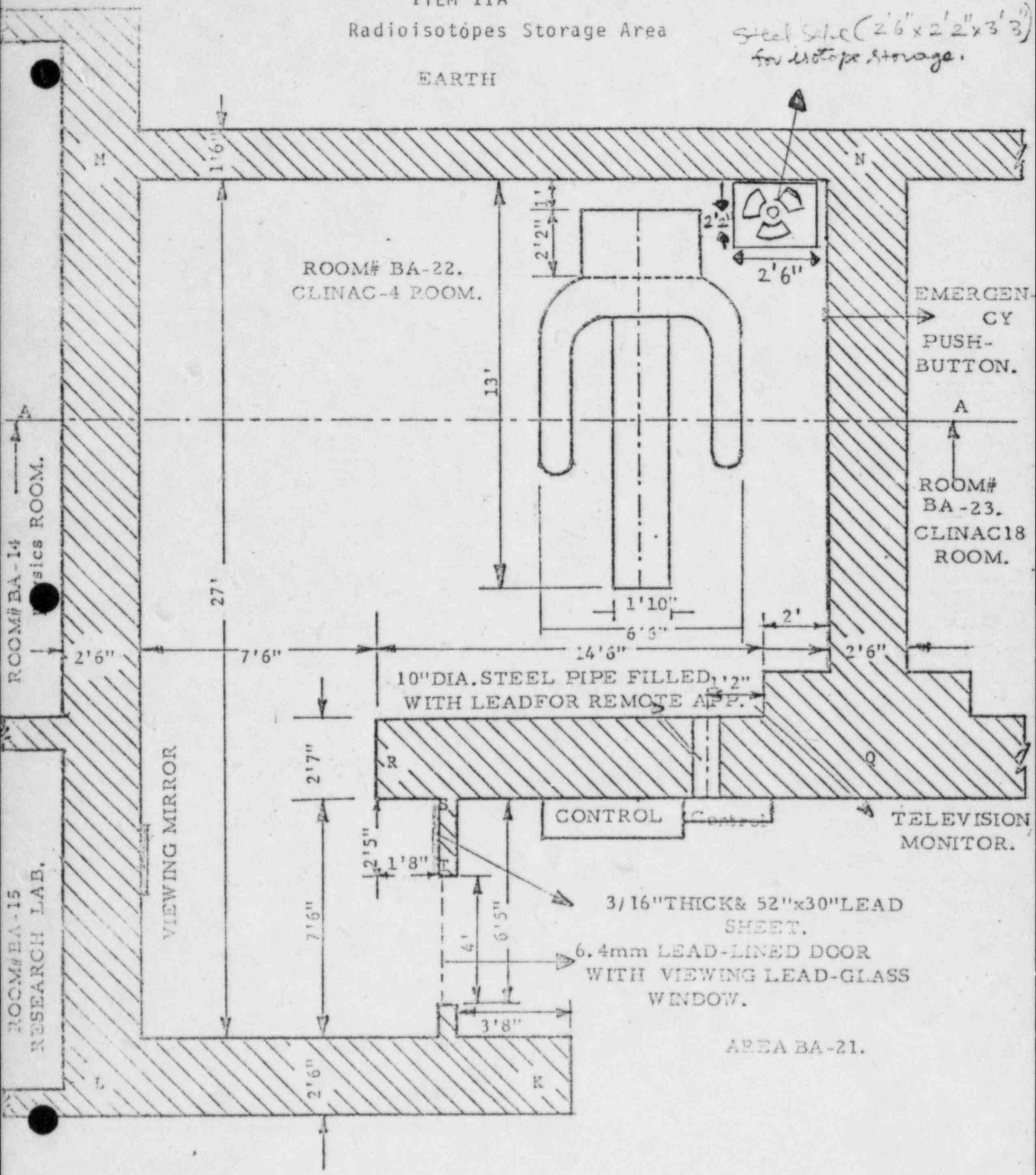
Item 11: (cont'd)

is given in item 11-B. The sources for these patients are taken from the isotope storage room in a portable lead container. One inch thick portable lead shields are used to radiation exposure to nursing staff, physicians and physicists. The treatment room plan for the Cobalt-60 remote afterloader is given in item 11-C. Items 11-D, E and F give the details of the source construction. Source in 11-D is produced by Neutron products, Maryland, and sources in items 11-E and F are produced by AECL.

ITEM 11A

Radioisotopes Storage Area

Steel Safe (2'6" x 2'2" x 3'3") for isotope storage.



AREA BA-21.

SCALE=1/4"=1'.

ML10

ITEM 11-B

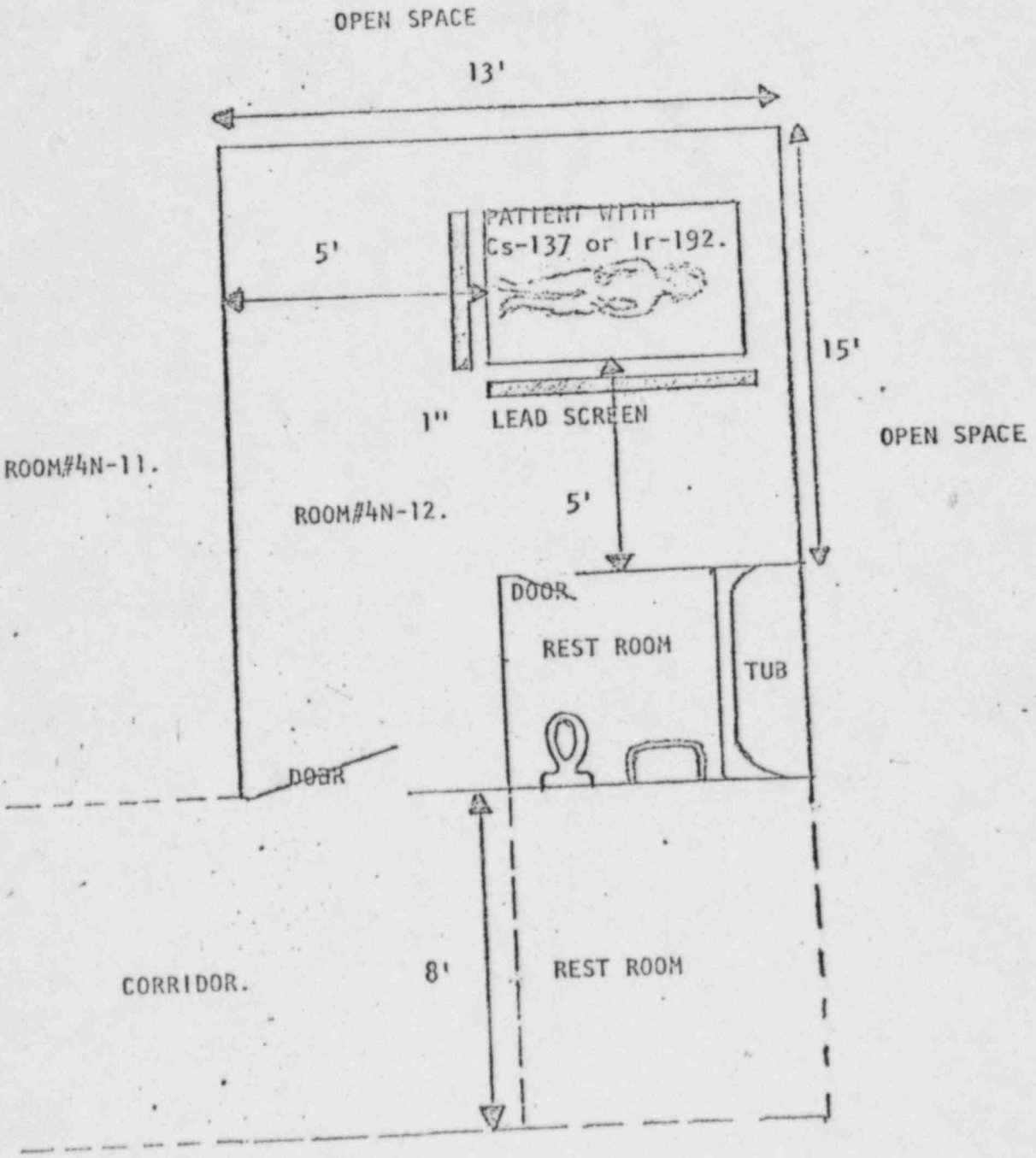


FIG.2:THE ROOM PLAN FOR Cs-137 & Ir-192 IMPLANT PATIENTS.

