

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

The Jewish Hospital
3200 Burnet Ave.
Cincinnati, Ohio 45229

TELEPHONE NO.: AREA CODE (513) 569 2290

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

Same

2. PERSON TO CONTACT REGARDING THIS APPLICATION

Paul A. Feller, Ph.D.

TELEPHONE NO.: AREA CODE (513) 569 2290

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

a. ☐ NEW LICENSEb. ☐ AMENDMENT TO LICENSE NO. _____c. ☒ RENEWAL OF LICENSE NO. 34-00855-07

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

(Same as current license)

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.)

Paul A. Feller, Ph.D.

(Same as current license)

6.a. RADIOACTIVE MATERIAL FOR MEDICAL USE

RADIOACTIVE MATERIAL LISTED IN:	ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (in millicuries)	ADDITIONAL ITEMS:	MARK ITEMS DESIRED "X"	MAXIMUM POSSESSION LIMITS (in millicuries)
10 CFR 31.11 FOR IN VITRO STUDIES	X	10	IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM	X	500
10 CFR 35.100, SCHEDULE A, GROUP I	X	AS NEEDED	PHOSPHORUS-32 AS SOLUBLE PHOSPHATE FOR TREATMENT OF POLYCYTHEMIA VERA, LEUKEMIA AND BONE METASTASES	X	100
10 CFR 35.100, SCHEDULE A, GROUP II	X	AS NEEDED	PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.	X	100
10 CFR 35.100, SCHEDULE A, GROUP III	X	4000	GOLD-198 AS COLLOID FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
10 CFR 35.100, SCHEDULE A, GROUP IV	X	AS NEEDED	IODINE-131 AS IODIDE FOR TREATMENT OF THYROID CARCINOMA	X	500
10 CFR 35.100, SCHEDULE A, GROUP V	X	AS NEEDED	XENON-133 AS GAS OR GAS IN SALINE FOR BLOOD FLOW STUDIES AND PULMONARY FUNCTION STUDIES.	X	1500
10 CFR 35.100, SCHEDULE A, GROUP VI	X	3000			

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
NONE			

8509120037 850731
REG3 LIC30
34-00855-07 PDR

Applicant _____
Check No. 002201
Amount Fee Category 15.58
Type of Fee Ren 15.58
Date Check Rec'd 10/13/84
Received By _____

RECEIVED BY LFMB
Date 12/9/84
Log 10-3-217
By _____
Orig. To _____
Action _____

NRC FORM 313M

(9-81)

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: October, 1980

Radiation Safety Committee 7. MEDICAL ISOTOPES COMMITTEE <input checked="" type="checkbox"/>		15. GENERAL RULES FOR THE SAFE USE OF RADIOACTIVE MATERIAL (Check One)	
<input checked="" type="checkbox"/>	Names and Specialties Attached; and		Appendix G Rules Followed; or
<input checked="" type="checkbox"/>	Duties as in Appendix B; or _____ (Check One)	<input checked="" type="checkbox"/>	Equivalent Rules Attached
	Equivalent Duties Attached	16. EMERGENCY PROCEDURES (Check One)	
8. TRAINING AND EXPERIENCE *		<input checked="" type="checkbox"/>	Appendix H Procedures Followed; or
	Supplements A & B Attached for Each Individual User; and		Equivalent Procedures Attached
	Supplement A Attached for RSO.	17. AREA SURVEY PROCEDURES (Check One)	
9. INSTRUMENTATION (Check One)		<input checked="" type="checkbox"/>	Appendix I Procedures Followed; or
<input checked="" type="checkbox"/>	Appendix C Form Attached; or		Equivalent Procedures Attached
	List by Name and Model Number	18. WASTE DISPOSAL (Check One)	
10. CALIBRATION OF INSTRUMENTS		<input checked="" type="checkbox"/>	Appendix J Form Attached; or
	Appendix D Procedures Followed for Survey Instruments; or _____ (Check One)		Equivalent Information Attached
<input checked="" type="checkbox"/>	Equivalent Procedures Attached; and	19. THERAPEUTIC USE OF RADIOPHARMACEUTICALS (Check One)	
	Appendix D Procedures Followed for Dose Calibrator; or _____ (Check One)		Appendix K Procedures Followed; or
<input checked="" type="checkbox"/>	Equivalent Procedures Attached	<input checked="" type="checkbox"/>	Equivalent Procedures Attached
11. FACILITIES AND EQUIPMENT		20. THERAPEUTIC USE OF SEALED SOURCES	
<input checked="" type="checkbox"/>	Description and Diagram Attached	<input checked="" type="checkbox"/>	Detailed Information Attached; and
12. PERSONNEL TRAINING PROGRAM			Appendix L Procedures Followed; or _____ (Check One)
<input checked="" type="checkbox"/>	Description of Training Attached	<input checked="" type="checkbox"/>	Equivalent Procedures Attached
13. PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL		21. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE GASES (e.g., Xenon - 133)	
<input checked="" type="checkbox"/>	Detailed Information Attached	<input checked="" type="checkbox"/>	Detailed Information Attached
14. PROCEDURES FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIALS (Check One)		22. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL IN ANIMALS N/A	
	Appendix F Procedures Followed; or		Detailed Information Attached
<input checked="" type="checkbox"/>	Equivalent Procedures Attached	23. PROCEDURES AND PRECAUTIONS FOR USE OF RADIOACTIVE MATERIAL SPECIFIED IN ITEM 6.b N/A	
			Detailed Information Attached

24. PERSONNEL MONITORING DEVICES			
TYPE (Check appropriate box)		SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	FILM	R. S. Landauer, Jr. & Co.	Monthly
	TLD		
	OTHER (Specify)		
b. FINGER	FILM		
	TLD	R. S. Landauer, Jr., & Co.	Monthly
	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)

b. APPLICANT OR CERTIFYING OFFICIAL (Signature)

(1) NAME (Type or Print)

Michael Coler

(1) LICENSE FEE CATEGORY:

7.C.

(2) TITLE

Vice President - Administration

(2) LICENSE FEE ENCLOSED: \$ 580.00

c. DATE

11-21-84

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 NRC Form 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.

ITEM 7

Names and Specialties of Radiation Safety Committee Members

H. N. Margolin, M.D., Chairman, Nuclear Medicine and Diagnostic Radiology Physician

P. A. Feller, Ph.D., R.S.O., Radiological Physicist

K. B. Krugh, Deputy R.S.O., Radiological Physicist

L. Winkler, Deputy R.S.O., Nuclear Medicine Supervisor and Technologist

R. Lenobel, M.D., Nuclear Medicine and Diagnostic Radiology Physician

E. Traiforos, M.D., Nuclear Medicine and Diagnostic Radiology Physician

R. Subramanya, M.D., Pathologist and Nuclear Medicine Physician

E. Silverstein, M.D., Pathologist and Nuclear Medicine Physician

H. Horwitz, M.D., Radiation Therapy Physician

A. Fine, M.D., Radiation Therapy Physician

M. D. Machnovitz, Risk Management Director

S. Smith, Assistant Vice President, Nursing Services

P. Schoenung, Radiation Therapy Supervisor and Technologist

J. Issenman, Diagnostic Radiology Supervisor and Technologist

G. Wietmarschen, Diagnostic Radiology Supervisor

M. Coler, Vice President for Administration

APPENDIX C

INSTRUMENTATION

1. Survey meters

- a. Manufacturer's name: Victoreen
 Manufacturer's model number: 493
 Number of instruments available: 2
 Minimum range: 0.01 mR/hr to 0.5 mR/hr
 Maximum range: 1.0 mR/hr to 50.0 mR/hr
- b. Manufacturer's name: Eberline
 Manufacturer's model number: E-120G
 Number of instruments available: 1
 Minimum range: 0.5 mR/hr to 10 mR/hr
 Maximum range: 50.0 mR/hr to 1000 mR/hr

2. Dose calibrator

Manufacturer's name: Capintec
 Manufacturer's model number: CRC-10R
 Number of instruments available: 1

3. Instruments used for diagnostic procedures

Type of Instrument	Manufacturer's Name	Model No.
Gamma Camera	Pickar	Dynacamera Series 5
Gamma Camera	Searle	Pho/Gamma 37P
Gamma Camera	Pickar	Dynacamera 4C
Portable Gamma Camera	Technicare	420
Portable Gamma Camera	Siemens	LEM
Uptake Scintillation Probe	Pickar	2801-D

4. Other (e.g., liquid scintillation counter, area monitor, velometer)

Well Scintillation Crystal	Pickar	621940
Counter	Pickar	Spectroscaler 4R
Xenon Gas Monitor	Nuclear Associates	Xenalert

APPENDIX C

INSTRUMENTATION

1. Survey meters

- a. Manufacturer's name: Keithley
 Manufacturer's model number: 36100
 Number of instruments available: 1
 Minimum range: 0.1 mR/hr to 200 mR/hr
 Maximum range: 10.0 mR/hr to 20,000 mR/hr
- b. Manufacturer's name: Technical Associates
 Manufacturer's model number: TBM-3
 Number of instruments available: 1
 Minimum range: 0.01 mR/hr to 0.16 mR/hr
 Maximum range: 1.0 mR/hr to 16.0 mR/hr

2. Dose calibrator

Manufacturer's name: Squibb
 Manufacturer's model number: CRC-6A
 Number of instruments available: 1

3. Instruments used for diagnostic procedures

Type of Instrument	Manufacturer's Name	Model No.

