NRC FORM 313M (9-81) 10 CFR 35	U.S. NUCLEAR REGULATORY COMMISSION APPLICATION FOR MATERIALS LICENSE – MEDICAL	Approved by OMB 3150-0041 Expires 9-30-83

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

Christian Hospital Northeast
11133 Dunn Road
St. Louis, Mo. 63136

TELEPHONE NO.: AREA CODE (314) 355 5075

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

Same and
Christian Hospital Northwest
1225 Graham Road
Florissant, Mo. 63031
(314) 839-3800

2. PERSON TO CONTACT REGARDING THIS APPLICATION

David J. Keys
Department of Radiology
TELEPHONE NO.: AREA CODE (314) 355 5075

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

a. ☐ NEW LICENSE
b. ☒ AMENDMENT TO LICENSE NO. 24-13383-01
c. ☐ RENEWAL OF LICENSE NO. _____

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

Fred Zivnuska, M.D. - Group VI
Fransiska Lee, M.D. - Group VI
Robert Baglan, M.D. - Group VI
Lily Hanes, M.D. - Group VI

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.)*

David J. Keys

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		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP V		AS NEEDED
10 CFR 35.100, SCHEDULE A, GROUP VI	X	2000

ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (In millicuries)
IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM		
PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES		
PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA		
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 YOU WILL POSSESS AT ANY ONE TIME	PRESCRIBE PURPOSE OF USE
See NRC License #24-13383-01			

Applicant .....
Check No. 7778
Amount Fee Category $340.00
Type of Fee Amend
Date Check Rec'd 12/28/83
Received By CA 12/28/83

Date 1/28/84
Log
By
Orig To
Action Compl

8508050124 850717
REG3 LIC30
24-13383-01 PDR

NRC FORM 313M (9-81)

Control No. 75927

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. _____ Date: _____

7. MEDICAL ISOTOPES COMMITTEE	
X	Names and Specialties Attached; and
	Duties as in Appendix B; or
X	Equivalent Duties Attached (Check One) See NRC License 24-13383-01
8. TRAINING AND EXPERIENCE	
X	Supplements A & B Attached for Each Individual User; and
X	Supplement A Attached for RSO.
9. INSTRUMENTATION *(Check One)*	
X	Appendix C Form Attached; or
	List by Name and Model Number
10. CALIBRATION OF INSTRUMENTS	
	Appendix D Procedures Followed for Survey Instruments; or (Check One)
X	Equivalent Procedures Attached; and
	Appendix D Procedures Followed for Dose Calibrator; or (Check One)
X	Equivalent Procedures Attached
11. FACILITIES AND EQUIPMENT	
	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)*	
	Appendix F Procedures Followed; or
	Equivalent Procedures Attached

15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL *(Check One)*	
	Appendix G Rules Followed; or
	Equivalent Rules Attached
16. EMERGENCY PROCEDURES *(Check One)*	
	Appendix H Procedures Followed; or
	Equivalent Procedures Attached
17. AREA SURVEY PROCEDURES *(Check One)*	
	Appendix I Procedures Followed; or
	Equivalent Procedures Attached
18. WASTE DISPOSAL *(Check One)*	
	Appendix J Form Attached; or
	Equivalent Information Attached
19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS *(Check One)*	
	Appendix K Procedures Followed; or
	Equivalent Procedures Attached
20. THERAPEUTIC USE OF SEALED SOURCES	
X	Detailed Information Attached; and
	Appendix L Procedures Followed; or (Check One)
X	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		FILM		
		TLD		
		OTHER (Specify)		
b. FINGER		FILM		
		TLD		
		OTHER (Specify)		
c. WRIST		FILM		
		TLD		
		OTHER (Specify)		

d. OTHER (Specify)

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: 7B

(2) LICENSE FEE ENCLOSED: $ 40

b. APPLICANT OR CERTIFYING OFFICIAL *(Signature)*

Fred C Brown

(1) NAME *(Type or Print)*

Fred Brown

(2) TITLE

President

c. DATE 11/14/83

NRC FORM 313M (9-81)

ITEM 4 (continued)

Delete as authorized user Robert W. Lohr, M.D.

Correct spelling of James Debnam, M.D.

ITEM 7

The medical isotope committee now consists of:

Mrs. Lee L. Kiehl, Assistant Administrator NE: Chairperson
Mr. Jeffrey Gruer, Assistant Administrator NW
Dr. James Debnam, Radiologist
Dr. Landy Weis, Pathologist
Dr. Walter Holloman, Radiologist
Mr. Walt Delaney, Adm. Director of Radiology
Ms. Martha Shannon, Supervisor, Special Chemistry Division, Lab
Mr. John Pyles, Nuclear Medicine Clinical Supervisor
Mr. Bill Lundak, Nuclear Medicine Technologist
Mrs. Linda Beller, R.N., Nurse Clinician
Mr. Kevin Hoffman, Safety Coordinator
Dr. Fred Zivnuska, Therapeutic Radiologist
Dr. Fransiska Lee, Therapeutic Radiologist
Dr. Robert Baglan, Therapeutic Radiologist
David Keys, M.A., Medical Physicist, Radiation Safety Officer

NRC FORM 313M SUPPLEMENT A
(9-81)

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
Frederick Zivnuska, M.D.	Missouri

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Therapeutic Radiology	12/14/74

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			
b. RADIATION PROTECTION			
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY			
e. RADIOPHARMACEUTICAL CHEMISTRY			

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

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

The American Board of Radiology

Organized through the cooperation of the
American College of Radiology, the American Roentgen Ray Society,
the American Radium Society, the Radiological Society of North America
and the Section on Radiology of the American Medical Association
Hereby certifies that

Frederick R. Zimmuska, M.D.