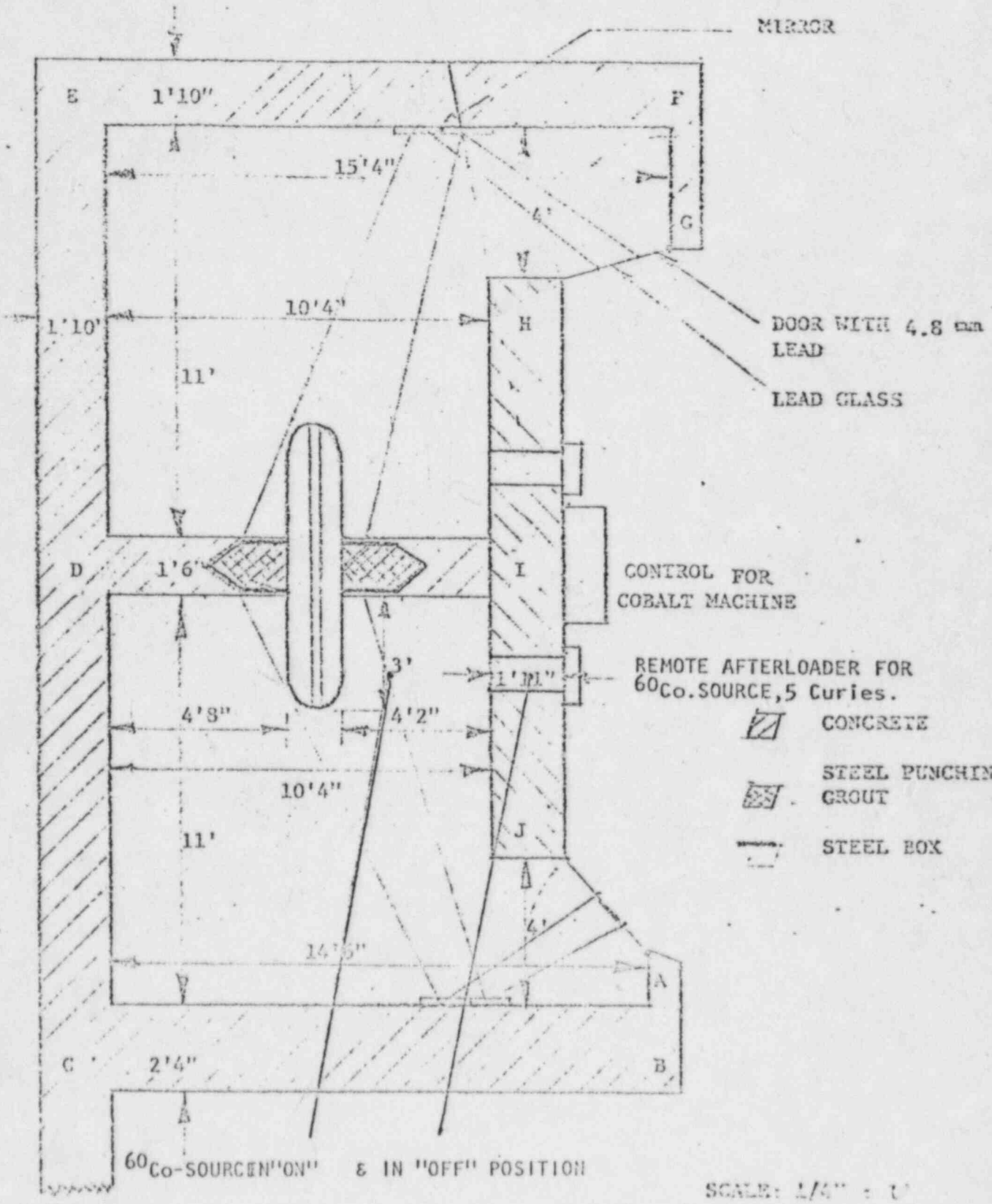
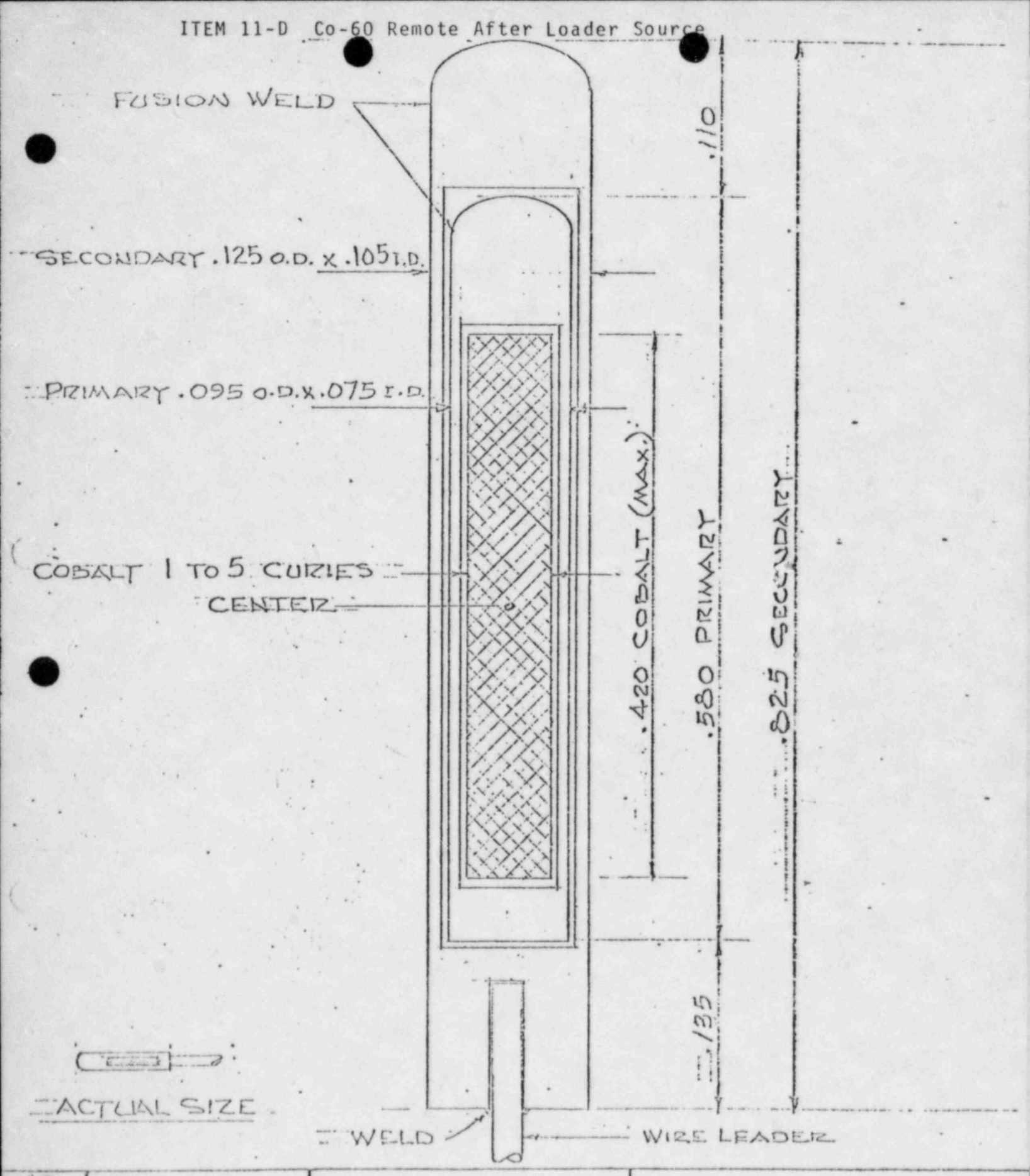