4. Other (e.g., liquid scintillation counter, area monitor, velometer)

ITEM 10

Calibration of Instruments

I. Survey Instruments

Survey instruments will be calibrated at least annually and after repair or adjustment. Survey meter calibrations will be conducted by the University of Cincinnati using procedures and sources approved by the NRC for their license number 34-06903-05, or by another consultant firm whose procedures and sources have been approved by the NRC, or by the manufacturer.

Low ranges (less than 0.5 R/h) of our survey meters may be conducted in-house using the procedures outlined for survey instruments in Appendix D of Regulatory Guide 10.8, Rev. 1, October, 1980. The calibration source for these in-house calibrations will be a CS-137 tube source (1.5 cm active length) manufactured by Nuclear Associates, Inc. Depending upon the meter and the exposure rates required, the calibration source will be either:

1. Model #67-802, Serial #U-5, strength 29.0 mCi, 11.3 mg Ra EQ, 9.36 mRHM, or,
2. Model #67-804, Serial #F-5, strength 55.5 mCi, 21.7 mg Ra EQ, 17.9 mRHM.

These sources were calibrated on August 17, 1982, by Nuclear Associates in a well-type gamma ionization chamber which had been previously calibrated with standards to the National Bureau of Standards. Nuclear Associates assures the accuracy of the calibration is $\pm 2\%$.

II. Dose Calibrator

A - Accuracy (to be performed at installation and annually thereafter)

1. Obtain reference standards of ^{137}Cs (0.1 - 0.2 mCi), ^{57}Co (3 - 5 mCi) and ^{133}Ba (0.1 - 0.5 mCi).
2. Place each standard in properly balanced and zeroed dose calibrator at proper radionuclide setting.
3. Record activity. Compare to certificate value. All records of procedures and NBS certificates are maintained in record books of the Radiation Safety Officer as well as in the radioisotope lab.

B - Linearity (to be performed at installation and quarterly thereafter)

1. Obtain a vial containing 300-400 mCi of $^{99\text{m}}\text{Tc}$. (This is the maximum activity that will be assayed in our calibrator)
2. Adjust the calibrator for $^{99\text{m}}\text{Tc}$, and check zero and adjust if necessary.

ITEM 10B - Linearity (cont'd)

3. Assay the vial in the calibrator recording the time and activity.
4. Repeat step 3 at 6, 24, 30 and 48 hours.
5. Using the activity measured at about 30 hours after the first measurement, calculate the activity that should have been present at each other time a measurement was made using a half-life of 6.03 hours.
6. Calculate the % - error for each measured activity value.

C - Constancy (to be performed daily)

1. Place dose calibrator dial at the ^{137}Cs setting or another reproducible setting, preferably with a relatively high gain.
2. Adjust background to zero.
3. Place ^{137}Cs standard in calibrator. Record the reading in the dose calibrator book and plot on graph paper.
4. Place dose calibrator dial at $^{99\text{m}}\text{Tc}$ setting or another reproducible setting, preferably with a relatively low gain.
5. Adjust background to zero.
6. Place ^{57}Co standard in calibrator. Record reading in dose calibrator book and plot on graph paper.
7. Initial and date the dose calibrator book.

D - If the results of any of the above tests (A, B, or C) differ from the expected results by more than $\pm 5\%$, the dose calibrator will be adjusted or repaired.

E - Geometrical Variation (to be performed at installation unless certified data on geometrical variations are supplied by manufacturer)

1. Put 1 ml of solution containing approximately 2 mCi of ^{57}Co or $^{99\text{m}}\text{Tc}$ or other appropriate radionuclide in a 30 cc vial.
2. Assay the vial in the dose calibrator using appropriate nuclide setting, range and background correction techniques. (if using $^{99\text{m}}\text{Tc}$, or another short-lived radionuclide, record the time of assay, and correct the reading for decay to a specified reference time.)

ITEM 10

E - Geometrical Variation (cont'd)

3. Increase the volume of liquid in the vial in steps of 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 2. (Follow good radiation safety practices to avoid contamination and to minimize radiation exposure).
4. Select one volume as a standard and calculate a correction ratio of measured activities for each volume to the reference volume activity. If the variation in measured activities for any volume differs from that of the standard volume by more than $\pm 2\%$, then for those volumes, the correction factor should be used during routine radionuclide assays for those volumes.

ITEM 11

Facilities and Equipment

Most packages containing radioactive materials are received in the Radioisotope Laboratory (see Item 13), Room BX2. Sealed sources to be used for radiation therapy are received in the brachytherapy room, Oncology Department, B-level Ridgeway Pavilion. Most radioactive waste is stored in the Radioisotope Laboratory, Room BX2. Sealed sources previously used for radiation therapy will be stored in the brachytherapy room. Access to Room BX2 during normal working hours is restricted to Nuclear Medicine personnel, and the room is locked during non-working hours. The brachytherapy room is locked at all times when unoccupied.

Preparation and dispensing from generators will be conducted behind the lead glass shield in the radioisotope lab. Syringe shields are routinely used during the preparation of patient doses. Doses are carried in shields in metal trays to the patients, then removed from the shields for patient administration. Ring badges are worn during preparation and administration of doses.

Radiation levels in unrestricted areas will be measured to be sure levels are below those limits specified in paragraph 20.105 (B) of 10 CFR 20.

Xe-133 ventilation studies usually will be performed in Room BX7, and occasionally in Rooms BX5 and BX3. Air to these rooms is supplied by ceiling level diffusers, and is exhausted through ceiling level exhaust vents. Negative pressure is maintained in each of these rooms as can be seen from the attached memorandum from our Plant Operations and Maintenance Department. The values for Rooms BX2 and BX7 are used in Item 21 to compute expected air concentrations of Xe-133. The air flow rate in Rooms BX2 and BX7 will be measured at least semiannually to insure the above rates have not changed.

The Jewish Hospital

MEMORANDUM

TO: Dr. Paul Feller
Radiology

FROM: Mr. J. Smith
A/C Shop Foreman, PO&M

DATE: November 20, 1984

SUBJECT: Air Volume Readings

As per your request, air flow readings were taken in rooms BX-2, BX-3, BX-5, and BX-7. The readings were taken with a shortridge instrument model CFM-78 Flowhood.

The following results are in cubic feet of air per minute:

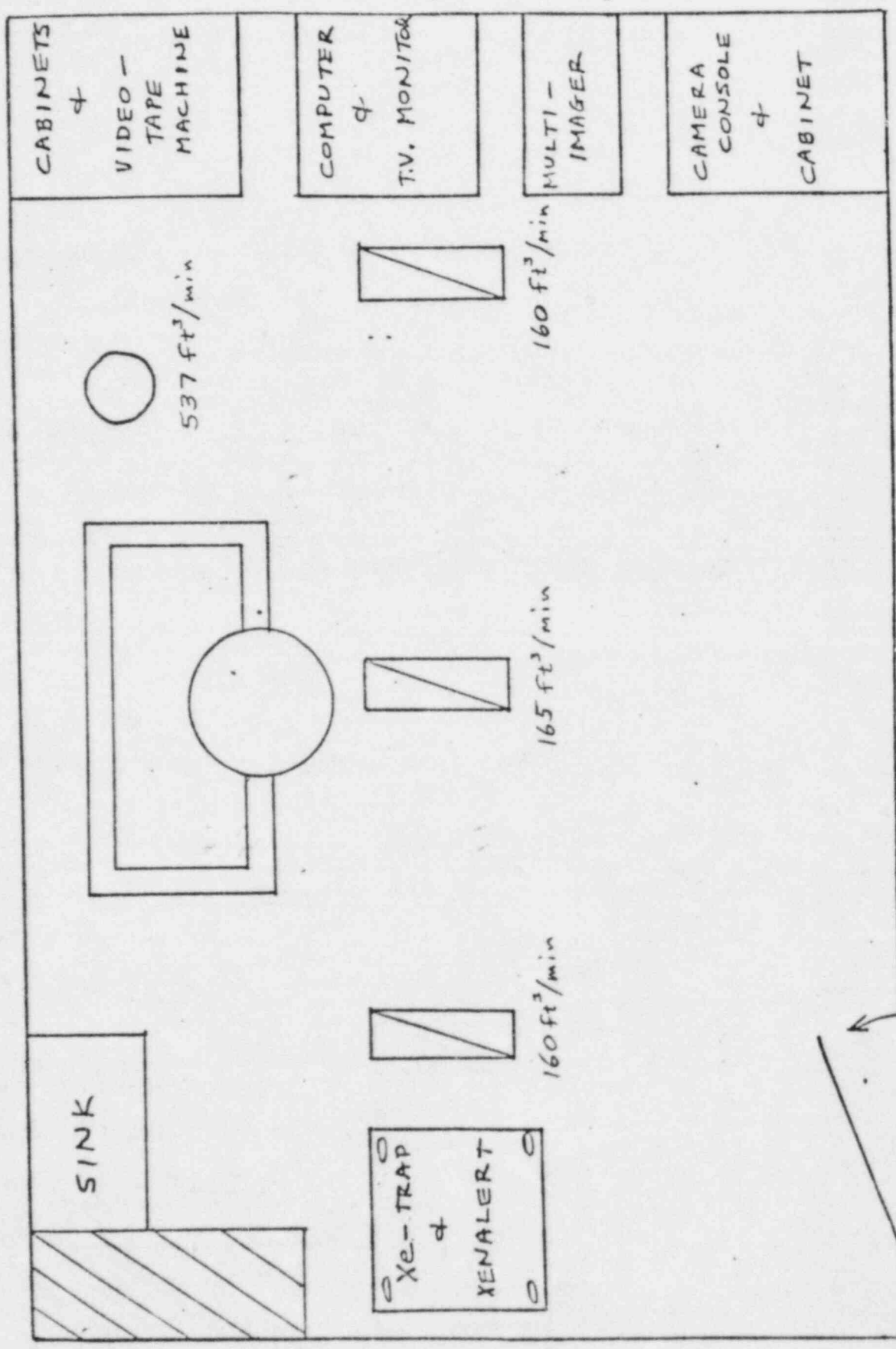
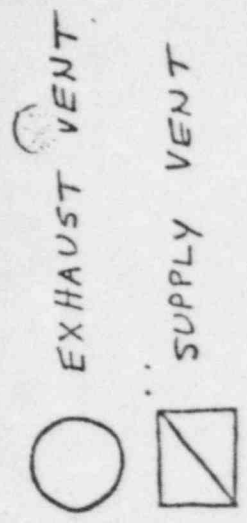
<u>Room</u>	<u>Supply</u>	<u>Exhaust</u>
BX-2	155	200
BX-3	337	347
BX-5	338	354
BX-7	485	537