Has pursued an accepted course of graduate study
and clinical work, has met certain standards and qualifications and
has passed the examinations conducted under the authority of
The American Board of Radiology
On this fourteenth day of December, 1974
Thereby demonstrating to the satisfaction of the Board
that he is qualified to practice the specialty of

Therapeutic Radiology

THE AMERICAN BOARD OF RADIOLOGY
INCORPORATED IN THE DISTRICT OF COLUMBIA
1934

Robert N. Cooley
President

C. Allen Good
Secretary

AMERICAN BOARD
1933
OF
MEDICAL SPECIALTIES
EXCELLENCE
OPTIMUSQUE

Control No. 75922

NRC FORM 313M SUPPLEMENT A (9-81) 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
Fransiska Lee, M.D.	Missouri

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Therapeutic Radiology	6/9/72

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			
b. RADIATION PROTECTION			
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY			
e. RADIOPHARMACEUTICAL CHEMISTRY			

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

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

The American Board

Organized through the coopera
American College of Radiology, the Americ
the American Radium Society, the Radiologica
and the Section on Radiology of the Ame
Hereby certifies that

Fransiska Ann Lee,

Has pursued an accepted course of
and clinical work, has met certain standar
has passed the examinations conducted u
The American Board of G
On this ninth day of June
Thereby demonstrating to the satisfac
that she is qualified to practice th

Therapeutic Radi

THE AMERICAN BOARD OF RADIOLOGY
INCORPORATED IN THE DISTRICT OF COLUMBIA
1934

John Francis Roach
President

C. L

Control No. 75927

Board of Radiology

ough the cooperation of the
gy, the American Roentgen Ray Society,
the Radiological Society of North America
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by certifies that

ka Ann Lee, M.D.

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n Board of Radiology
inth day of June, 1972
to the satisfaction of the Board
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C. Allen Good
Secretary

AMERICAN BOARD
OF
MEDICAL SPECIALTIES
EXCELLENCE
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NRC FORM 313M SUPPLEMENT A (9-81) 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
Robert Baglan, M.D.	Missouri

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Therapeutic Radiology	June 7, 1980

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
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e. RADIOPHARMACEUTICAL CHEMISTRY			

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ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

The American Board o

Organized through the cooperatio
American College of Radiology, the American
the American Radium Society, the Radiological
the Section on Radiology of the American
and the American Society of Therape
Hereby certifies that

Robert Joseph Baglan,

Has pursued an accepted course of g
and clinical work, has met certain standards
has passed the examinations conducted und
The American Board of Ra
On this seventh day of June,
Thereby demonstrating to the satisfaction
that he is qualified to practice the

Therapeutic Radiol

THE AMERICAN BOARD OF RADIOLOGY
INCORPORATED IN THE DISTRICT OF COLUMBIA
1934

E. Richard Lee
President

C. A

Control No. 75927

n Board of Radiology

through the cooperation of the
diology, the American Roentgen Ray Society,
ty, the Radiological Society of North America,
gy of the American Medical Association
n Society of Therapeutic Radiologists
Hereby certifies that

Joseph Baglan, M.D.

accepted course of graduate study
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seventh day of June, 1980
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AMERICAN BOARD
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OF
MEDICAL SPECIALTIES
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President

C. Allen Good
Secretary

NRC FORM 313M SUPPLEMENT A
(9-81)

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
Lily Hanes, M.D.	Missouri/Illinois

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
See NRC License No. 24-00794-03 dated May 19, 1977.		

4. TRAINING RECEIVED IN BASIC RADIOISOTOPE HANDLING TECHNIQUES

FIELD OF TRAINING A	LOCATION AND DATE(S) OF TRAINING B	TYPE AND LENGTH OF TRAINING	
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b. RADIATION PROTECTION			
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d. RADIATION BIOLOGY			
e. RADIOPHARMACEUTICAL CHEMISTRY			

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

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

Control No. 75927

MATERIALS LICENSE

Supplementary Sheet

License Number 24-00794-03

This Copy Is For Your Files

Docket or
Reference No.

Amendment No. 34

St. John's Mercy Medical Center
615 S. New Ballas Road
St. Louis, Missouri 63141

In accordance with letter dated April 27, 1977, License Number 24-00794-03 is amended as follows:

Condition 11. is amended to read:

11. Licensed material shall be used by, or under the supervision of, Thomas F. Maher, M.D. Licensed material for diagnostic procedures may also be used by, or under the supervision of, Donald C. Spalding, M.D., or Douglas R. Lilly, M.D. Licensed material for non-human use may also be used by, or under the supervision of, Dr. Frederick G. Germuth, Jr., Dr. Eugene Rodriguez, Dr. Vicent G. Palermo, or Dr. Antonio H. Salvador. Licensed material for diagnostic procedures and Iodine 131 for treatment of hyperthyroidism may also be used by, or under the supervision of, John F. Lindeman, M.D. Licensed material for Group VI may also be used by, or under the supervision of, Lily Ann Hanes, M.D.

License in effect now.

Renewed June 14, 1979

Date May 19, 1977

For the U. S. Nuclear Regulatory Commission

John E. Baumgartner

by Radioisotopes Licensing Branch
Division of Fuel Cycle and
Material Safety
Washington, D.C. 20555

NRC FORM 313M SUPPLEMENT A
(9-81)

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
David J. Keys	NA

3. CERTIFICATION

SPECIALTY BOARD A	CATEGORY B	MONTH AND YEAR CERTIFIED C
American Board of Radiology	Therapeutic Radiological Physicist	12/9/77
	Diagnostic Radiological Physicist	6/5/81

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			
b. RADIATION PROTECTION			
c. MATHEMATICS PERTAINING TO THE USE AND MEASUREMENT OF RADIOACTIVITY			
d. RADIATION BIOLOGY			
e. RADIOPHARMACEUTICAL CHEMISTRY			

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

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

The American Board of Radiology

Organized through the cooperation of the
American College of Radiology, the American Roentgen Ray Society,
the American Radium Society, the Radiological Society of North America,
the Section on Radiology of the American Medical Association
and the American Society of Therapeutic Radiologists
Hereby certifies that

David J. Keys, M.A.