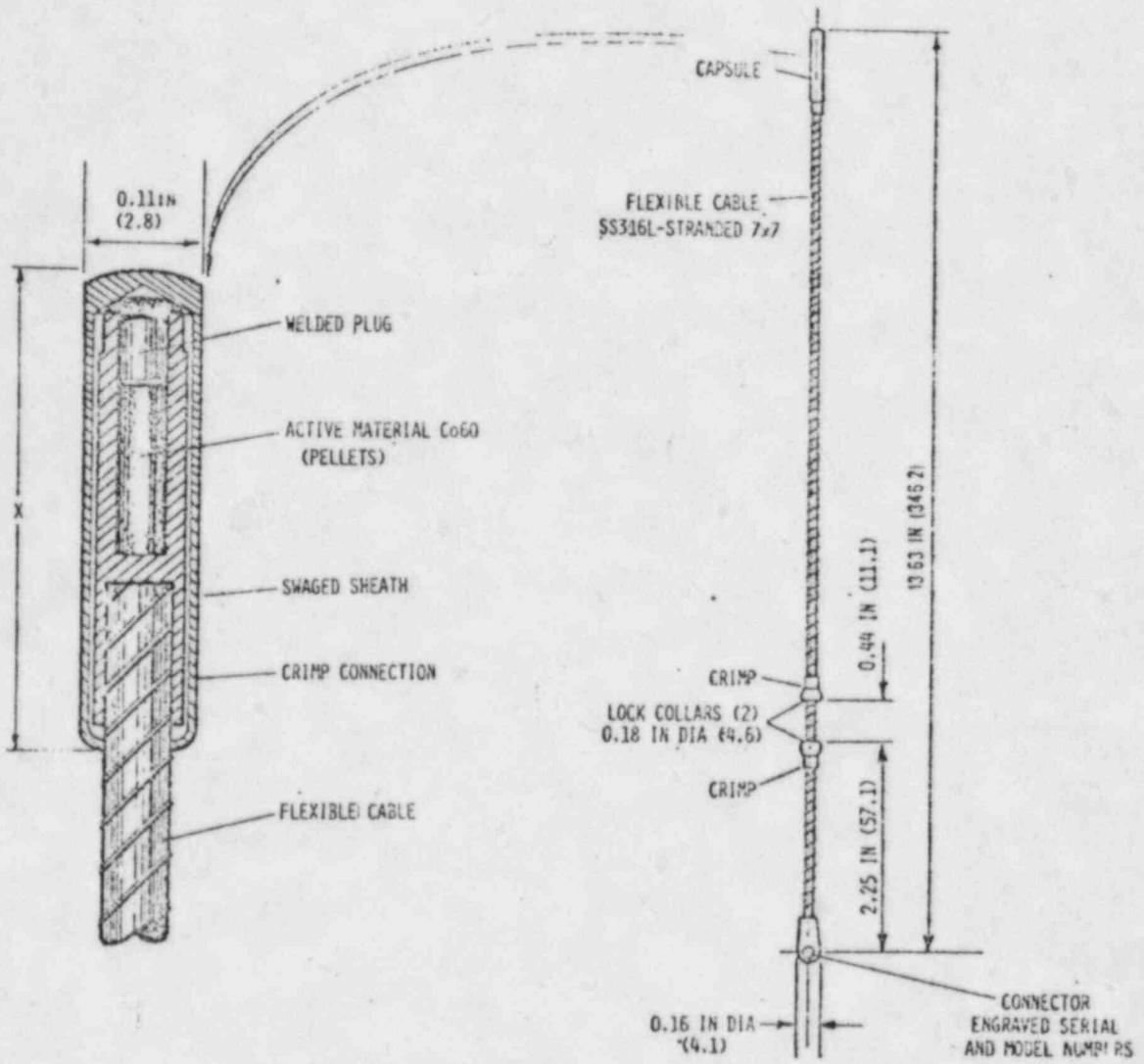
FIG.3: THE TREATMENT ROOM PLAN FOR Co-60 REMOTE AFTERLOADER IN THE HOWARD UNIVERSITY HOSPITAL.

ITEM 11-D Co-60 Remote After Loader Source



REVISIONS	COBALT-60 AFTERLOADER SOURCE	HOWARD UNIVERSITY RADIOISOTOPE SOURCE TYPE HU-0
APPROVED		
DRAWN		SIZE A SHEET OF REV.
SCALE 10/1 DATE		

ITEM 11-E Co-60 Remote After Loader Source Type C-303



NUMBER OF PELLETS	DIMENSION 'X'	
	INCHES	MM
1	0.43	10.9
2	0.45	11.4
4	0.54	13.7

NOTES:

1. MATERIAL-STAINLESS STEEL 316L.
2. BRACKETED DIMENSIONS REPRESENT MILLIMETRES.
3. ALL CRIMPS PULL TESTED TO 100 LB (45.4 KG.)
4. AXIAL ALIGNMENT TO BE WITHIN 3 DEGRESS OF TRUE AXIS OF CABLE AFTER CRIMPING
5. CONNECT DISCONNECT PLIERS PRODUCT NO. D894.
6. Co. 60 PELLET DIMENSIONS: 1.0 MM. DIA
   1.0 MM. LONG

ML10

ATOMIC ENERGY OF CANADA LIMITED
COMMERCIAL PRODUCTS
P.O. BOX 6300, Postal Station J, OTTAWA, CANADA. K2A 3W3

TITLE: REMOTE AFTERLOADING DEVICE SOURCE

REF. DWG. A14252 | REVISED JUNE 1975

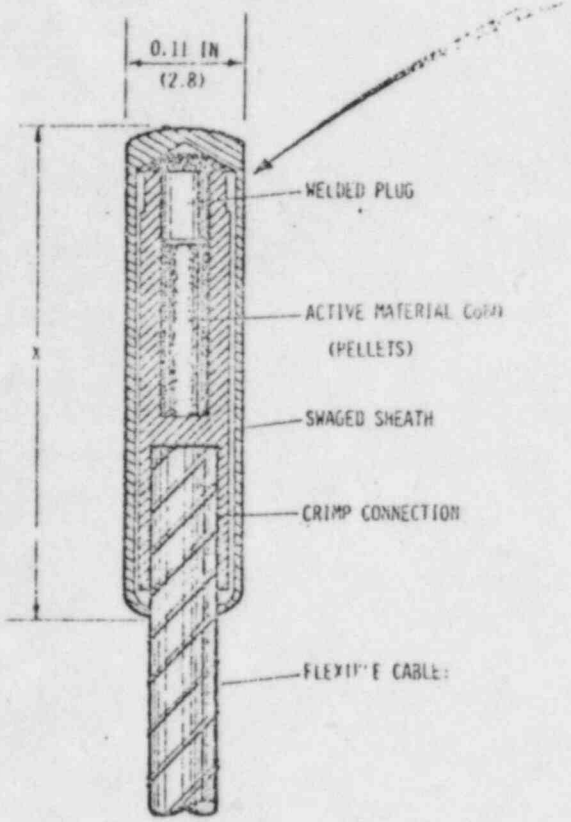
DATE JULY 1974

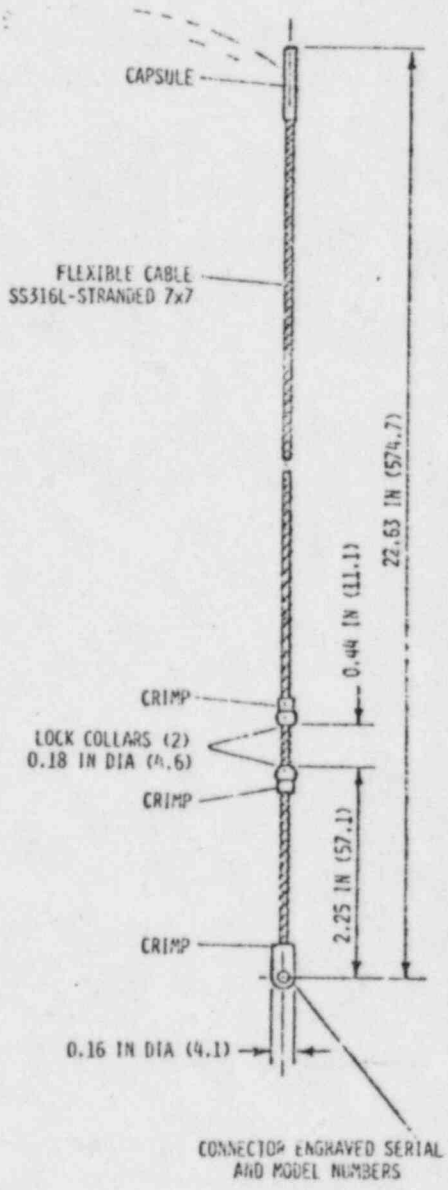
DRAWN	CHECKED	APPROVED
JB	CAD	[illegible]

No. C-303 | REV A

SHEET 1 OF 1

IT[illegible]11-F Co-60 Remote After[illegible]oader Source Type C-304





NUMBER OF PELLETS	DIMENSION 'X'	
	INCHES	MM
1	0.43	10.9
2	0.45	11.4
4	0.54	13.7

NOTES:

1. MATERIAL - STAINLESS STEEL 316L
2. BRACKETED DIMENSIONS REPRESENT MILLIMETRES
3. ALL CRIMPS PULL TESTED TO 100 LB (45.4 KG)
4. AXIAL ALIGNMENT TO BE WITHIN 3 DEGREES OF TRUE AXIS OF CABLE AFTER CRIMPING
5. CONNECT/DISCONNECT PLIERS PRODUCT NO. 6074.
6. Co60 PELLET DIMENSIONS: 1.0MM DIA x 1.0 MM LONG

ATOMIC ENERGY OF CANADA LIMITED
COMMERCIAL PRODUCTS
P.O. BOX 6300, Postal Station J, OTTAWA, CANADA K2A 3W3

TITLE
REMOTE AFTERLOADING DEVICE SOURCE

REF. DWG. A14253 | REVISED

DATE JULY 1974 | No. C-304 | REV. 0

DRAWN | CHECKED | APPROVED

SHEET 1 OF 1

ATTACHMENT VII

PERSONNEL TRAINING

ITEM: 12

PERSONNEL TRAINING PROGRAM

The Radiotherapy Department holds teaching conferences everyday between 8:00 a.m. - 9:00 a.m. to all staff members. Out of these teaching hours, 20-30 hours in a year are spent on radiation safety. Personnel are instructed as required by 10 CFR, Part 19. New employees in the department are instructed properly and at least twice in a year after joining the department. Nursing staff, taking care of radioactive patients, are given lectures in radiation protection twice in a year. The nursing staff also receives written instructions in the care of patients with isotope implants or I-131.

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ATTACHMENT VIII

PROCEDURES FOR ORDERING, RECEIVING AND SAFELY OPENING PACKAGES
CONTAINING RADIOACTIVE MATERIALS

PROCEDURES FOR ORDERING, RECEIVING AND SAFETY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS

All radioactive materials shall be ordered in accordance with Howard University policies and N.R.C. requirements by the technologist assigned to quality control. The following procedures are to be followed:

1. Check inventory record,

2. Telephone vendor and give purchase order number, name of radioactive material, quantity and desired date of receipt,

3. Record in inventory record,

4. Inform vendor all shipments are to be delivered to:

   Shipping & Receiving (Loading Dock)
   Howard University Hospital
   2041 Georgia Avenue, N.W.
   Washington, D.C. 20060

5. The Radiation Safety Officer will periodically check records to ensure orders do not exceed authorized quantities.

At all times (off-duty hours included) packages are placed in a secure storage area by Shipping and Receiving personnel, who in turn notifies the Radiation Safety Officer that a package has arrived, who in turn delivers the package to the Nuclear Medicine Division or the Department of Radiotherapy. Prior to the delivery to the custodian, all packages are inspected for damage and a determination is made which assures that no surface contamination exists. If contamination is found, the Office of Radiation Safety takes proper action to prevent spread of contamination.

The Nuclear Medicine Division and Department of Radiotherapy personnel follow procedures in Appendix F of Regulatory Guide 10.8 after receipt of the package.

APPENDIX F

PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. Special requirements will be followed for packages containing quantities of radioactive material in excess of the Type A quantity limits as specified in paragraphs 20.205(a)(1) and (c)(1) of 10 CFR Part 20 (more than 20 Ci for Mo-99 and Tc-99m). They will be monitored for surface contamination and external radiation levels within 3 hours after receipt if received during working hours or within 18 hours if received after working hours, in accordance with the requirements of paragraphs 20.205(a) through (c). All shipments of liquids greater than exempt quantities will be tested for leakage. The NRC Regional Office will be notified in accordance with the regulations if removable contamination exceeds 0.01 μCi/100 cm^2 or if external radiation levels exceed 200 mR/hr at the package surface or 10 mR/hr at 3 feet (or 1 m).

2. For all packages, the following additional procedures for opening packages will be carried out:

   a. Put on gloves to prevent hand contamination.

   b. Visually inspect package for any sign of damage (e.g., wetness, crushed). If damage is noted, stop procedure and notify Radiation Safety Officer.

   c. Measure exposure rate at 3 feet (or 1 m) from package surface and record. If >10 mR/hr, stop procedure and notify Radiation Safety Officer.

   d. Measure surface exposure rate and record. If >200 mR/hr, stop procedure and notify Radiation Safety Officer.

   e. Open the package with the following precautionary steps:

      (1) Open the outer package (following manufacturer's directions, if supplied) and remove packing slip.

      (2) Open inner package and verify that contents agree with those on packing slip. Compare requisition,* packing slip, and label on bottle.

      (3) Check integrity of final source container (i.e., inspect for breakage of seals or vials, loss of liquid, and discoloration of packaging material).

      (4) Check also that shipment does not exceed possession limits.

   f. Wipe external surface of final source container and remove wipe to low background area. Assay the wipe and record amount of removable radioactivity (e.g., μCi/100 cm^2, etc.). Check wipes with a thin-end-window G-M survey meter, and take precautions against the spread of contamination as necessary.

   g. Monitor the packing material and packages for contamination before discarding.

      (1) If contaminated, treat as radioactive waste.

      (2) If not contaminated, obliterate radiation labels before discarding in regular trash.

3. Maintain records of the results of checking each package, using "Radioactive Shipment Receipt Record" (see next page) or a form containing the same information.

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*In the case of special orders (e.g., therapy doses), also compare with physician's written request.

ATTACHMENT IX

GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL

APPENDIX G

GENERAL RULES FOR SAFE USE OF RADIOACTIVE MATERIAL

1. Wear laboratory coats or other protective clothing at all times in areas where radioactive materials are used.

2. Wear disposable gloves at all times while handling radioactive materials.

3. Monitor hands and clothing for contamination after each procedure or before leaving the area.

4. Always use syringe shields for routine preparation of patient doses and administration to patients, except in circumstances such as pediatric cases when their use would compromise the patient's well-being. In these exceptional cases, use other protective methods such as remote delivery of the dose (e.g., through use of a butterfly valve).

5. a. Do not eat, drink, smoke, or apply cosmetics in any area where radioactive material is stored or used.

   b. Do not store food, drink, or personal effects with radioactive material.

6. a. Assay each patient dose in the dose calibrator prior to administration. Do not use any doses that differ from the prescribed dose by more than 10 percent.

   b. For therapeutic doses, also check the patient's name, the radionuclide, the chemical form, and the activity vs. the order written by the physician who will perform the procedure.

7. Wear personnel monitoring devices (film badge or TLD) at all times while in areas where radioactive materials are used or stored. These devices should be worn at chest or waist level. Personnel monitoring devices when not being worn to monitor occupational exposures should be stored in a designated low background area.

8. Wear TLD finger badges during elution of generator and preparation, assay, and injection of radiopharmaceuticals.

9. Dispose of radioactive waste only in specially designated and properly shielded receptacles.

10. Never pipette by mouth.

11. Survey generator, kit preparation, and injection areas for contamination after each procedure or at the end of the day. Decontaminate if necessary.

12. Confine radioactive solutions in covered containers plainly identified and labeled with name of compound, radionuclide, date, activity, and radiation level, if applicable.

13. Always transport radioactive material in shielded containers.

ATTACHMENT X

EMERGENCY PROCEDURES

APPENDIX H

EMERGENCY PROCEDURES

Minor Spills

1. NOTIFY: Notify persons in the area that a spill has occurred.

2. PREVENT THE SPREAD: Cover the spill with absorbent paper.

3. CLEAN UP: Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose of in the radioactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable gloves.

4. SURVEY: With a low-range, thin-window G-M survey meter, check the area around the spill, hands, and clothing for contamination.

5. REPORT: Report incident to the Radiation Safety Officer.

Major Spills

1. CLEAR THE AREA: Notify all persons not involved in the spill to vacate the room.

2. PREVENT THE SPREAD: Cover the spill with absorbent pads, but do not attempt to clean it up. Confine the movement of all personnel potentially contaminated to prevent the spread.

3. SHIELD THE SOURCE: If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.

4. CLOSE THE ROOM: Leave the room and lock the door(s) to prevent entry.

5. CALL FOR HELP: Notify the Radiation Safety Officer immediately.

6. PERSONNEL DECONTAMINATION: Contaminated clothing should be removed and stored for further evaluation by the Radiation Safety Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

RADIATION SAFETY OFFICER: G.B. Talley
OFFICE PHONE: 636-7216
HOME PHONE: 584-3196

ALTERNATE NAMES AND TELEPHONE NUMBERS DESIGNATED BY RADIATION SAFETY OFFICER:
Dr. Alfred Goldson 745-1421
Mr. J. Rao Nibhanupudy 745-1421

* The appropriate information for your facility should be supplied in these blanks when posting these procedures or submitting them with the application.