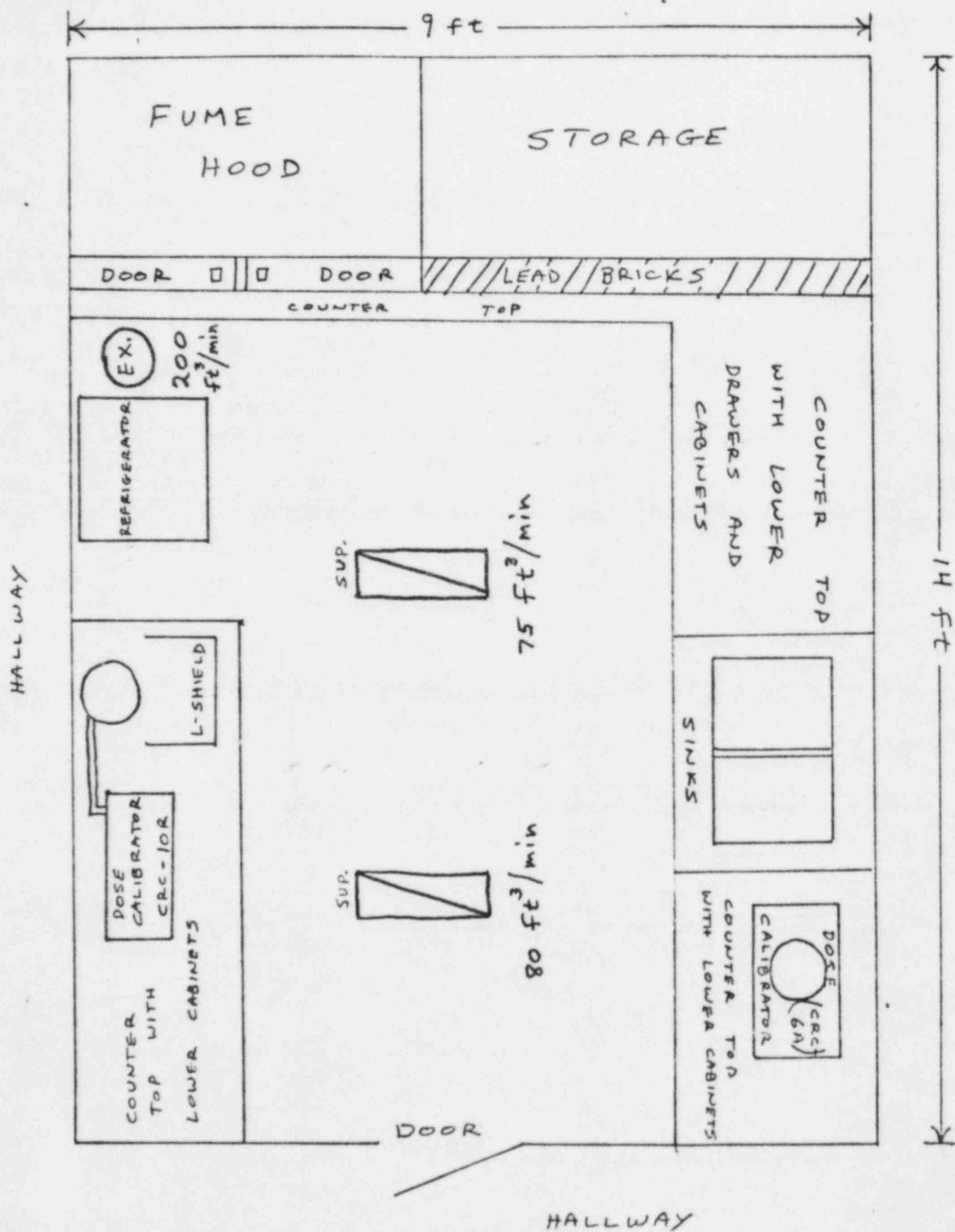
This proves a negative pressure in the rooms.

JS/bjw
cc: Mr. T. Gaeddert, Jr.
Mr. W. Dean
Mr. J. V. Judd
Mr. C. Dietz

Item 11, 11-21-84

Room BX7 CAMERA ROOM





ROOM BX2

RADIOISOTOPE

HOT LAB

ITEM 11, 11-21-84

ITEM 12Personnel Training Program

Radiation workers (technologists) will receive instructions pursuant to 10CFR19 section 19.12 before assuming duties with, or in the vicinity of, radioactive materials, whenever there is a significant change in duties, regulations or terms of this license, and at other times as deemed necessary by the Radiation Safety Officer or the Radiation Safety Committee.

The following information will be given either in a series of lectures by the Radiation Safety Officer (or his designate) or as individual communications (oral or written)

1. All terms of the license pertinent to radiation safety.
2. Areas where radioactive material is used or stored.
3. Potential hazards associated with radioactive material.
4. Radiological safety procedures appropriate to their respective duties.
5. Pertinent NRC regulations.
6. Rules and regulations of the licensee.
7. Obligation to report unsafe conditions to the Radiation Safety Officer.
8. Appropriate response to emergencies or unsafe conditions.
9. Right to be informed of their radiation exposure and bio-assay results.
10. Locations where the licensee has posted or made available notices, copies of pertinent regulations, and copies of pertinent licenses and license conditions (including applications and applicable correspondence), as required by 10 CFR part 19.

It is anticipated that most technologists will be Board Certified and less than 8 hours of initial instructions will be needed. However, as much time as necessary will be taken.

Ancillary personnel will be given instructions commensurate with their duties. That is, housekeeping will be told not to disturb anything marked "radioactive" and to call the emergency number listed on the laboratory door if a problem arises when there is no technologist in attendance (weekends, evenings, etc.). Security has the same instructions except they will deliver packages after normal working hours (see item 13). Nursing instructions are contained in items 19 and 20.

Radiation workers and ancillary personnel will be provided, on an annual basis, refresher training commensurate with their duties. This will be in the form of a lecture or lectures, or as individual communications (oral or written) from the Radiation Safety Officer or his designee.

ITEM 13

Procedures for Ordering and Accepting Delivery
of Radioactive Material

1. The Chief Nuclear Medicine Technologist or Supervisor will supervise the placing of all orders for radioactive materials and will ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.
2. A system for ordering and receiving radioactive materials will be established and maintained. The system will consist minimally of the following:
 - a. Ordering of routinely used materials.
 - (1) Written records that identify the isotope, compound, activity levels, and supplier, etc., will be used.
 - (2) The written records will be referenced when opening or storing radioactive shipment.
 - b. Ordering of specially used materials (e.g., therapeutic uses).
 - (1) A request will be obtained from the physician who will perform the procedure.
 - (2) Persons ordering the materials will reference the physician's written request when placing the order. The physician's request will indicate isotope, compound, activity level, etc.
 - (3) The physician's request will be referenced when receiving, opening, or storing the radioactive material.
3. During normal working hours, carriers will be instructed to deliver radioactive packages directly to the Nuclear Medicine Department, or in the case of sealed brachytherapy sources, to the Oncology Department.
4. During off-duty hours, security personnel or other designated individuals will accept delivery of radioactive packages in accordance with the outlined procedures detailed in the attached memorandum to The Jewish Hospital Security Department.

The Jewish Hospital

MEMORANDUM

TO: Allen Jones, Director of Security DATE: November 19, 1984
FROM: P. A. Feller, Radiation Safety Officer SUBJECT: RECEIVING SHIPMENTS OF RADIO-
ACTIVE MATERIAL AFTER REGULAR HOURS

As part of our N.R.C. radioactive materials license renewal process, this memo restates the currently used protocol for after-hours receipt of radioactive material.

The procedure for receiving packages containing radioactive material between 1630 and 0800 hours or on Sundays and Holidays is as follows:

1. The shipment is to be received and signed for by the switchboard operator on duty. The operator is to notify Security, and a security person is to transfer the package to Room BX2 as soon as possible. The door must be unlocked and the package placed on the counter immediately to the right of the door, or on the floor in front of this counter. The door is then to be relocked.
2. If the package is wet or damaged, the operator is to contact the radiation safety officer immediately. The carrier is to remain at the hospital unit until it can be determined if the delivery person or the van is contaminated.

The Radiation Safety Officer can be reached at:

Working hours - 569-2290 or 569-2070

Non-working hours - 569-2070

Please place a copy of this memo in your department policy manual and post the radiation safety officer's name and phone numbers among your listing of key personnel. This memo and these procedures are essentially the same as those specified in the memo to you from L. E. Hellkamp on June 17, 1983.