Has pursued an accepted course of graduate study
and clinical work, has met certain standards and qualifications and
has passed the examinations conducted under the authority of
The American Board of Radiology
On this ninth day of December, 1977
Thereby demonstrating to the satisfaction of the Board
that he is qualified to practice the specialty of

Therapeutic Radiological Physics

THE AMERICAN BOARD OF RADIOLOGY
INCORPORATED IN THE DISTRICT OF COLUMBIA
1934

Sidney W. Nelson
President

C. Allen Good
Secretary

AMERICAN BOARD
OF
MEDICAL SPECIALTIES
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The American Board o

Organized through the cooperation
American College of Radiology, the American
the American Radium Society, the Radiological
the Section on Radiology of the American
and the American Society of Therapeu
Hereby certifies that

David J. Keys, M.A

Has pursued an accepted course of g
and clinical work, has met certain standards
has passed the examinations conducted und
The American Board of Rad
On this fifth day of June, 19
Thereby demonstrating to the satisfaction
that he is qualified to practice the

Diagnostic Radiological

THE AMERICAN BOARD OF RADIOLOGY
INCORPORATED IN THE DISTRICT OF COLUMBIA
1934

Harold B. Jacobson, M.D.
President

Control No. 75927

ican Board of Radiology

nized through the cooperation of the
l Radiology, the American Roentgen Ray Society,
Society, the Radiological Society of North America,
Radiology of the American Medical Association
merican Society of Therapeutic Radiologists
Hereby certifies that

David J. Keys, M.A.

ed an accepted course of graduate study
has met certain standards and qualifications and
examinations conducted under the authority of
American Board of Radiology
On this fifth day of June, 1981
onstrating to the satisfaction of the Board
is qualified to practice the specialty of

ostic Radiological Physics

AMERICAN BOARD
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OF
MEDICAL SPECIALTIES
EXCELLENCE
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ld B. Jacobson, M.D
President

Secretary

ITEM 9

The following equipment is to be added for use with brachytherapy

INSTRUMENTATION

1. Survey Meters

   a. Manufacturer's name: Ludlum

      Manufacturer's model number: Model 2 survey meter, Model 44-2 High Energy Gamma Scintilator

      Number of instruments available: 1

      Minimum range: 0 mr/hr to 0.5 mr/hr (31 K CPM at 0.1 mR/hr Ra-226)

      Maximum range: 0 /hr to 50 mr/hr

   b. Manufacturer's name: Victoreen

      Manufacturer's model number: 492

      Number of instruments available: 1

      Minimum range: 0 mr/hr to 10 mr/hr

      Maximum range: 0 mr/hr to 1000 mr/hr

*Note - Other suitable survey meters meeting the criteria of Item 9 Regulatory Guide 10.8-4 may be substituted as necessary (repairs, replacements, etc.)

2. Dose calibrator

   Manufacturer's name:

   Manufacturer's model number:

   Number of instruments available:

3. Diagnostic instruments

Type of Instrument	Manufacturer's Name	Model No.

4. Other

   1 Victoreen Model 687 D Minometer
   5 Victoreen Model 362 Pocket Dosimeters

Control No. 75927

METHODS FOR CALIBRATION OF (X AND GAMMA-RAY) SURVEY METERS

A. The calibration of survey meters shall be performed in accordance with the following:

1. The radionuclide sources used for calibration shall be approximate point sources.

2. The source activities shall be traceable* within 5% accuracy to the United States National Bureau of Standards (NBS) calibrations.**

3. Scales of the instrument within the exposure range of 1.0 mR/hr to 500 mR/hr shall be calibrated in at least two points such that: a) one point is in each half of the scale; and, b) the two points are separated by 35-50% of full scale. Digital or logarythmic readout instruments shall have one point in each decade calibrated.

4. The exposure rate measured by the instrument shall not differ from the true exposure rate by more than ±10% of the calculated or known value for each point checked. Scales with exposure rate measurements in error by 10% or 20% will be provided with appropriate correction factors. Meters in error by 20% or more must be repaired by the manufacturer or other competent personnel.

* For purposes of this document, the amount of radioactivity in a source is said to be traceable to a national standard when its radioactivity was determined by comparison with a source of the same isotope (or a proper simulated source, isotpically), the activity of which is certified by the U.S. National Bureau of Standards.

** In lieu of using a traceable radioactive source, an instrument traceable (transfer instrument[0]) to the National Bureau of Standards, within ±5%, may be used as an alternative standard.

0 American National Standards Institute, ANSI N323-1978, "Radiation Protection Instrumentation Test and Calibration".

NOTE:

Sources of Cobalt 60, Cesium 137, or Radium 226 are appropriate for use in calibrations.

B. RECORDS

1. Records for Item A shall include as a minimum:

   a. Radionuclide used
   b. Activity and date of source
   c. Present activity
   d. Date of calibration
   e. Calculated and measured radiation values
   f. Respective distance from source for each calculated radiation value
   g. Necessary scale correction factors (required if calculated and measured radiation values do not agree within ±10%)
   h. Make, model, and serial number of survey meter being calibrated
   i. Name of individual performing the calibration

C. Use of Inverse Square Law and Radioactive Decay Law

1. A calibrated source will have a calibration certificate giving its output at a given distance measured on a specific 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 output at other times after the specified date.

2. INVERSE SQUARE LAW:

   S (R_1) (R_2)

   * - - P_1

   - - - - - - - - - - P_2

   Exposure rate at P_2:

$$R_2 = \frac{(P_1)^2 \times (R_1)}{(P_2)^2}$$

   where $\underline{S}$ IS THE POINT SOURCE

   $\underline{R_1 \text{ and } R_2}$ are in the same units (mR/hr or R/hr)

   P_1 and P_2 are in the same units (centimeters, meters, feet, etc.)

Control No. 75927

3. RADIOACTIVE DECAY LAW:

Exposure rate t units of time after specified calibration date:

$$R_t = R_o \times e^{\frac{-(0.693t)}{T_{1/2}}}$$

where

R_o and R_t	are in the same units (mR/hr or R/hr)
R_o	is exposure rate on 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 100mR/hr at 1 meter on March 10, 1975. Radionuclide half-life is 5.27 years.