ATTACHMENT XI

WASTE DISPOSAL

APPENDIX J

WASTE DISPOSAL

Note: In view of the recent problems with shallow-land burial sites used by commercial waste disposal firms, NRC is encouraging its licensees to reduce the volume of wastes sent to these facilities. Important steps in volume reduction are to segregate radioactive from nonradioactive waste, to hold short-lived radioactive waste for decay in storage, and to release certain materials in the sanitary sewer in accordance with § 20.303 of 10 CFR Part 20.

1. Liquid waste will be disposed of (check as appropriate)

_____ In the sanitary sewer system in accordance with § 20.303 of 10 CFR Part 20.

_____ By commercial waste disposal service (see also Item 4 below).

_____ Other (specify): _____

_____

2. Mo-99/Tc-99m generators will be (check as appropriate)

_____ Returned to the manufacturer for disposal.

_____ Held for decay* until radiation levels, as measured in a low background area with a low-level survey meter and with all shielding removed, have reached background levels. All radiation labels will be removed or obliterated, and the generators will be disposed of as normal trash.**

_____ Disposed of by commercial waste disposal service (see also Item 4 below).

_____ Other (specify): _____

_____

3. Other solid waste will be (check as appropriate)

x

_____ Held for decay* until radiation levels, as measured in a low background area with a low-level survey meter and with all shielding removed, have reached background levels. All radiation labels will be removed or obliterated, and the waste will be disposed of in normal trash.

_____ Disposed of by commercial waste disposal service (see also Item 4 below).

_____ Other (specify): _____

_____

4. The commercial waste disposal service used will be Radiation Service Organization, Laurel, Md.

(Name) (City, State)

NRC/Agreement State License No. MD-33-021-01

*Be sure that waste storage areas were described in Item 11 and that they are surveyed periodically (Item 17).

**These generators may contain long-lived radioisotopic contaminants. Therefore, the generator columns will be segregated so that they may be monitored separately to ensure decay to background levels prior to disposal.

ATTACHMENT XII

THERAPEUTIC USE OF RADIOPHARMACUTICALS

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APPENDIX K

RADIATION SAFETY PROCEDURES FOR THERAPEUTIC USE OF RADIOPHARMACEUTICALS*

1. All patients treated with I-131 or Au-198 will be placed in a private room that has a toilet. The large surfaces in the room and toilet areas that are more likely to be contaminated will be covered with absorbent pads or protective material as appropriate to the amounts of contamination to be expected. Attention should be given to objects likely to be touched by the patient, e.g., telephones, doorknobs, and other items that would be difficult to decontaminate. Plastic bags or wrappings that are waterproof and easily disposable should be used on the smaller items.

2. The patient's room will be properly posted or attended in accordance with §§20.203 or 20.204 of 10 CFR Part 20.

3. Surveys of the patient's room and surrounding areas will be conducted as soon as practicable after administration of the treatment dose. Exposure rates will be measured at the patient's bedside and 3 feet (or 1 m) from the patient after administration and at the entrance to the room. The Radiation Safety Officer or his designee will then determine how long a person may remain at these positions and will post these times on the patient's chart and on his door. The results of daily surveys will be used to recalculate permitted times, which will be posted on the patient's chart and on his door.

4. The form, Nursing Instructions for Patients Treated with Phosphorus-32, Gold-198, or Iodine-131 (or a similar form containing all the requested information), will be completed immediately after administration of the treatment dose. A copy will be posted on the patient's chart.

5. Radiation levels in unrestricted areas will be maintained less than the limits specified in paragraph 2[illegible].105(b) of 10 CFR Part 20.

6. All linens will be surveyed for contamination before being removed from the patient's room and, if necessary, will be held for decay.

7. Disposable plates, cups, eating utensils, tissue, surgical dressings, and other similar waste items will be placed in a specially designated container. The material will be collected daily by the Radiation Safety Officer or his designee, checked for contamination, and disposed of as normal or radioactive waste, as appropriate.

8. Nondisposable items used for these patients will be held in plastic bags in the patient's room and will be checked for contamination by the Radiation Safety Officer or his designee. Items may be returned for normal use, held for decay, or decontaminated, as appropriate.

9. If urine and vomitus from I-131 therapy patients are collected, they will be stored for decay in the radioactive waste storage area. Such stored wastes will be retained until they have reached background levels, as measured with a low-level survey meter. They will then be released to the sanitary sewer system.

10. Before a therapy patient's room is reassigned to another patient, the room will be surveyed for contamination and decontaminated if necessary, and all radioactive waste and waste containers will be removed.

11. Nursing Instructions

    a. Nurses should spend only that amount of time near the patient required for ordinary nursing care. Special restrictions may be noted on the precaution sheet on the patient's chart. Nurses should read these restrictions before administering to the patients. Call the Nuclear Medicine Department or the Radiation Safety Officer with any questions about the care of these patients. Nursing personnel who attend the patient will wear personnel monitoring devices as advised by the Radiation Safety Office.

    b. Visitors will be limited to those 18 years of age or over unless other instructions are noted on the precaution sheet on the patient's chart.

    c. Patients must remain in bed while visitors are in the room and visitors should remain at least 3 feet (or 1 m) from the patient.

    d. Patients containing radioactive materials are to be confined to their rooms except for special medical or nursing purposes approved by the Nuclear Medicine Department.

    e. No nurse, visitor, or attendant who is pregnant should be permitted in the room of a patient who has received a therapeutic amount of radioactivity until the patient no longer presents a radiation hazard. Female visitors should be asked whether they are pregnant.

    f. Attending personnel should wear rubber or disposable plastic gloves when handling urinals,

---

* Be sure to submit a complete response to Item 19b in addition to referencing procedures in Appendix K.

bedpans, emesis basins, or other containers having any material obtained from the body of the patient. Wash gloves before removing and then wash hands. The gloves should be left in the patient's room in the designated waste container. These gloves need not be sterile or surgical in type.

g. Disposable items should be used in the care of these patients, whenever possible. These items should be placed in the designated waste container. Contact the Radiation Safety Officer or his designee for proper disposal of the contents of the designated waste container.

h. All clothes and bed linens used by the patient should be placed in the laundry bag provided and should be left in the patient's room to be checked by the Radiation Safety Officer or his designee.

i. All nondisposable items should be placed in a plastic bag and should be left in the patient's room to be checked by the Radiation Safety Officer or his designee.

j. Surgical dressings should be changed only as directed by the physician. Au-198 leaking from a puncture wound may stain the dressings dark red or purple. Such dressings should not be discarded but should be collected in plastic bags and turned over to the Radiation Safety Officer or his designee. Handle these dressings only with tongs or tweezers. Wear disposable gloves.

k. For I-131 patients:

(1) To the degree possible with cooperative patients, urine will be collected in special containers provided by the Radiation Safety Officer or his designee. The patient should be encouraged to collect his own urine in the container. If the patient is bedridden, a separate urinal or bed pan should be provided. The urinal or bed pan should be flushed several times with hot soapy water after use.

(2) If the nurse helps to collect the excreta, disposable gloves should be worn. Afterward, hands should be washed with the gloves on and again after the gloves are removed. The gloves should be placed in the designated waste container for disposal by the Radiation Safety Officer or his designee.

(3) Disposable plates, cups, and eating utensils will be used by patients who are treated with I-131.

(4) Vomiting within 24 hours after oral administration, urinary incontinence, or excessive sweating within the first 48 hours may result in contamination of linen and floor. In any situation where the patient's room may be contaminated or if radioactive urine and/or feces is spilled during collection, call the Radiation Safety Officer or his designee, Ext. _____. Meanwhile, handle all contaminated material with disposable gloves and avoid spreading contamination.

(5) Keep all contaminated wastes and vomitus in plastic bags in the patient's room for disposal by the Radiation Safety Officer or his designee. Feces need not be routinely saved unless ordered on the chart. The same toilet should be used by the patient at all times and it should be well flushed (3 times). The Radiation Safety Officer will establish procedures for disposal of wastes (see Item 12 below).

l. If a nurse, attendant, or anyone else knows or suspects that his or her skin or clothing, including shoes, is contaminated, notify the Radiation Safety Officer or his designee immediately. This person should remain in an area adjacent to the patient's room and should not walk about the hospital. If the hands become contaminated, wash them immediately with soap and water.

m. If a therapy patient should need emergency surgery or should die, notify the Radiation Safety Officer or the Nuclear Medicine Department immediately.

n. When the patient is discharged, call the Radiation Safety Officer or his designee or the Nuclear Medicine Department and request that the room be surveyed for contamination before remaking the room.