PAF/dm

cc: Betty Givans

Item 13, 11-21-84

ITEM 14

Procedures for Safely Opening Packages
Containing Radioactive
Materials

Appendix F procedures will be followed with the following modifications:

Most radioactive material deliveries to Nuclear Medicine are from a Radiopharmacy and consist of small attache cases containing several individual doses of radiopharmaceuticals. The Nuclear Medicine Lab receives several of these deliveries each day via the commercial radiopharmacy's courier. In order to reduce the time and paperwork required of the technologist, the survey measurements required in Appendix F sections 2C and 2D will not be recorded unless the measured values are greater than those allowed by the radiation level sticker on the case.

ITEM 15

General Rules for Safe Use of Radioactive Material

Appendix G rules will be followed except for Item 4. As a substitute for Item 4, we will observe the following precautions:

Syringe shields will be used for routine preparation of patient doses and administration to patients, except in circumstances where it is deemed that their use could compromise patient comfort or lead to a higher radiation dose to the technologist. In exceptional cases, the use of other protective methods (such as remote delivery through the use of a butterfly valve) will be used if practicable.

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): returned to commercial Radiopharmacy via their courier

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.**

* 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.

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

☐ Other (specify): _____

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

☒ 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

(Name) _____ (City, State) _____

NRC/Agreement State License No. _____

ITEM 19

Therapeutic Use of Radiopharmaceuticals

General Safety Procedures (Nurses)

Each patient 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 may 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.

The patient's room will be properly posted or attended in accordance with SS 20.203 or 20.204 of 10 CFR Part 20, and radiation levels in unrestricted areas will be maintained at less than the limits specified in paragraph 20.105 (b.) of 10CFR Part 20.

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. (see Survey Form Therapeutic Radioiodine).

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. 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.

The Radiation Safety Officer is to be notified if the patient dies or requires emergency surgery during treatment.

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

See enclosed precaution forms for the particular studies for more detailed nursing instructions. The appropriate form(s) will be posted on the patient's chart.

ITEM 19General Radiation Safety (Technologists)

Good radiation safety procedures will be followed in the preparation of therapy doses of I-131 and other therapy agents. Disposable gloves will be used to open vials containing therapeutic amounts of I-131, and this procedure will be performed in the fume hood of Room BX2, described elsewhere in this application.

The technologist performing the above procedure will, within 24 hours, have a thyroid count to determine the thyroid burden of I-131 received from this procedure.

The technologist and the preparation and administration areas will be surveyed as soon as possible after the administration to prevent spread of any contamination.

THE JEWISH HOSPITAL
RADIATION SAFETY OFFICE
RADIOPHARMACEUTICAL RADIATION SURVEY

NAME: _____
 ROOM NUMBER: _____ DATE: _____
 ISOTOPE USED: _____ AMOUNT: _____ SITE: _____
 PHYSICIAN: _____ TIME OF SURVEY: _____

(Patients receiving **Iodine -131** treatment shall remain hospitalized until the residual activity is 30 millicuries or less.)

Survey:

Dose rate at Bedside _____ mR/hr.
 Dose rate at 1 meter (3 ft., 3 in.) _____ mR/hr.
 Dose rate behind shield _____ mR/hr.

1. Pregnant women or minors (under 18) should not visit patient.
2. Visitors and neighboring patients should remain at a distance of more than 6 feet from patient.
3. Hospital personnel, including nursing and technical staff, may perform usual duties for periods not exceeding:

BEDSIDE _____ minutes/week/person
 1 METER _____ minutes/week/person

4. Personnel should rotate duties in handling patient.
5. MAKE SURE THAT THE YELLOW RADIOACTIVE TREATMENT WARNING SIGN ACCOMPANYING THIS FORM IS ATTACHED TO THE PATIENT'S DOOR OR TO THE BED IN A CONSPICUOUS PLACE.

 Radiation Safety Office

Certification of Patient Radioactivity:

I certify that the amount of I-131 remaining in _____ is less than 30 mCi, and that he/she may be discharged at the discretion of his/her physician.

 Radiation Safety Office

Date: _____

Time: _____

THE JEWISH HOSPITAL
 RADIOISOTOPE LABORATORY
THERAPEUTIC RADIOIODINE (< 30 mCi) NURSING INSTRUCTIONS

NAME: _____

ROOM NUMBER: _____ DATE: _____

ISOTOPE USED: ^{131}I AMOUNT: _____ VIA: _____

PHYSICIAN: _____

These precautions are to be followed until the time of discharge after each therapeutic dose of radioiodine less than 30 mCi.

1. Urinals, bedpans, etc. should be rinsed with water to which Radioiodine Cleaning Solution has been added (1 ounce to 1 pint of water) then washed with soap solution. Radioiodine Cleaning Solutions consists of 4 gm. potassium iodide to 1 liter of water and can be obtained from the pharmacy.
2. Whenever the patient goes to the bathroom, 1 ounce of Radioiodine Cleaning Solution should be added to toilet (or bedpan) before using. Allow this to stand for 2 minutes after the toilet or bedpan is used, then flush 3 times.
3. Nurses or aides should use rubber gloves in handling urinals, bedpans, and linens. Linen soiled with urine or vomitus should be changed and placed in any double plastic bag. The bag should be labeled "danger radioactivity" and placed in the patient's bathroom until it can be monitored by someone from the Radiation Safety Office. The Radiation Safety Officer (RSO) should be notified immediately: if the patient dies, or requires emergency surgery; if any radioactive urine is spilled; or if any other radiation safety questions arise. The RSO can be reached at 569-2290 during regular hours or via the Jewish Hospital or X-Ray Department operator at other times.
4. Contact with the patient should be limited to non-pregnant adults. Visitors should stay 6 feet or more away from the patient during their visits.
5. Home Instruction and the necessary prescription should be supplied the patient for home use at the time of discharge.

Item 19

Revised: 11/21/84

THE JEWISH HOSPITAL
RADIOISOTOPE LABORATORY
THERAPEUTIC RADIOIODINE (> 30 mCi) NURSING INSTRUCTIONS

NAME: _____
 ROOM NUMBER: _____ DATE: _____
 ISOTOPE USED: ^{131}I AMOUNT: _____ VIA: _____
 PHYSICIAN: _____

These precautions are to be followed after each therapeutic dose of radioiodine in excess of 30 mCi.

1. The patient may use the toilet immediately in accordance with Patient In-Hospital Instructions Form. If a patient is incontinent, a closed urinary collecting system should be used. As soon as urine is evident in the collecting bag, it should be dumped into the toilet following instructions of Patient In-Hospital Form. Radioiodine Cleaning Solution consists of 4 gm. potassium iodide to 1 liter of water, and can be obtained from the pharmacy. The use of bedpans should be discouraged unless absolutely necessary.
2. Nurses or aides should use rubber gloves in handling urine specimens, bedpans, and linens. Linen soiled with urine or vomitus should be changed and placed in any double plastic bag. The bag should be labeled with "danger radioactivity" and placed in the patient's bathroom until it can be monitored by someone from the Radiation Safety Office.
3. Disposable eating utensils should be used, and kept in a plastic bag until monitored by someone from the Radiation Safety Office.
4. The Radiation Safety Officer (RSO) should be notified immediately: if the patient dies, or requires emergency surgery; if any radioactive urine is spilled; or if any other radiation safety questions arise. The RSO can be reached at 569-2290 during regular hours or via the Jewish Hospital or X-Ray Department operator at other times.
5. Rubber gloves, etc. should be rinsed with water to which Radioiodine Cleaning Solution has been added (1 ounce to 1 pint of water) then washed with soap solution.
6. All personnel in contact with the patient should be non-pregnant adults. They should follow the time limits for contact with the patient which are listed on the Radiation Survey Form.
7. Visitors should be limited to non-pregnant adults. They should remain 6 feet or more away from the patient. Visiting time, at 6 feet, should be no more than 2 hours per day per visitor.
8. Home Instruction and the necessary prescriptions should be supplied the patient for home use at the time of discharge.

THE JEWISH HOSPITAL
RADIOISOTOPE LABORATORY
THERAPEUTIC RADIOIODINE (> 30 mCi) IN-HOSPITAL PATIENT INSTRUCTIONS

In-hospital precautions to be taken by patient after receiving a therapeutic dose of radioiodine (I-131).

1. Prior to urination, contact the nurse who will place one ounce (two (2) ~~te~~ tablespoonsful) of Radioiodine Cleaning Solution in toilet bowl water.
2. Urinate directly into the toilet taking care so that the area around the toilet is not soiled with urine.
3. Flush the toilet three (3) times.
4. Always wash hands after urinating, then fill the sink basin with water and add one ounce of Radioiodine Cleaning Solution. Let it stand for two minutes, then drain and run tap water for two minutes.
5. Wash out the bath with soap or cleanser after tub or shower bath.

THE JEWISH HOSPITAL
RADIOISOTOPE LABORATORY
THERAPEUTIC RADIOIODINE - HOME INSTRUCTIONS

Home precautions to be taken by patient after receiving a treatment dose of radioiodine (I-131).