Question: What is the output at 10 cm. on March 10, 1977 (2.0 years later)?

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

$$R = 100 \text{ mR/hr} \times e^{\frac{-(0.693 \times 2.0)}{5.27}}$$

$$= 100 \times 0.77 =$$

77 mR/hr at 1 meter
on March 10, 1977

b. Output at 2 m, 2.0 years after calibration date:

$$R(10 \text{ cm}) = \frac{(1 \text{ m})^2}{(2.0 \text{ m})^2} \times 77 \text{ mR/hr}$$

$$= \frac{1}{4} \times 77 = 19.2 \text{ mR/hr}$$

at 2 m, 2.0 years after calibration

D. Measurement of Check Source Exposure Level

1. When a check source is available with the meter, a reading using the thin window (if applicable) shall be taken and recorded.

E. Physical Description of Facilities, Sources, and Set-Up

1. The facility used for radiation measurement should be any room, not already containing radioactive sources, whose walls are shielded against radiation. Typical examples of this are x-ray rooms, betatron rooms, etc. For leakage measurement, any site having only background radiation shall be used.

2. Cesium-137 sources shall be used for calibration of survey instruments. Sources used will be 3M 6D6C tube sources with activities in the range of 5 to 40 mg-Ra equivalence.

3. The calibration jig consists of a high density styrofoam block. The source is positioned upright at the edge of the block. The styrofoam block is positioned on a table or other platform approximately 3 to 5 ft. above floor level. No scatterer is present within a 3 ft. radius of the direct path from the source to the meter.

4. Using cesium sources selected, calculate the appropriate distances necessary in order to obtain 1/3 and 2/3 of full scale deflection for each of the scales to be calibrated (or mid-decade ±20% for digital, logarythmic scales). Use no distance larger than 4 meters or shorter than 0.5 meters.

5. During the measurement process, maintain the maximum feasible distance from the source. Minimize your time by being prepared. Extraneous personnel shall not be allowed in the chosen room during calibration. Keep unused sources in a well shielded carrier in a distant corner of the room.

6. Record data. Calibrate each scale if needed and/or possible to within 10% of the correct response. Otherwise provide calibration factor or statement of need to repair.

7. Provide a signed written report using the facsimile calibration report form in Appendix A.

CERTIFICATE OF INSTRUMENT CALIBRATION

For: Certificate Number

SURVEY INSTRUMENT

INSTRUMENT DATA Type _____ Model _____

Serial No. _____ Probe _____

CALIBRATION DATA

Scale	d	Radiation Level	Meter Reading	d	Radiation Level	Meter Reading

---

ALL READINGS UNLESS OTHERWISE INDICATED ARE IN mR/hr
DISTANCES IN METERS

Calibration Source _____ Serial No. _____

Source Activity _____ mCi Temperature _____ °C

MAINTENANCE DATA
( ) Clean battery contacts
( ) Battery replacement, Type: _____

We certify that this instrument was calibrated on the date shown and it meets presently accepted standards for this type of equipment.

This instrument should be recalibrated before _____

CHECKED BY _____ DATE _____

METHODS FOR CALIBRATION OF (X AND GAMMA-RAY) POCKET DOSIMETERS

A. The calibration of pocket dosimeters shall be performed in accordance with the following:

1. The radionuclide sources used for calibration shall be approximate point sources.

2. The source activities shall be traceable* within 5% accuracy to the United States National Bureau of Standards (NBS) calibrations.**

3. Each scale of the instrument shall be calibrated at least at two points such that: (a) one point is in each half of the scale; and, (b) the two points are separated by 35-50% of full scale.

4. The exposure rate measured by the instrument shall not differ from the true exposure rate by more than ± 20% of the calculated or known value for each point checked.

* For purposes of this document, the amount of radioactivity in a source is said to be traceable to a national standard when its radioactivity was determined by comparison with a source of the same isotope (or a proper simulated source, isotopically), the activity of which is certified by the U.S. National Bureau of Standards.

** In lieu of using a traceable radioactive source, an instrument traceable (transfer instrument[0]) to the National Bureau of Standards, within ±5%, may be used as an alternative standard.

0 American National Standards Institute, ANSI N323-1978, "Radiation Protection Instrumentation Test and Calibration"

NOTE:

Sources of Cobalt 60, Cesium 137, or Radium 226 are appropriate for use in calibrations.

B. RECORDS

1. Records for Item A shall include as a minimum:

   a. Radionuclide used
   b. Activity and date of source
   c. Present activity
   d. Date of calibration
   e. Calculated and measured radiation values
   f. Respective distance from source for each calculated radiation value and time used
   g. Necessary scale correction factors (required if calculated and measured radiation values do not agree within $\pm$20%)
   h. Make, model, and serial number of pocket dosimeter being calibrated
   i. Name of individual performing the calibration

C. Use of Inverse Square Law and Radioactive Decay Law

1. A calibrated source will have a calibration certificate giving its output at a given distance measured on a specific 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 output at other times after the specified date.

2. INVERSE SQUARE LAW:

   S (R_1) (R_2)

   * - - P_1

   - - - - - - - - - - P_2

   Exposure rate at P_2:

$$R_2 = \frac{(P_1)^2 \times (R_1)}{(P_2)^2}$$

   where

   $\underline{S}$ IS THE POINT SOURCE

   $\underline{R_1 \text{ and } R_2}$ are in the same units (mR/hr or R/hr)

   $\underline{P_1 \text{ and } P_2}$ are in the same units (centimeters, meters, feet, etc.)

3. RADIOACTIVE DECAY LAW:

Exposure rate t units of time after specified calibration date:

$$R_t = R_o \times e^{\frac{-(0.693t)}{T_{1/2}}}$$

where

R_o and R_t are in the same units (mR/hr or R/hr)

R_o is exposure rate on 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 meter on March 10, 1975. Radionuclide half-life is 5.27 years.