12. Waste Disposal

When contaminated wastes are transported to the Waste Storage/Disposal area, precautions will be taken to minimize external irradiation of personnel. Stored wastes will be shielded to maintain exposure to personnel in restricted and unrestricted areas ALARA.

Date _____

NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH PHOSPHORUS-32, GOLD-198, OR IODINE-131

Patient's Name: _____

Room No.: _____ Physician's Name: _____

Radioisotope Administered: _____

Date and Time of Administration: _____

Dose Received: _____ Method of Administration: _____

Exposure Rates in mR/hr

Date	3 feet from bed	10 feet from bed

(Comply with all checked items)

_____ 1. Visiting time permitted: _____

_____ 2. Visitors must remain _____ from patient.

_____ 3. Patient may not leave room.

_____ 4. Visitors under 18 are not permitted.

_____ 5. Pregnant visitors are not permitted.

_____ 6. Film or TLD badges must be worn.

_____ 7. Pocket chambers will be worn for supplementary personnel monitoring of individual tasks.

_____ 8. Tag the following objects and fill out the tag:

_____ door _____ chart

_____ bed _____ wrist

_____ 9. Disposable gloves must be worn while attending patient.

_____ 10. Patient must use disposable utensils.

_____ 11. All items must remain in room until approved for removal by the Radiation Safety Officer or his designee.

_____ 12. Smoking is not permitted.

_____ 13. Room is not to be released to Admitting Office until approved by the Radiation Safety Officer or his designee.

_____ 14. Other instructions.

In case of an emergency contact:

RSO

_____

Name On-duty/Off-duty Telephone Numbers

ATTACHMENT XIII

THERAPEUTIC USE OF SEALED SOURCES

ITEM - 20

Therapeutic Use of Sealed Sources

a. The sealed sources when not in use are stored in a steel safe as sketched in item 11-A and radiation levels outside the safe are less than 2 mR/hr. Co60 source used in intracavitary implants by remote after-loading technique is in a lead housing as shown in item 11-C, permanently.

b. 1. disposable gloves are worn when handling radioisotopes.
2. lead-vinyl gloves are worn when working with I-125 sources.
3. all the sealed source loading is done by using long tongs and from behind the lead shielding.

c. Finger badges are worn by personnel working with the use of sealed sources in implants.

d. The sealed sources (CS-137 and Iv-192) are transported to patient rooms in 8cm diameter cylindrical lead containers.

e. Source inventory is done quarterly. Number of sources and their activity and time and day are entered in a book and the same is done after the return of the sources.

f. The implanted area and the whole body of the patient, the patient's bed, the patient's room including rest room, are monitored after the sources are removed from the patient to make sure that all the sources are removed from the patient.

APPENDIX L

RADIATION SAFETY PROCEDURES FOR THERAPEUTIC USE OF SEALED SOURCES*

1. All patients treated with brachytherapy sources will be placed in a private room that has a toilet.

2. The patient's room will be properly posted or attended in accordance with §§ 20.203 or 20.204 of 10 CFR Part 20.

3. Surveys of the patient's room and surrounding areas will be conducted as soon as practicable after sources are implanted. Exposure rate measurements will be taken at 3 feet (or 1 m) from the patient with sources implanted, at the patient's bedside, at 3 feet (or 1 m) from the bed, and at the entrance to the room. The Radiation Safety Officer or his designee will then determine how long a person may remain at these positions and will post these times and the exposure rate at 3 feet (or 1 m) from the patient on the patient's chart.

4. Immediately after sources are implanted, the form "Nursing Instructions for Patients Treated with Brachytherapy Sources" will be completed and attached to the patient's chart.

5. Radiation levels in unrestricted areas will be maintained less than the limits specified in paragraphs 20.105(b)(1) and (b)(2) of 10 CFR Part 20.

6. Nurses caring for brachytherapy patients will be assigned film or TLD badges. TLD finger badges will also be assigned to nurses who must provide extended personal care to the patient. Pocket dosimeters may be assigned in addition to a film or TLD badge.

7. At the conclusion of treatment, a survey will be performed in accordance with paragraph 35.14(b)(5)(vii) of 10 CFR Part 35 to ensure that all sources other than permanent implants have been removed from the patient and that no sources remain in the patient's room or in any other area occupied by the patient. At the same time, all radiation signs will be removed and all film and TLD badges assigned to nurses will be collected. If the patient is to be discharged, the final survey will also include a notation on the patient's chart that the activity remaining in the patient meets conditions for release from the hospital.

8. Instructions to Nurses

   a. Special restrictions may be noted on the precaution sheet on the patient's chart. Nurses should read these instructions before administering to the patient. The Radiation Safety Officer should be contacted to answer any questions about the care of these patients in regard to radiation safety precautions.

   b. Nurses should spend only the minimum time necessary near a patient for routine nursing care. Obtain and wear a film or TLD badge or a pocket chamber as instructed by the Radiation Safety Officer.

   c. When a nurse is assigned to a therapy patient, a film or TLD badge should be obtained immediately from the Radiation Safety Officer or his designee. The badge shall be worn only by the nurse to whom it is issued and shall not be exchanged among nurses.

   d. Pregnant nurses should not be assigned to the personal care of these patients.

   e. Never touch needles, capsules, or containers holding brachytherapy sources. If a source becomes dislodged, use long forceps and put it in the corner of the room or in the shielded container provided; contact Radiation Therapy, the Radiation Safety Officer, or the Nuclear Medicine Department at once.

   f. Bed bath given by the nurse should be omitted while the sources are in place.

   g. Perineal care is not given during gynecologic treatment; the perineal pad may be changed when necessary unless orders to the contrary have been written.

   h. Surgical dressings and bandages used to cover the area of needle insertion may be changed only by the attending physician or radiologist and MAY NOT BE DISCARDED until directed by the radiologist. Dressings should be kept in a basin until checked by the Radiation Safety Officer or his designee.

      Special orders will be written for oral hygiene for patients with oral implants.

   i. No special precautions are needed for sputum, urine, vomitus, stools, dishes, instruments, or utensils unless specifically ordered, but these items should be saved for a check with a radiation survey meter to ensure that no sources have been inadvertently displaced into them.

* Be sure to submit complete responses to Items 20a through 20f in addition to referencing procedures in Appendix L.

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j. All bed linens must be checked with a radiation survey meter before being removed from the patient's room to ensure that no dislodged sources are inadvertently removed.

k. These patients must stay in bed unless orders to the contrary are written. In any event, patjents will remain in their assigned rooms during the treatment ,eriod.

l. Visitors will be limited to those 18 years of age or over unless other instructions are noted on the precaution sheet on the patient's chart.

m. Visitors should sit at least 3 feet (or 1 m) from the patient and should remain no longer than the time specified on the form posted on the patient's door and on his chart.

n. No nurse, visitor, or attendant who is pregnant should be permitted in the room of a patient while brachytherapy sources are implanted in the patient. Female visitors should be asked whether they are pregnant.

o. Emergency Procedures

(1) If an implanted source becomes loose or separated from the patient, or

(2) If the patient dies, or

(3) If the patient requires emergency surgery, immediately call _____

_____

Telephone No. (days) _____

(nights) _____

p. At the conclusion of treatment, call the Radiation Safety Officer to (1) survey the patient and room, (2) count the radiation sources to be sure that all temporary implants have been removed prior to discharging the patient, and (3) record a summary of the final survey results on the patient's chart. If any permanent implants are to remain in the patient, the Radiation Safety Officer will brief the patient on precautions for minimizing radiation exposure to others after discharge from the hospital.

07433

ATTACHMENT IV

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL
SPECIFIED IN ITEM 6.B

PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE

MATERIAL SPECIFIED IN ITEM 6.B.

A) DEPLETED URANIUM:

1. Source material will not be used in any process. It is permanently fixed in accelerator head for shielding purposes.

2. The uranium is incorporated into the lead shielding of the accelerator.

3. All uranium components are plated with cadmium and conspicuously stamped with the legend: "Caution: Radioactive Material - Depleted Uranium."

4. All the repair work requiring machining, drilling or scraping the protective coating of depleted uranium, should be done by manufacturer, namely Varian Associates of Palo Alto, California.