1. Sleep alone for two weeks.
2. Whenever possible use separate toilet facilities, that is, a toilet not used by other members of the family.
3. Before urinating always place one ounce (two (2) tablespoonsful) of Radioiodine Cleaning Solution in toilet bowl water before flushing the toilet. Then flush the toilet three (3) times.
4. Use care so that the area around the toilet is not soiled with urine.
5. If you return to work within two weeks, take a 3 ounce bottle of Radioiodine Cleaning Solution with you and use as above each time you urinate.
6. Bed linen and clothing need no special precautions, except when there are young children in the family, in which case your linen and clothing should be washed separately with soap or detergent, after the other clothing has been washed. Then the tub or washing machine should be rinsed three (3) times.
7. Wash out bath with soap or cleanser after tub or shower bath.
8. You may eat 3 hours after treatment and your diet need not be altered in any way.
9. Use stringent contraceptive measures to avoid pregnancy during the three (3) months after treatment. Do not breast feed during this time.
10. If any questions arise regarding these instructions, please feel free to call 569-2291 and ask to discuss them with the staff doctor on duty.

31.

THE JEWISH HOSPITAL OF CINCINNATI
PRECAUTIONS IN PHOSPHORUS-32 COLLOID THERAPY

Phosphorus-32 colloid is a pure beta-emitter which is injected directly into a body cavity. The external radiation dose to personnel from these patients is minimal. Personnel may spend as much time as is necessary in the vicinity of these patients. No special attention need be given to the patient's vomitus, urine or sputum. The only concern is to prevent the spread of contamination which may "leak" from the injection site.

1. Wear rubber gloves to handle damp dressings from the injection sites.
2. Store these dressings and gloves in a trash bag and save for the Radiation Safety Officer (RSO).
3. If the liquid spills onto the floor, cover spill immediately with any absorbent material (bed sheet, towels, etc.) and call the RSO in the Radiation Therapy Department, Ext. 2290. Take care not to spread the contamination to other areas.
4. If contamination occurs after normal working hours, call the main X-ray Department, ext. 2070. Request that the RSO be notified.

PAUL A. FELLER, PH.D.
RADIATION SAFETY OFFICER

KENT B. KRUGH, M.S.
DEPUTY RADIATION SAFETY OFFICER

RADIATION THERAPY DEPARTMENT
569-2290 (Department)
569-2070 (Main X-ray, after hours)

THE JEWISH HOSPITAL OF CINCINNATI
PRECAUTIONS IN PHOSPHORUS-32 SODIUM PHOSPHATE THERAPY

Phosphorus-32 sodium phosphate is a pure beta-emitter which is injected I.V. into patient. The external radiation dose to personnel from these patients is minimal. Personnel may spend as much time as is necessary in the vicinity of these patients. Since P-32 sodium phosphate is soluble, the patient's urine and vomitus may contain some radioactive P-32. The following precautions should be followed:

1. If the patient can use the toilet, 2 ounces of cleaning solution for Radioactive Phosphorus should be placed in the bowl before use, then the toilet flushed three times.
2. If the patient cannot use the toilet, a separate bedpan should be provided. Two ounces of cleaning solution for Radioactive Phosphorus should be added to the toilet bowl before flushing, then the toilet flushed three times. The bedpan should be rinsed with the Solution (1 ounce solution 3 parts water) after each use.
3. Use rubber gloves in handling bedpans, linens, urine containers and in bathing patient.
4. Use a detergent for washing gloves, bedpans, etc., after these are first rinsed in Radioactive Protective Solution diluted as above.
5. Keep soiled linen in bag at end of bed and call Radiation Safety Office for monitoring.
6. These precautions shall be followed for one week after each dose of Phosphorus-32 sodium phosphate.
7. Cleaning solution for radioactive phosphorus consists of 3 gm. $\text{Na H}_2\text{PO}_4$ in 1 liter of water.

PAUL A. FELLER, PH.D.

RADIATION SAFETY OFFICER

KENT B. KRUGH, M.S.

DEPUTY RADIATION SAFETY OFFICER

RADIATION THERAPY DEPARTMENT

569-2290 (Department)

569-2070 (Main X-ray, after hours)

ITEM 20

Therapeutic Use of Sealed Sources

Responsibility of Radiotherapist:

1. Attending radiotherapist shall be solely responsible for all aspects of prescription, use and return of sources to brachytherapy storage area.
2. Prior to insertion and following removal, the sources shall be in possession of the therapist or locked in appropriately shielded designated areas for which the therapist is responsible.
3. Sources shall be brought to patient in Operating Room or at the patient's bedside by the radiation therapist or designate. A radiologic technologist qualified in brachytherapy handling may aide the therapist, and if in doing, shall remain with the sources until therapist takes charge of the sources.
4. When sources are removed from patient, the radiation therapist or designate shall personally see that a source count and a radiation survey are performed on the patient before discharge. The radiation therapist shall also personally see that the sources are returned to designated safe storage area (the technologist may assist therapist by receiving sources and returning sources immediately to safe storage area).
5. Each therapist shall maintain a current copy of standing orders for patients undergoing brachytherapy with the Radiation Safety Officer for review by the Radiation Safety Committee.

The Patient:

1. The patient will be assigned to a private room.
2. On the day when the sources are to be inserted, the patient should be bathed before going to the OR. She shall not be bathed by a nurse or attendant again until the radioactive sources are removed. However, she may bathe herself to the extent permitted by the radiation therapist or be bathed by a relative or friend who is over the age of 45.
3. When the patient can leave Recovery, she shall be taken to Diagnostic Radiology as an emergency. It is the responsibility of the Recovery Room to notify Radiology when the patient is ready for transfer for radiography.
4. After the radiographs have been taken and inspected, the patient shall be transferred immediately to her room.

ITEM 20Pre-Load Case (Sources Inserted in OR)

If the patient is a pre-load case she shall be isolated at one end of the Recovery Room, the attending nurses shall be issued film badges, and the radiation survey shall be performed in Recovery. The patient shall be shielded from other patients and personnel.

After-Load Case (Sources Inserted in Patient's Room)

1. No special precautions are required in the recovery room.
2. The radiation survey shall be performed in the patient's room as soon as possible, following the insertion of the sources. A completed copy of the Brachytherapy Radiation Survey shall be returned to the Radiation Safety Office, and the original shall be part of the patient's hospital chart.

Accountability

A log of each source shall be kept in the brachytherapy room so the location of all sources is always available.

The Radiation Safety Officer shall be informed of the movement and location of all sources. The radiation therapist is responsible for initial notification and notification of changes in location of sources as they occur.

Use of Outside Sources

If radioactive sources other than those available at The Jewish Hospital are brought to the Hospital, prior approval by the Radiation Safety Committee shall be obtained. The Radiation Safety Officer has the necessary forms for preparing a protocol. Since human use is involved, the request for use should be prepared well in advance so that review by the Radiation Safety Committee may be completed prior to the need for patient care. In case of emergency need, one should contact the Radiation Safety Office or a physician member of the Radiation Safety Committee.

Accident or Incident - Actual or Possible: Immediate Notification

In the event of any type of accident, incident, loss or possible untoward event, the radiation therapist shall notify the Radiation Safety Office and one or more members of the Radiation Safety Committee immediately.

Nursing and Other Staff:

All nursing personnel and other staff at The Jewish Hospital who attend the patient while the radioactive sources are in place shall be issued film badges supplied by the Radiation Safety Office. Nurses should observe the time limits (max. time for 100 millirem (1 millisievert) exposure) noted on the survey form and enforce the precautions for

ITEM 20

pregnant women, minors and visitors listed on the form. Any nurse who is pregnant, or suspects herself to be pregnant, shall not attend the patient. Nurses and other assistants should take full advantage of time and distance as protection measures. It must not be overlooked that doing the job in one-half the time is just as effective as halving the radiation with shielding, and that working twice as far from the source is also as effective as doing the job in one-fourth the time.

Personnel should 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.

Surgical dressing 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.

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.

At the conclusion of treatment, call the Radiation Safety Office 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 or designee, will brief the patient on precautions for minimizing radiation exposure to others after discharge from the hospital.

Special Instructions for Radon Seeds

The same instructions apply as for radium except that, since the material is decaying fairly rapidly ($T_{1/2} = 3.8$ days), the patients may reach a radioactive level acceptable for discharge before treatment has been completed.

All patients containing cobalt-60, cesium-137 or radium-226 implants shall remain hospitalized until the implants are removed. Those receiving Radon-222 may be discharged when the activity does not exceed 4.6 mCi.

Radiation levels at bedside and 1 meter from a patient receiving therapy with greater than 4.6 mCi of Radon-222 will be recorded by Radiation Safety Office personnel on the survey form.

ITEM 20

Nursing personnel will be limited to 100 millirems (0.001 Sievert) per week. Other exposure limitations will be in compliance with NCRP Report No. 37, "Precautions in the Management of Patients who have Received Therapeutic Amounts of Radionuclides".

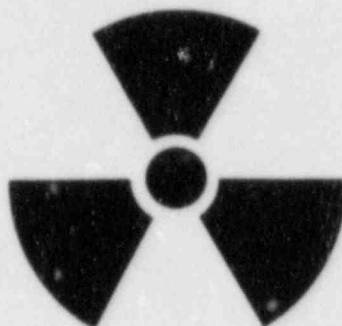
Maximum Patient Activity at Discharge

Iodine-131	30 mCi or less
Radon-222	4.6 mCi or less
Cesium-137, Iridium - 192, Radium-226	Implants must be removed before patient release.

See enclosed precaution forms for the particular studies for more detailed nursing instructions. These forms are distributed to the nurses in the area designated to house the brachytherapy patients.