Question: What is the output at 10 cm. on March 10, 1977 (2.0 years later)?

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

$$R = 100 \text{ mR/hr} \times e^{\frac{-(0.693 \times 2.0)}{5.27}}$$

$$= 100 \times 0.77 =$$

77 mR/hr at 1 meter on March 10, 1977

b. Output at 10 cm., 2.0 years after calibration date:

$$R(10cm) = \frac{(1 \text{ m})^2}{(0.1\text{m})^2} \times 7.7 \text{ mR/hr}$$

$$= \frac{1}{0.01} \times 7.7 = 770 \text{ mR/hr}$$

at 10 cm, 2.0 years after calibration.

c. How long must the pocket dosimeter remain in place at 10 cm in order to receive an exposure of 150 mR using the source in part "a"?

$$t = \frac{150 \text{ mR}}{770 \text{ mR/hr} \quad 1 \text{ hr/60 min.}}$$

$$= 11.7 \text{ minutes } (11' 41")$$

D. Measurements of Leakage Radiation

1) Pocket Dosimeters will be charged, placed in a radiation free environment (excluding background radiation), then read after a minimum of 24 hours has passed. A pocket dosimeter will be considered defective if the rate of leakage is greater than 5% of the dosimeter scale reading.

E. Physical Description of Facilities, Sources, and Set-Up

1) The facility used for radiation measurement should be any room, not already containing radioactive sources, whose walls are shielded against radiation. Typical examples of this are x-ray rooms, betation rooms, etc. For leakage measurement, any site having only background radiation shall be used.

2) Cesium-137 sources shall be used for calibration of pocket dosimeters to be used with Cesium-137 or Radium-226 implants. Sources used will be 3M 6D6C tube sources with activities in the range of 5 to 40 mg-Ra equivalence.

3) The calibration jig consists of a high density styrofoam block. The source is positioned upright in the center of the block. Holes have been drilled at 10 cm radii for placement of upright pocket dosimeters.

CALIBRATION OF DOSE CALIBRATOR

A. Sources Used for Linearity Test

(Check as appropriate)

X First elution from new Mo-99/Tc-99m generator

or

X Other* (specify) Unit dose supplied by radiopharmaceutical

B. Sources Used for Instrument Accuracy and Constancy Tests **

Radionuclide	Suggested Activity (mCi)	Activity (mCi)	Accuracy
Co-57	3-5	1-5***	5%
Ba-133	0.1-0.5	0.1-0.5	5%
Cs-137	0.1-0.2	0.5-0.9****	5%
Ra-226	1-2	0.07-0.2 -	

C. _____ The procedures described in Section 2 of Appendix D will be used for calibration of the dose calibrator

or

X Equivalent procedures are attached.

*For licensees who are not authorized for Mo-99/Tc-99m generators, activity must be equivalent to the highest activity used.

** Sources used will be sources manufactured for the use as dose calibrator check sources, and sold by a licensed company.

*** To allow at least 2 half lifes of a 5 mCi source.

**** A 0.825 mCi is currently available.

METHODS FOR CALIBRATION OF DOSE CALIBRATOR*

All radiopharmaceuticals must be assayed for activity to any accuracy of 10 percent. The most common instrument for accomplishing this is an ionization-type dose calibrator. The instrument must be checked for accurate operation at the time of installation and periodically thereafter.

A. Test for the following:

1. Instrument constancy (daily)

2. Instrument accuracy (at installation and annually thereafter)

3. Instrument linearity (at installation and quarterly thereafter)

4. Geometrical variation (at installation)

B. After repair or adjustment of the dose calibratory, repeat all the appropriate tests listed above (dependent upon the nature of the repairs).

C. Test for Instrument Constancy

Instrument constancy means that there is reproducibility within a stated acceptable degree of precision, in measuring a constant activity over time. Assay at least one relatively long-lived reference source such as Cs-137, Co-57,** or Ra-226** using a reproducible geometry before each days's use of the instrument. Preferably, at least two reference sources (for example, 3-5 mCi of Co-57 and 100-200 uCi of Cs-137 or 1-2 mg Ra-226 (with appropriate decay corrections) will be alternated each day of use to test the instruments performance over a range of photon energies and source activities.

1. Assay each reference source using the appropriate instrument setting (i.e., Cs-137 setting for Cs-137).

2. Measure background level at same instrument setting, or check that automatic background subtraction is operating properly when blanks are inserted in the calibrator.

3. Calculate net activity of each source subtracting out background level.

4. For each source, compare the net activity versus the day of the year.

5. Indicate the predicted activity of each source based on decay calculations and the ±5 percent limits on the graph.

6. Repeat the procedure used for the Cs-137 source for all the radionuclide settings to be used that day.

7. Variations greater than ±5 percent from the predicted activity indicate the need for instrument repair or adjustement.

8. Investigate higher than normal background levels to determine their origin and to eliminate them if possible by decontamination, relocation, etc.

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* See ANSI N42.13-1978. "Calibration and Usage of Dose Calibrator Ionization Chambers for the Assay of Radionuclides" (American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018).

** Co-57 and Ra-226 are not subject to NRC licensing; the respective State agency should be consulted to determine its requirements for possessing this material.

D. Inspect the instrument on a quarterly basis to ascertain that the measurement chamber liner is in place and that instrument zero is properly set (see manufacturer's instructions).

E. Test of Instrument Linearity

The linearity of a dose calibrator should be ascertained over the entire range of activities employed. This test will use a vial of Tc-99m whose activity is equivalent to the maximum anticipated activity to be assayed (e.g., the first elution from a new generator).

1. Assay the Tc-99m vial in the dose calibrator, and subtract background level to obtain net activity in millicuries.

2. Repeat step 1 at typical time intervals of 6, 24, 30 and 48 hours after the initial assay.

3. Using the 30-hour activity measurement as a starting point, calculate the predicted activities at 0, 6, 24, and 48 hours using the following table:

Assay Time* (hr)	Correction Factor
0	31.633
6	15.853
24	1.995
30	1
48	0.126

Example: If the net activity measured at 30 hours was 15.625 mCi, the calculated activities for 6 and 48 hours would be 15.625 mCi x 15.853 = 247.7 mCi and 15.625 mCi x 0.126 = 1.97 mCi, respectively.