5. Radiation exposure level at treatment distance of 80cm is 0.4 mR/hr.

6. The U-235 is depleted to less than 0.2%.

B. Californium - 252

Source: We have a Californium - 252 source loaned to us from the Department of Energy, Savannah River Operations Office, Aiken, South Carolina. The source is still in the shipping container. Source type is ALC-P_4C. Having a maximum activity of 22 micrograms.

The source is doubled encapsulated in stainless steel and attached to a 10 foot long airplane type steel cable of 1/16" diameter.

The source dimensions are 2.8mm outer diameter, 23mm total length and 15mm active length.

Use: We plan to use Cf-252 source for animal studies and clinical studies. The protocols are enclosed.

Howard University has complete animal facilities on the fourth floor of the College of Medicine, supervised by a veterinarian. The animals will be brought to the Californium irradiation facility for external irradiation and taken back. No implantation will be used and thus no radiation protection is required. During the irradiation of animals and patients, no nursing care is usually required. During the surface treatment in the head and neck region, the source will be kept 1cm above the tumor and no treatment will be given with the source closer than 3cm to the eye, so that the exposure to the eye will be less than 1/10th of the treatment dose.

Leak Test: Leak test will be done by taking smears from the source and checking for alpha contamination on nuclear chicago and ortec helium argon, modular gas flow proportional systems. Leak test will be analyzed using the following alpha reference standards: thorium - 230 and plutonium-238.

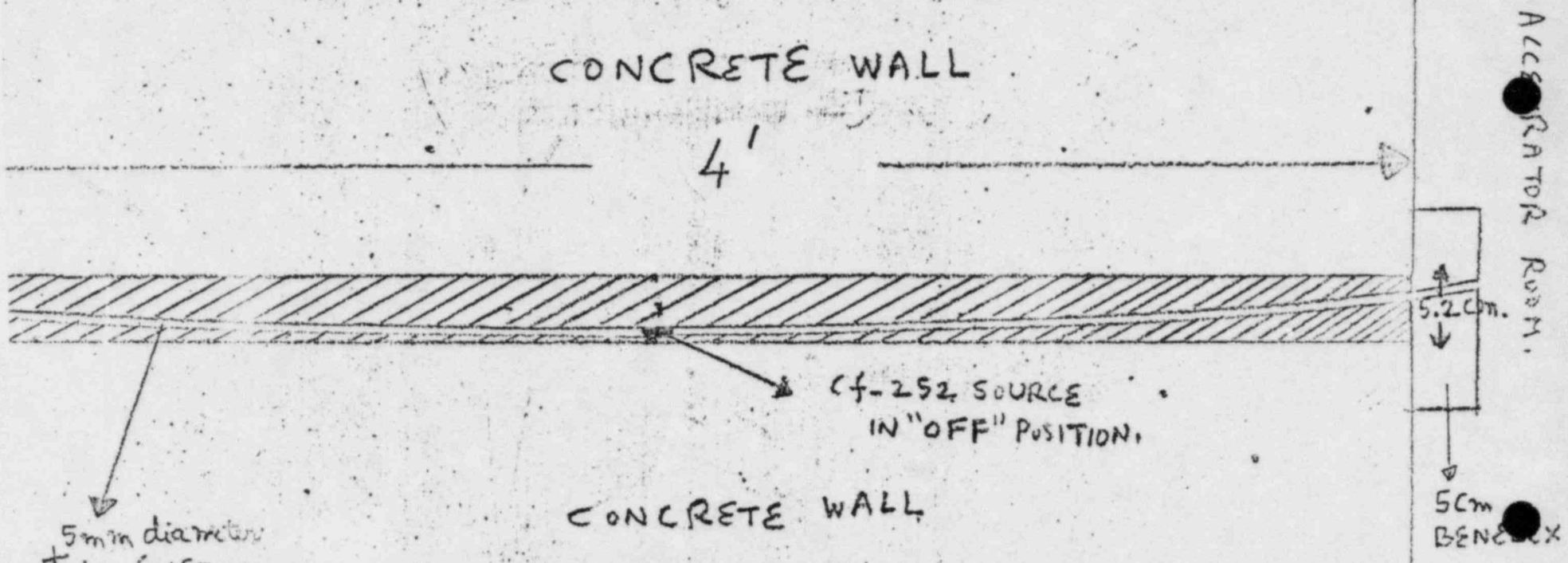
Shielding: The Californium - 252 source will be shielded by a combination of lead, concrete and benelex (see attached figs. 1, 2, and 3). The shielding is designed to give less than or equal to 1.2 millirem per hour outside the shielding.

Treatment: In the "off" the source is in the wall of the treatment room. The safe and the applicator on the patient are then connected with a nylon tube. The personnel leave the room and the door closed. The source is pushed from outside with the help of stainless steel cable into the applicator. The duration is recorded by timer and after pre-determined time is reached the source is retracted into the safe.

The consent of the patient or their representatives will be obtained before treatment.

Equipment: A portable Nuclear Chicago BF_3 detector which is calibrated against a standard 1 curie Pv-Be source. We plan to buy a Neutron Survey meter.

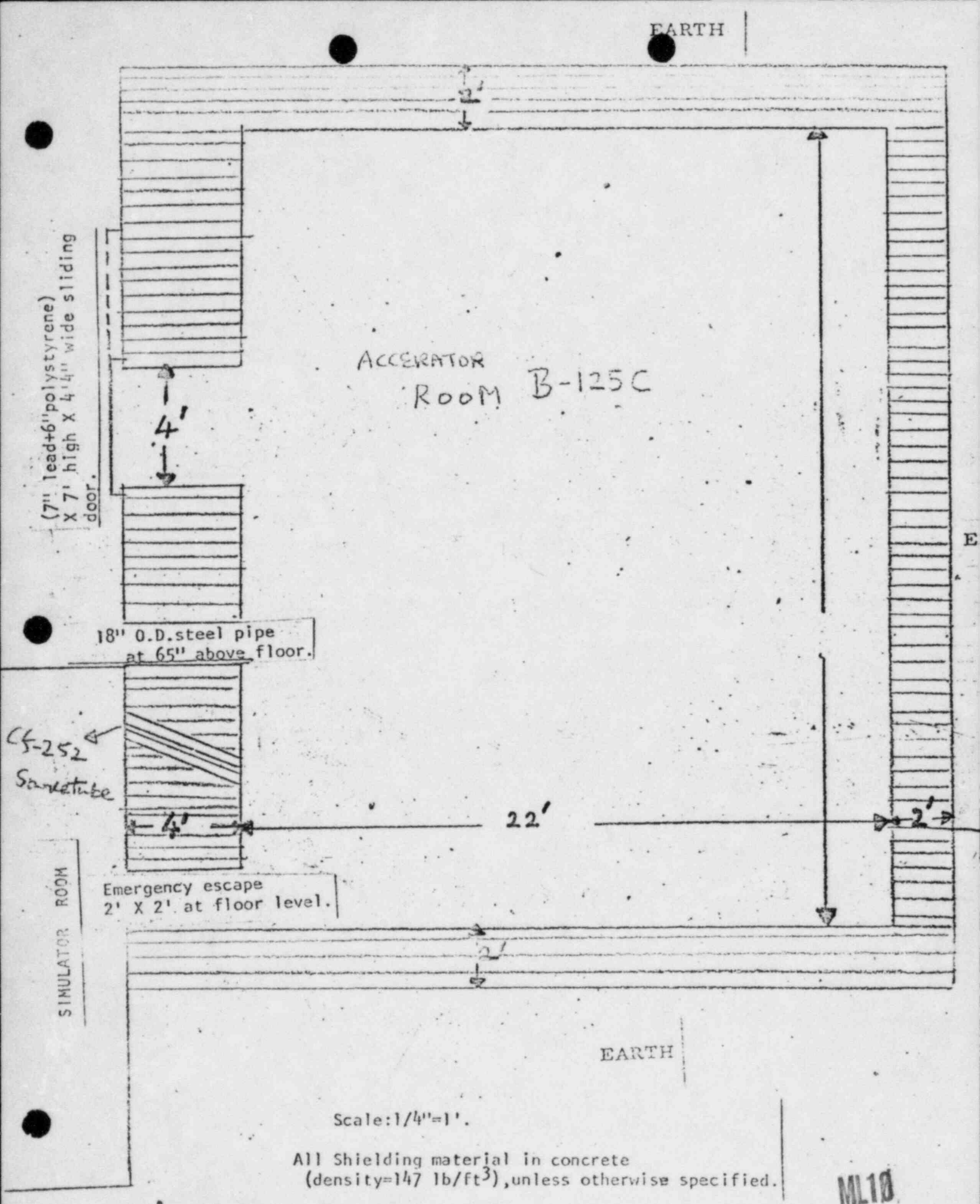
Personnel Monitoring: Neutron sensitive film badges are used for personnel monitoring.