CAUTION

PATIENT BEING TREATED WITH
RADIOACTIVE MATERIAL



NAME: _____ RM. #: _____
DATE _____ ISOTOPE _____ SITE _____ AMOUNT _____

PRECAUTIONS

Pregnant women should not visit patient.

Visitors and neighboring patients should remain at a distance of more
than ft. from patient.

Hospital personnel, including nursing and technical staff, may perform
usual duties for periods not exceeding:

BEDSIDEminutes/week

1 METERminutes/week

Personnel should rotate duties in handling patient.

Phone:

569-2290

569-2070

Radiation Safety Office

THE JEWISH HOSPITAL ONCOLOGY CENTER
BRACHYTHERAPY RADIATION SURVEY

NAME _____

ROOM NUMBER _____ DATE _____

ISOTOPE USED: _____ AMOUNT: _____ SITE: _____

PHYSICIAN: _____ TIME OF INSERTION: _____

SURVEY:

Dose rate at Bedside _____ mR/hr.
Dose rate at 1 meter _____ mR/hr.

1. Pregnant women or minors (under 18) should not visit patient.
2. Visitors and neighboring patients should remain at a distance of more than 6 feet from patient.
3. Hospital personnel, including nursing and technical staff, may perform usual duties for periods not exceeding:

Bedside _____ minutes/week/person
1 Meter _____ minutes/week/person

4. Personnel should rotate duties in caring for the patient.
5. MAKE SURE THAT THE YELLOW RADIOACTIVE TREATMENT WARNING SIGN ACCOMPANYING THIS FORM IS ATTACHED TO THE PATIENT'S DOOR OR TO THE BED IN A CONSPICUOUS PLACE.
6. Lead shield should be positioned between patients bed and the door.

Radiation Safety Officer

BRACHYTHERAPY SOURCE REMOVAL CERTIFICATION:

I certify that patient _____ has had his/her entire brachytherapy loading removed, and that all sources used in the loading are accounted for. These determinations were made by a source count and a survey of the patient, bed linens, waste basket and room performed following the removal of the sources from the patient.

M.D.

Date

Time

28

THE JEWISH HOSPITAL OF CINCINNATI
BRACHYTHERAPY PRECAUTIONS FOR GYNECOLOGIC APPLICATIONS

1. All patients are housed in private rooms.
2. Patients in adjoining rooms must be of non-childbearing age.
3. Visitors should remain behind the protective screen. Pregnant visitors and children are not allowed.
4. Nursing personnel within unit should alternate in taking care of these patients. Pregnant nurses should not provide patient care.
5. Nurses to give medications, trays, etc. No back rubs to patient. Patients will bathe themselves. Foley catheter care should be omitted. Nurse to spend minimum time with patient.
6. Low residue diet.
7. Bed rest in recumbent position, but encouraged to turn from side to side and move legs; sit up at 45° for meals.
8. If packing or radioactive material comes out, pick up material with forceps and put into lead container in patient's room. If material cannot be placed in lead container, put in bag, and place bag behind lead container. Lead container should be placed in far corner of the room. Call Radiation Safety Officer or his designee IMMEDIATELY, at ext. 2290, or through main X-ray desk, ext. 2073, after hours.
9. If any problems occur, call the patient's physician, (see list below for names and phone numbers). During normal working hours call:
 - a. Radiation Therapy, Ext. #2290
 - or
 - b. Oncologists - telephone numbers listed below
10. Lead container in room is always empty. It is there to receive radioactive material when it is removed.

Note: If yellow "Radioactive Materials" sign is not in place after the sources are loaded, contact the R.S.O., ext. 2290 or the oncologist in charge.

PAUL A. FELLER, PH.D.,
RADIATION SAFETY OFFICER
KENT B. KRUGH,
DEPUTY RADIATION SAFETY OFFICER
569-2290 (Department)
569-2070 (Main X-Ray, After Hours)

<u>RADIATION ONCOLOGISTS</u>	<u>OFFICE</u>
Dr. Bernard Aron	872-4775
Dr. Pearl Compaan	281-6200
Dr. Archie Fine	281-6200
Dr. Harry Horwitz	281-6200
Dr. Richard Levy	751-4448
Dr. Carol Milburn	281-6200
Dr. Sudha Mahalingam	281-6200
Dr. Kenneth Murdock	281-6200
Dr. James Thomson	281-6200

40.

THE JEWISH HOSPITAL OF CINCINNATI
BRACHYTHERAPY PRECAUTIONS FOR IRIIDIUM-192 BREAST IMPLANTS

1. All patients are housed in private rooms.
2. Visitors should remain behind the protective screen. Pregnant visitors and children are not allowed. Pregnant nurses should not provide patient care.
3. Patients may bathe themselves.
4. If radioactive material comes out, pick up material with forceps and put into lead container. If material cannot be placed in lead container, put in bag and place bag behind lead container. Lead container should be placed in far corner of the room. Call Radiation Safety Officer or his designee IMMEDIATELY at ext. 2290.
5. If any problems occur, call the patient's physician, (see list below for names and phone numbers). During normal working hours call:
 - a. Radiation Therapy, Ext. #2290
 - or
 - b. Oncologists: telephone numbers listed below.
6. Lead container in room is always empty. It is there to receive radioactive material when it is removed.

Note: If yellow "Radioactive Materials" sign is not in place after the sources are loaded, contact the R.S.O. - ext. 2290 or oncologist in charge.

PAUL A. FELLER, PH.D.
RADIATION SAFETY OFFICER
KENT B. KRUGH, M.S.
DEPUTY RADIATION SAFETY OFFICER
RADIATION THERAPY DEPARTMENT
569-2290 (Department)
569-2070 (Main X-ray, after hours)

<u>RADIATION ONCOLOGISTS</u>	<u>OFFICE</u>
Dr. Bernard Aron	872-4775
Dr. Pearl Compaan	281-6200
Dr. Archie Fine	281-6200
Dr. Harry Horwitz	281-6200
Dr. Richard Levy	751-4448
Dr. Carol Milburn	281-6200
Dr. Sudha Mahalingam	281-6200
Dr. Kenneth Murdock	281-6200
Dr. James Thomson	281-6200

Item 20, 11-21-84

BRACHYTHERAPY PRECAUTIONS FOR IODINE-125 SEED IMPLANT OF PROSTATE

1. Private rooms are recommended.
2. Because the energy of I-125 is low (35 KeV) and the prostate is beneath a substantial amount of tissue, there is very little radiation coming from the patient. Nurses may proceed with all normal duties in caring for the patient. However, pregnant nurses should not attend to these patients.
3. Collect all urine for 72 hours post-surgery, strain and leave strainer in jug. Personnel from Radiotherapy will survey strainer daily to check for any radioactive I-125 seeds which may have been passed by the patient. These are small metallic seeds which are about 1/8th of an inch long and are somewhat thicker than a straight pin. Keep catheter tube and bag when removed to be surveyed for seeds.
4. KEEP ALL OF THE PATIENT'S CLOTHES, TOWELS, SHEETS AND DRESSINGS TO BE SURVEYED DAILY BY RADIO THERAPY PERSONNEL.
5. In the event that one or more of the Iodine-125 seeds are found in the patient's bed clothes or sheets after having been passed through the urine, they should be picked up with a forceps or tweezers (never with the fingers) and placed in a shielded container (Radiotherapy will have provided container). Call the Radiation Safety Officer or his designee at extension 2290.
6. Pregnant visitors and children under 18 are not allowed in patient's room.
7. Any additional information will be provided by the Radiation Safety Officer or physician.

Iodine-125 implants are permanent and require only a single surgical procedure. One of the chief advantages in the use of I-125 is the reduction in exposure to Hospital personnel, patients or their families which is achieved by substituting Iodine-125 for other high energy gamma emitters in interstitial implants.

Note: If yellow "Radioactive Materials" sign is not in place after the sources are loaded, contact the R.S.O., ext. 2290 or the oncologist in charge.

PAUL A. FELLER, PH.D.

RADIATION SAFETY OFFICER

KENT B. KRUGH, A.S.

DEPUTY RADIATION SAFETY OFFICER

<u>RADIATION ONCOLOGISTS</u>	<u>OFFICE</u>
Dr. Bernard Aron	872-4775
Dr. Pearl Compaan	281-6200
Dr. Archie Fine	281-6200
Dr. Harry Horwitz	281-6200
Dr. Richard Levy	751-4448
Dr. Carol Milburn	281-6200
Dr. Sudha Mahalingam	281-6200
Dr. Kenneth Murdock	281-6200
Dr. James Thomson	281-6200

RADIATION THERAPY DEPARTMENT

569-2290 (Department)

569-2070 (Main X-ray, after hours)

Item 20, 11-21-84

THE JEWISH HOSPITAL OF CINCINNATI
BRACHYTHERAPY PRECAUTIONS FOR GOLD-198 SEED IMPLANTS

1. All patients are housed in private rooms.
2. Patients in adjoining rooms must be of non-childbearing age.
3. Visitors should remain behind the protective screen. Pregnant visitors and children are not allowed.
4. The patient may be up and about. Encourage foot exercises.
5. Pregnant nurses should not provide patient care.
6. Bed linens may be changed--linens do not have to be saved in the room. Dispose of them in the linen chutes.
7. In the event that one or more of the Gold Seeds are found they should be picked up with forceps and placed in the lead container. Call Radiation Safety Officer or his designee at Ext. 2290.
8. If any problems occur, call the patient's physician, (see list below for names and phone numbers). During normal working hours call:
 - a. Radiation Therapy, Ext. #2290
 - or
 - b. Oncologists telephone numbers listed below.