4. On log-log or semi-log coordinate paper, plot the measured net activity (for each time interval) versus the calculated activity (for the same time interval).

5. The activities plotted should be within ±5 percent of the calculated activity if the instrument is linear and functioning properly. Errors greater than ±5 percent indicate the need for repair or adjustment of the instrument.

6. If instrument linearity cannot be corrected, it will be necessary in routine assays to use either (a) an aliquot of the eluate that can be accurately measured or (b) the graph constructed in step 4 to relate measured activities to calculated activities.

F. Test for Geometrical Variation

There may be significant geometrical variation in activity measured as a function of sample volume or configuration, depending on the volume and size of the ionization chamber used in the dose calibrator. The extent of geometrical variation should be ascertained for commonly used radionuclides and appropriate correction factors computed if variations are significant, i.e., greater than ±2 percent. (Even though correction factors may be provided by the manufacturer, the accuracy of these should be checked.) When available from the manufacturer, certified data on geometrical variations may be used in lieu of these measurements.

To measure variation with volume of liquid, a 30-cc vial containing 2 mCi of Co-57 or other appropriate radionuclide in a volume of 1 ml will be used.

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* Assay times should be measured in whole hours and correction factors should be used to the third decimal place as indicated. The more recent half-life of $T_{1/2}$ = 6.02 hours has been used in calculating these correction factors.

1. Assay vial at the appropriate instrument setting, and subtract background level to obtain net activity.

2. Increase the volume of liquid in the vial in steps to 2,4,8,10,20 and 25 ml by adding the appropriate amount of water or saline. After each addition, gently shake vial to mix contents and assay as in step 1. (Follow good radiation safety practices to avoid contamination and to minimize radiation exposure.)

3. Select one volume as a standard (such as the volume of reference standard used in performing the test for instrument accuracy), and calculate the ratio of measured activities for each volume to the reference volume activity. This represents the volume correction factor (CF).

   Example: If activities of 2.04, 2.02, and 2.00 mCi are measured for 4, 8, and 10 ml volumes and 10 ml is the reference volume selected.

   $$4 \text{ ml Volume CF} = \frac{2.00}{2.04} = 0.98$$

4. Plot the correction factors against the volume on linear graph paper. Use this graph to select the proper volume correction factors for routine assay of that radionuclide.

5. The true activity of a sample is calculated as follows:

   True Activity = Measured Activity x Correction Factor

   where the correction factor used is for the same volume and geometrical configuration as the sample measured.

6. Similarly, the same activity of Co-57 in a syringe may be compared with that of 10 ml in a 30-cc vial, and a correction factor may be calculated.

7. It should be noted that differences of 200 percent in dose calibrator readings between glass and plastic syringes have been observed for lower-energy radionuclides such as I-125, which should be assayed in a dose calibrator only if the reliability of such an assay can be established. Glass tubes and syringes may also vary enough in thickness to cause significant errors in assaying I-125. Hence, adequate correction factors must be established.

   An alternative to providing syringe calibration factors is to simply assay the stock vial before and after filling the syringe. The activity in the syringe is then the difference in the two readings (with a volume correction if significant).

G. Test for Instrument Accuracy

Check the accuracy of the dose calibrator for several radionuclides, including Cs-137, Co-57, and Ba-133, using appropriate reference standards whose activities have been calibrated by comparisons with standard sources that have been assayed by NBS and documented.

The activity levels of the reference sources used should approximate those levels normally encountered in clinical use (e.g., Co-57, 3-5 millicuries) giving adequate attention to source configuration. Identify in your application the three sources that you will use. State nuclide, activity, and calibration accuracy. The lower-energy reference standards (Tc-99m, Xe-133, I-125) must be in vials with the same thickness of glass as the actual samples to be measured for best accuracy.

1. Assay the reference standard in the dose calibrator at the appropriate setting, and subtract the background level to obtain the net activity.

2. The average activity determined in step 2 should agree with the certified activity of the reference source within ±5 percent after decay corrections.

3. Repeat the above steps for other commonly used radionuclides for which adequate reference standards are available.

4. Keep a log of these calibration checks.

5. Calibration checks that do not agree within ±5 percent indicate that the instrument should be repaired or adjusted. If this is not possible, a calibration factor should be calculated for use during routine assays of radionuclides.

6. At the same time the instrument is being initially calibrated at the licensee's facility with the reference standards, place a long-lived source in the calibrator, set the instrument, in turn, at the various radionuclide settings used (Cs-137, I-131, Tc-99m, I-125, etc.), and record the readings. These values may later be used to check instrument calibration at each setting (after correcting for decay of the long-lived source) without requiring more reference standards. Keep a log of these initial and subsequent readings.

ITEM 12 - PERSONNEL TRAINING PROGRAM

In accordance with Section 19.12 of 10 CFR, Part 19, the following is a description of the training required for all personnel who work with or in the vicinity of radioactive materials:

1. The nuclear medicine department will be staffed by individuals who will be classified as occupational employees. These individuals will perform their duties from the radiation safety viewpoint under the direction of the physician(s) named on the license application.

2. Every effort will be made to hire nuclear medicine technology registered or registry eligible personnel to work with radioactive material. Orientation of such personnel for a day or two by the physician(s) named on the license and/or by the supervising technologist will include the following:

a. Indicate areas where radioactive materials are used or stored.
b. Potential hazards associated with radioactive materials.
c. Radiological safety procedures appropriate to their respective duties.
d. Pertinent NRC regulations.
e. The rules and regulations of the license.
f. The pertinent terms of the license.
g. Their obligation to report unsafe conditions.
h. Appropriate response to emergencies or unsafe conditions.
i. Their right to be informed of their radiation exposure and bioassay results.