ACCELERATOR ROOM.

NOTE: When Cf-252 is in "OFF" position, both ends of Source cavity will be plugged with a polythene tube filled with hydrogenous material like Paraffin.

FIG. 1.



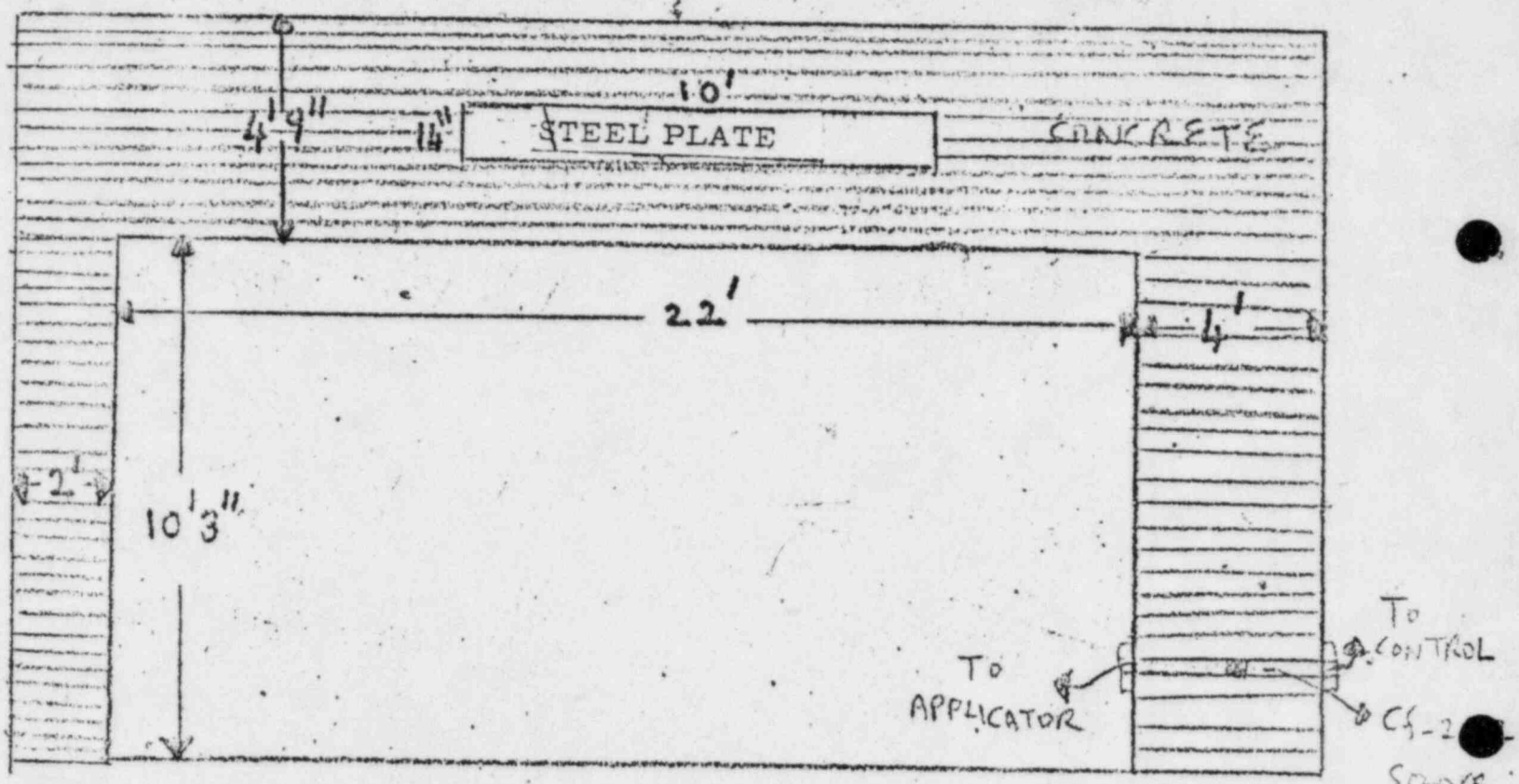
Scale:1/4"=1'.

All Shielding material in concrete
(density=147 lb/ft^3),unless otherwise specified.

ML10

FIG. 2

PARKING LOT



VERTICAL CROSS-SECTION

FIG. 3

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PROTOCOL FOR ANIMAL STUDIES WITH CALIFORNIUM-252 SOURCE IN A REMOTE AFTERLOADER

1. Source: The Savannah River Laboratory is prividing a 20-25 microgram Californium-252 source of 2.8 mm outside diameter, 23 mm total length and 15 mm active length. This source is double encapsulated in stainless steel capsules and is swaged to an airplane type stainless steel cable of 1/16 inch diameter and 10 feet length.

2. Remote Afterloader: The remote afterloader is as developed by Henschke, Hilaris, and Mahan is described in the attached 1964 publication. A model of this type has been used in the Memorial Center for Cancer and Allied Diseases in New York since 1965 and one afterloader of this type for the use with a 5 Curie cobalt-source is available in the Department of Radiotherapy of the Howard University Hospital.

3. Operation: An appropriate applicator is secured to the immobilized experimental animal. The applicator is then connected with a nylon tube to the safe in the wall which contains the Californium-252 source. Through this nylon tube, the source is guided from the control area into the applicator with the help of the stainless steel cable. On the arrival of the source in the proper position, an electrical contact is made, which starts the timer. At the end of the set treatment time, the source is retracted into the safe.

4. Radiation Safety of Operating Personnel: The treatment room is entered by the operating personnel only, if the source has been retracted in the safe. The treatment room is equipped with an independent radiation monitor, which flashes a red light, if the source is out of the safe.

5. Radiation Safety of Personnel in Adjacent Rooms: The concrete walls of the treatment room provide sufficient protection to all adjoining areas if the source is in the "on" position.

6. Animal Studies: The Californium-252 source and a similar cobalt-60 source will be used to compare reactions of normal tissues and of transplanted tumor response. The principal experiments will be carried out in mice inoculated with Lewis Lung Cancer in the hind leg. Irradiation will be carried out at different stages of the tumor development and at different dose levels.

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PROTOCOL FOR CLINICAL STUDIES WITH A CALIFORNIUM-252 SOURCE IN A REMOTE AFTERLOADER

1. Source: The Savannah River Laboratory is providing a 20-25 microgram Californium-252 source of 2.8 mm outside diameter, 23 mm total length and 15 mm active length. This source is double encapsulated in stainless steel capsules and is swaged to an airplane type stainless steel cable of 1/16 inch diameter and 10 feet length.

2. Remote Afterloader: The remote afterloader is as developed by Henschke, Hilaris, and Mahan is described in the attached 1964 publication. A model of this type has been used in the Memorial Center for Cancer and Allied Diseases in New York since 1965 and one afterloader of this type for the use with a 5 Curie cobalt-source is available in the Department of Radiotherapy of the Howard University Hospital.

3. Operation: An appropriate applicator is secured to the immobilized experimental animal. The applicator is then connected with a nylon tube to the safe in the wall which contains the Californium-252 source. Through this nylon tube, the source is guided from the control area into the applicator with the help of the stainless steel cable. On the arrival of the source in the proper position, an electrical contact is made, which starts the timer. At the end of the set treatment time, the source is retracted into the safe.

4. Radiation Safety of Operating Personnel: The treatment room is entered by the operating personnel only, if the source has been retracted in the safe. The treatment room is equipped with an independent radiation monitor, which flashes a red light, if the source is out of the safe.

5. Radiation Safety of Personnel in Adjacent Rooms: The concrete walls of the treatment room provide sufficient protection to all adjoining areas if the source is in the "on" position.

6. Clinical Studies: Patients with multiple skin metastases, after being fully informed of the intent of the study, will be asked whether they are willing to sign a permit for the treatment of some of their skin metastases with Californium-252 and of other skin metastases comparable number with cobalt-60. At the same time the patient will also receive all other indicated therapy for his primary cancer as well as any other treatment which is appropriate. Thus, the welfare of the patient would in no way be compromised by the proposed study.