Note: If yellow "Radioactive Materials" sign is not in place after the sources are loaded, contact the R.S.O. - ext. 2290 or oncologist in charge.

PAUL A. FELLER, PH.D.,
RADIATION SAFETY OFFICER
KENT B. KRUGH
DEPUTY RADIATION SAFETY OFFICER
569-2290 (Department)
569-2070 (Main X-Ray, After Hours)

<u>RADIATION ONCOLOGISTS</u>	<u>OFFICE</u>
Dr. Bernard Aron	872-4775
Dr. Pearl Compaan	281-6200
Dr. Archie Fine	281-6200
Dr. Harry Horwitz	281-6200
Dr. Richard Levy	751-4448
Dr. Carol Milburn	281-6200
Dr. Kenneth Murdock	281-6200
Dr. Sudha Mahalingam	281-6200
Dr. James Thomson	281-6200

THE JEWISH HOSPITAL OF CINCINNATI
DEATH OF PATIENT IMPLANTED WITH RADIOACTIVE SOURCES:

In the event of the death of a patient who has been implanted with radioactive sources (i.e., Cesium 137 or Radium 226 tubes or needles, Gold 198, or Iodine 125 seeds, or Iridium 192 seeds) the following procedures shall be adhered to:

1. Attending radiation oncologist and radiation safety officer (R.S.O.) shall be notified as soon as possible, and they shall attach a radioactivity precautions tag if the radioactive sources cannot be removed.
2. If the patient had a temporary implant (i.e., Cesium 137, Radium 226, or Iridium 192 sources) the sources shall be removed as soon as possible by the radiation oncologist or personnel from radiation therapy.
3. If no autopsy is to be performed:
 - a. A radioactivity report should be attached to the death certificate.
 - b. The approval of the R.S.O. must be obtained before the body may be released.
 - c. If exposure rate at 25 cm. from the center of the radioactive material is less than 0.25 R/Hr., no further precautions are necessary. This is approximately .70 mCi of Gold 198.
 - d. There is essentially no hazard of external exposure from gammas for Iodine 125 seeds.
4. If an autopsy is to be performed or is desireable:
 - a. The autopsy is to be carried out by the appropriate pathologist under the guidance of R.S.O. or radiation oncologist.
 - b. If possible, the entire block of tissue containing the radioactive material should be removed first. This tissue should be put in containers, covered with preservative, properly labelled, and stored in appropriate isolated and shielded area until radioactive decay permits safe handling.
 - c. If only a sample of the implanted region is to be taken, this part of the body that still contains sources should be avoided until the rest of the autopsy has been carried out.
 - d. Actual contact with small specimens taken from the removed section should be avoided, if the activity of the specimen is estimated to be more than 100 microcuries.
5. Cremation:
 - a. The R.S.O. should determine if the body will be an external hazard to crematorium employees
 - b. The body may be cremated with no precautions, provided that the crematorium has not handled bodies containing an overall annual total of 2,000 milli-curies.

- c. If a body contains Iridium 192, the radioactivity must be removed before cremation.

Reference: NCRP Report #37, "Precautions in the Management of Patients who have Received Therapeutic Amounts of Radionuclides," pages 24-38.

Paul A. Feller, Ph.D.,
Radiation Safety Officer

Kent B. Krugh, M.S.
Deputy R.S.O.

Radiation Therapy Department
569-2290
569-2070
(Main X-ray - after hours)

ITEM 21

Lung Imaging (Ventilation Study)

Less than 30 studies per week are conducted; 15 studies per week is average.

A. Introduction

Ventilation studies are valuable in the evaluation of the gaseous distribution that occurs in the lungs. The ventilation studies are used most frequently in the differential diagnosis of chronic obstructive disease and pulmonary embolism. A normal patient should have xenon-133 concentration in his lungs close to background by 120 seconds after washout has begun at the latest, unless breathing is painful. Patients with small tidal volume and/or low respiratory frequency may take 2 to 3 minutes. If washout is slightly prolonged but uniform, it may be normal.

B. Pertinent data for quality imaging.

Isotope	Optimum Gamma Energy	Radiopharmaceutical	Source	Activity Range (mean)	Route	Patient prep.	Optimum Imaging time
133	80keV	¹³³ Xe gas	NEN	5-25 (12)	Inhalation	None	Upon admini- stration of the activity

C. Imaging procedure - gamma camera only

1. assemble the Xenon rebreathing apparatus
 - a. tie the bag half-way with a rubber band to ensure a greater concentration of Xenon per unit area of oxygen. Fill the bag with oxygen.
 - b. fill the CO₂ absorbing container half-way with soda lime.
 - c. attach the mask.
2. Xenon trap - the desiccant levels (Drierite) should be checked in each trap prior to its use. If they are a pink color, they are water saturated and need to be changed. Typically, the desiccant in the Atomic Products trap must be replaced after each patient or two. Negligence in changing the crystals will result in technologist contamination by ¹³³Xe and the replacement of a \$200 charcoal cartridge.

3. Camera settings

- a. 80 keV energy setting for ^{133}Xe
- b. 20% window
- c. collimation - low energy diverging
 - 1) Pho gamma 3 - diverging collimator
 - 2) Picker Dynacamera - LEAP collimator
 - 3) Picker Dynacamera - LEAP collimator
- d. 30 second timed exposures

4. Patient positioning

- a. posterior projection is routine - the patient can be supine or sitting. The back is towards the camera, the mid-coronal line is parallel to the collimator face. The field of view includes the area from the base of the neck to below the diaphragms.
- b. a helpful hint for good patient positioning - adjust the analyzer on the camera for ^{57}Co settings. Have the patient hold the ^{57}Co flood source disk in front of his chest. A transmission of the lungs can be obtained and lungs viewed on the persistence oscilloscope. Correct positioning can be obtained.

5. Procedure

- a. turn on the xenon trap.
- b. attach the mask to the patient. Make sure the mask is flush to the face covering the nose and mouth. Adjust the rebreathing apparatus to closed system breathing.
- c. the first view is a single breath-held view. Inject the xenon upon an exhalation pause. Once the patient achieves a full normal inhalation, instruct them to hold their breath. Collect a 30 second exposure. If the patient cannot hold his breath for the 30 second duration, collect the exposure for the length of time in which he can.

ITEM 21

5. Procedure (continued)
- d. the patient breathes normally for approximately 3-5 minutes to ensure pulmonary gaseous equilibrium.
 - e. expose a 30 second equilibrium film.
 - f. adjust the apparatus to the open, room air system. Attach the trap tubing to the outlet by the bag on the rebreathing apparatus. The patient will now be breathing in room air and exhaling xenon gas into the bag.
 - g. expose 6 consecutive 30 second washout films.
 - h. once the study is finished, discard the rebreathing apparatus and mask and turn off the trap.
- D. The patient receives a routine perfusion study at the termination of the xenon study unless he has had a previous study the day prior. The patient must also receive a routine PA chest x-ray for correlation of data.
- E. Storage - Xenon will be stored in the fume hood as described in Item 11.

ITEM 21

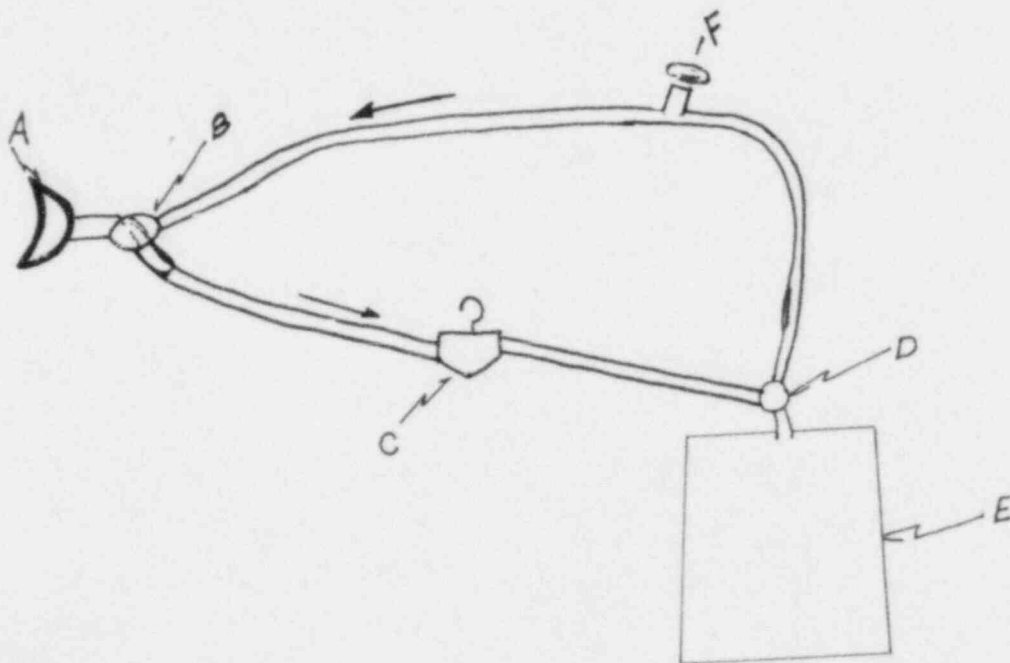
PROCEDURE:

1. Position patient and rebreathing unit, with the collection bag out of view of the camera.
2. Clamp tubing between D and F with a "Kelly Clamp".
3. Remove cap from D, attach O₂ tubing and add O₂ to bag. Experience will indicate the amount necessary, but about 3-4 liters or about half full is usually sufficient. Care must be taken not to overfill the bag, since the last phase (washout) of the procedure requires that a few exhalations of the patient must go into the bag.
4. Explain the procedure to the patient and when ready to begin, place a nose-clamp on the patient. Release the Kelly Clamp from the tubing and assist the patient in inserting the mask. Have the patient breathe normally through the system to establish confidence. Add more O₂ if required. Remove the O₂ source and recap the inlet (D).
5. Proceed with one of the following:
 - a. Attach the gas device (syringe, special gun, etc. to inlet B. Have patient exhale completely and upon inhalation, rapidly inject the gas and start the camera. Have patient hold breath until sufficient counts are collected or until the patient must breathe. In the meantime remove the gas appliance (syringe or gun) and recap B.
 - or:
 - b. If perfusion study is intended, inject solution containing the dissolved gas I.V. while patient is "holding breath" and obtain the perfusion data.
6. When the patient is breathing again through the system, begin collection "equilibrium phase" data. Add more O₂ to system if required. However, this is rarely necessary.