Posting of documents as required by CFR 10, Part 19.11 will be made in a prominent position of the working area of NRC regulated employees. Typically this notice will be placed on a bulletin board in the working area.

3. Access into areas where radioactive material is stored or used will be restricted for nonoccupational personnel. When it is necessary for nonoccupational personnel to enter these areas, as in the case of certain patients who need special care, personnel so involved will be present under the direction of the nuclear medicine technologist, who will ensure that the exposure of these persons is held to the minimum required for the performance of the nuclear medicine procedure. Further, all nonoccupational personnel will receive instruction as to the location and potential hazards associated with radioactive material during their hospital orientation process and annually thereafter in the form of verbal instructions and/or hospital interdepartment memos.

Prepared 11/83
License #24-13383-01

PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

1. The chief nuclear medicine technologist his/her designee will place all orders for radioactive material and will ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.

2. For Groups I to V, the security quard will escort courriers to the nuclear medicine department when packages are delivered bearing a D.O.T. Radioactive III label. Packages bearing a Radioactive I or II label will be signed for by the security guard and taken immediately to the appropriate department.

For Group VI sources, the receiving dock will be notified that radioactive material is expected from (Manufacturer). Upon arrival of the sources, the receiving dock is to notify the RSO or his designee and the security guard. The RSO or his designee will accept the package and accompany the material to the source room.

3. The following directive will be issued to hospital personnel:

TO: Managerial Personnel of:

Security
Purchasing
Receiving
Nursing
Volunteers

FROM: Administration

SUBJECT: Delivery of packages containing radioactive materials.

When courriers or common carriers arrive with packages containing radioactive materials, contact the security guard on duty. Personnel, except the security guards who are trained in the proper handling of radioactive materials, are not to personally accept packages containing radioactive materials.

If the package is wet or appears to be damaged, immediately contact the Radiation Safety Officer.* Ask the carrier to remain until it can be determined that neither he nor the delivery vehicle is contaminated.

*Through the operator or phone (314) 355-5075 or 355-5657.

Item #13
Prepared 11/83
License #24-13383-01

A. Procedures for the use of Group VI sources

1. Store the Cs-137 tube sources in a key-locked safe with at least 3 inches of lead surrounding the storage vaults. Store other Group VI sources in either the lead carrier provided in the shipping container, the lead safe if space is available, or any other appropriate safe such that the exposure rate will not exceed the limits of 10 CFR, Part 20.105 (b)(1) and (b)(2).

2. Use whenever possible 10" long forceps in the handling of radioactive materials.

3. Perform as much work as possible with the radioactive materials shielded behind the L block.

4. Minimize your time of handling the sources by being prepared and efficient.

5. Use TLD finger badges and wear your whole body badge while preparing the radioactive sources.

6. Transport the sources in carriers, labeled "Radioactive Materials", having at least 1" lead shielding. Always leave at least one carrier within the patient's room in case an emergency removal is necessitated. Where possible long-handled carts should be used to transport the carriers from the source room to the patient's room and vice versa.

7. For each implant indicate in the log book provided in the source room the following information:

   a. Date
   b. Patient's name
   c. Patient's room number
   d. Source employed
   e. Physician
   f. Date survey performed, source count performed
   g. Initials of surveyor
   h. Initials of person performing storing sources

8. Quarterly inventory all sources.

9. For each patient treated survey the patient and room with a radiation survey instrument and perform a source count prior to the removal of radiation restrictions and release of the patient.

10. Ensure that adjacent patients or staff do not receive 100 mR in one week.

11. Enclose the Nursing Instructions for Brachytherapy in the patient's chart.

12. When possible, place the portable lead shields next to the patient's bed.

B. Nursing instructions for brachytherapy

C. Personnel monitoring for nurses

1. Nurses are considered as non-radiation workers.

2. During the first year or for the first 10 implants, whichever is shorter, the nursing staff will be provided pocket dosimeters for evaluation of the typical and maximum radiation exposure per nurse per shift.

3. If results indicate that it is unlikely that any nurse will receive 125 mR in one year, then pocket dosimeters will no longer be required.

4. The RSO will be responsible by monitoring the number of implants, the activities involved, and the room location of the implant to ensure that the nursing staff stays within the permissible levels of 10 CFR.

D. Permissible level of radiation in unrestricted areas

1. Radiation levels may exist in adjacent rooms which could result in a dose of 2 mR in one hour or 100 mR if continuously present in 7 days. However in accordance with 10 CFR 20.105(a) steps will be taken to ensure that it is not likely that any individual receives a dose to the whole body in any period of one calendar year in excess of 0.5 rem. The steps will be as follows:

For a patient in an adjacent room -

i) Assume that an adjacent patient will not be placed in an adjacent room more than twice a year.
ii) Calculate the expected exposure from the proposed implant to the mid point of the adjacent patient.
iii) If the exposure is less than 200 mR take no action. (NCRP Report No. 37, Page 16, Lines 32-37, used for guidance.) If the exposure could be greater than 200 mR provide additional shielding, move the patients farther apart, or move the adjacent patient prior to reaching the 200 mR level.

For an adjacent nursing (or other staff) office -

i) Calculate the exposure for the implant based upon 8 hr shifts, the number of implants per year and the anticipated occupancy -

1/4 classroom, lounge
1 occupied office
X if specific data is available

ii) or, if data is available, calculate the exposure based on measured data (e.g. pocket dosimeter study)
iii) If the exposure is less than 200 mR per year take no action, else provide additional shielding, move the patient worker further apart, or disallow use of the room.

DATE:_____

NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH SEALED SOURCES

Patient's Name:_____

Room Number:_____ Physician's Name:_____

Isotope & Activity:_____ Recommended Time for Care:_____ mins/shift/staff

Date and Administration:_____

Date and Time Sources are to be Removed:_____

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.

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. The Radiation Safety Officer or his designee will then determine how long a person may remain at these positions.

4. 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 regarding radiation safety precautions.

5. Nurses should spend only the minimum time necessary near a patient for routine nursing care.

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

7. 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.

8. Bed baths given by the nurse should be omitted while the sources are in place.

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

10. Surgical dressings and bandages used to cover the area of needle insertion may be changed only by the attending physician or the radiation therapist and MAY NOT BE DISCARDED until directed. 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.

11. No special precautions are needed for sputum, urine, vomitus, stools, dishes, instruments, or utensils unless specifically ordered.

12. All bed linen 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. Housekeeping procedures should be suspended until sources are removed.

CONTINUED ON BACK

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

14. 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. Visitors must notify nursing station when arriving and leaving.

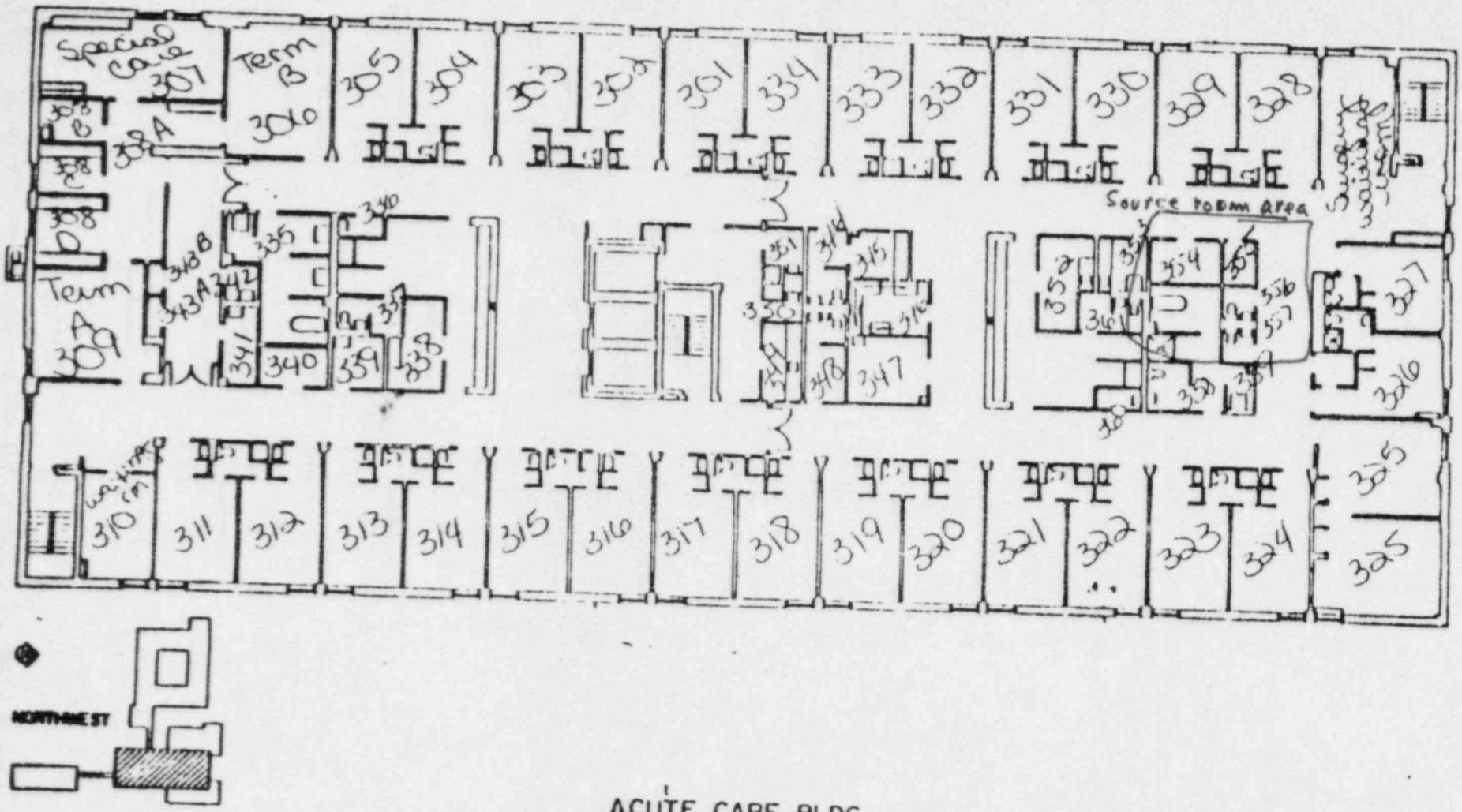
15. Visitors should sit at least 3 feet (or 1 m) from the patient and should remain no longer than the time specified on the form posted on the patient's door and on his chart.

16. 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.

17. Emergency Procedures:
    1. If an implant source becomes loose or separated from the patient, or,
    2. If the patient dies, or,
    3. If the patient requires emergency surgery, immediately call David J. Keys or the Radiation Therapist -

    Telephone No.(days) X5075
    David Keys (nights) 532-9236
    Radiation Therapy (nights) 569-6031

18. At the conclusion of treatment, a survey will be performed 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 any other area occupied by the patient. At the same time, all radiation signs will be removed. 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.



ACUTE CARE BLDG.

3rd FLOOR PLAN

Revised 8/81

CHRISTIAN NW

Room	Function
354	Nurses Locker Room
355	Source Room
356	Restroom
358	Nurses Locker Room and Patient Bath

PROCEDURES AND PRECAUTIONS FOR USE OF Sr-90 SEALED SOURCES

1. Christian Hospitals will receive the Sr-90 source from William L. Walter, M.D., private practice license number 24-13383-01, upon his arrival with the source. The source may be used at Christian Northeast or Christian Northwest.

2. Prior and after use the Sr-90 source will be kept locked in its container.

3. The Sr-90 source will be transferred back to Dr. Walter upon his leaving the hospital.

4. A log will be kept indicating the date and time of each receipt and transfer of the Sr-90 source.

Item #23
Prepared 10/25/83
License #24-13383-01