ITEM 21

When sufficient data are collected, simultaneously open F and clamp the tubing between D and F securely with a Kelly Clamp. Patient is now inhaling outside air and exhaling into the bag. Three or four breaths are usually sufficient, however, this may continue until bag becomes full enough to offer resistance. Remove the mouthpiece and remove the entire rebreathing apparatus, with the clamp in place. The gas is then discharged into the xenon trap as previously discussed.

NOTE: during the procedure, a positive method of exhausting the room air must be provided in case the patient rejects the mask during the procedure.



- A: Mask
- B: Inlet for Gas
- C: CO₂ Absorber - to be filled with soda lime as used in spirometer
- D: Inlet for O₂
- E: Collection Bag
- F: Capped bypass

Gas Trap Monitoring

1. To measure the concentration in the effluent from a gas trap, place one end of a 1" I.D. hose on the XenAlert's air intake and the other end over the gas trap exhaust port.
2. Place the INTEGRATE and BLOWER switches on TRAP/STANDBY.
3. Place the METER MULTIPLIER switch on X1000. Proceed with the wash-out procedure and observe the MPC meter reading. If it reads less than 100 MPC, place the switch on X100.
4. Determine the activity (A) in the trap effluent by using the formula:
$$A = \text{MPC} \times 10^{-5} \times V \times T$$

where - A = effluent activity in μCi .
 MPC = reading from analog meter
 10^{-5} = 1 MPC in $\mu\text{Ci/ml}$
 V = trap flow velocity in ml/minute
 T = washout time in minutes
5. Remove the gas trap hose connection.
6. Turn on the BLOWER until the MPC meter reads zero, which indicates that all the xenon from the trap is out of the XenAlert. This should take about 5 minutes.
7. Return the INTEGRATE switch to ON or ROOM AIR in order to continue monitoring room air.
8. Record the results.

Xenalert System Calibration

Place a radioactive source, such as Victoreen Model 62-103 Cs-137 Check Source, (10 μ Ci) on top of the instrument, directly over the label which reads: "Place Check Source Here". Be sure the printed side of the source faces up. The meter should read approximately 2 MPC with this particular source. Check the instrument at least weekly to make sure it is still operational.

Xenon Air Concentration

A. Restricted Areas

As specified elsewhere in this application, this laboratory will do a maximum of 30 ventilation studies per week using an average of 12 mCi Xe-133 per study. The studies will be done in Room BX7 which has a ventilation rate of 537 ft³/min.

1. Maximum activity used per week = A

$$A = \frac{12 \text{ mCi}}{\text{patient}} \times \frac{30 \text{ patients}}{\text{week}} \times \frac{1 \times 10^3 \text{ } \mu\text{Ci}}{\text{mCi}}$$

$$= 3.6 \times 10^5 \text{ } \mu\text{Ci/week}$$

2. Assumed loss rate = f = 0.20

3. Room ventilation rate = V

$$V = \frac{537 \text{ ft}^3}{\text{min}} \times 1.7 \times 10^6 \frac{\text{ml/hr}}{\text{ft}^3/\text{min}} \times \frac{40 \text{ hr}}{\text{wk}} =$$

$$= 3.6 \times 10^{10} \text{ ml/week}$$

4. $C = \frac{A \times f}{V} = \frac{3.6 \times 10^5 \text{ } \mu\text{Ci/week} \times 0.20}{3.6 \times 10^{10} \text{ ml/week}}$

$$= 2.0 \times 10^{-6} \text{ } \mu\text{Ci/ml}$$

5. This satisfies 10 CFR Part 20, Section 20.103. which requires that $C \leq 1 \times 10^{-5} \text{ } \mu\text{Ci/ml}$.

Xenon Air Concentrations

B. Unrestricted Areas

1. In Room BX7 over a one-year period, an average of 15 ventilation studies per week are performed using an average of 12 mCi per study. Room BX7 has a total ventilation rate of 537 ft³/min.

- a. Activity used per year = A

$$A = \frac{15 \text{ patients}}{\text{week}} \times \frac{12 \text{ mCi}}{\text{patient}} \times \frac{10^3 \mu\text{Ci}}{\text{mCi}} \times \frac{52 \text{ weeks}}{\text{year}}$$

$$= 9.4 \times 10^6 \mu\text{Ci/year}$$

- b. Assumed loss rate = f = 0.20

- c. Ventilation rate = V

$$V = \frac{537 \text{ ft}^3}{\text{min}} \times \frac{1.49 \times 10^{10}}{\text{ft}^3/\text{min}} \times \frac{\text{ml/year}}{\text{ft}^3/\text{min}}$$

$$= 8.0 \times 10^{12} \text{ ml/year}$$

d. $C = \frac{A \times f}{V} = \frac{9.4 \times 10^6 \mu\text{Ci/year} \times 0.20}{8.0 \times 10^{12} \text{ ml/year}}$

$$= 2.4 \times 10^{-7} \mu\text{Ci/ml}$$

- e.

This satisfies 10 CFR Part 20, Section 20.106 which requires that

$$C \leq 3 \times 10^{-7} \mu\text{Ci/ml}.$$

Xenon Air Concentrations

B. Unrestricted Areas (continued)

2. In Room BX2, Xe-133 will be stored in the fume hood until ready to use. Xe-133 is obtained in individual doses, each in a sealed ampoule. Normally an ampoule is delivered in the morning for use the same day, so that the average time spent in the fume hood is under four hours. The ventilation rate in BX2 is 200 ft³/min. In order to maintain a concentration averaged over one year of less than 3×10^{-7} $\mu\text{Ci}/\text{year}$, the following activity is the maximum that may be released into the hood.

$$A = C \times V$$

$$= 3 \times 10^{-7} \mu\text{Ci}/\text{ml.} \times 200 \text{ ft.}^3/\text{min} \times 1.49 \times 10^{10} \frac{\text{ml}/\text{year}}{\text{ft}^3/\text{min}}$$

$$= 9.0 \times 10^5 \mu\text{Ci}/\text{year.}$$

The total activity of Xe-133 used per year is

$$\frac{15 \text{ studies}}{\text{week}} \times \frac{12 \text{ mCi}}{\text{study}} \times \frac{10^3 \mu\text{Ci}}{\text{mCi}} \times \frac{52 \text{ wk}}{\text{year}} = 9.4 \times 10^6 \mu\text{Ci}/\text{yr.}$$

This would mean a maximum fractional loss of

$$\frac{4.5 \times 10^5}{9.4 \times 10^6} = 0.10$$

That is, a 10% loss of Xe-133 from the sealed containers can be tolerated.

A very small (< 2%) loss of Xe-133 is expected from individual sealed dose ampoules while stored for a few hours until used. The exception is if the source is damaged while placing it into the hood, in which case all the Xe-133 would be released.

At 12 mCi per source, 75 sources may be damaged before the above level is reached, or about 1.5 sources every week. If this level of accidental occurrences is approached, the laboratory will stop performing the study.

Xenon Air Concentrations

- C. In the event of an accidental release of a dose of Xe-133 into Room BX7, the room is evacuated until the exposure rate in the room as measured by a low-level survey meter is at background level + 3%. For an average dose of 12 mCi, the volume, V, of air needed to reach the maximum restricted area concentration is:

$$V = \frac{12 \text{ mCi} \times 10^3 \frac{\mu\text{Ci}}{\text{mCi}}}{1 \times 10^{-5} \mu\text{Ci/ml} \times 2.832 \times 10^4 \text{ ml/ft}^3} = 4.2 \times 10^4 \text{ ft.}^3$$

At an exchange rate of 537 ft³/min, the time needed to exchange this volume is 78 minutes.

Handling of Saturated Filters

If either of our two Xe-133 filters becomes saturated, the filter entrance and exit ports will be plugged, the filter removed from its box, and placed in the fume hood in Room BX-2 for two months to let the Xe-133 decay. The trap will then be tested for its trapping ability. If it will no longer absorb Xe-133, it will be discarded.

ALARA - As low as Reasonable Achievable

The following ALARA program closely follows recommendations from the Nuclear Regulatory Commission. These requirements apply to all users of ionizing radiation irrespective of the nature and source of the radiation.

Program for Maintaining Occupational
Radiation Exposures at the Jewish Hospital, ALARA

1. Management Commitment

- a. We, the management of Jewish Hospital, are committed to the program described in this paper for keeping exposures (individual and collective) as low as reasonably achievable (ALARA). In accord with this commitment, we hereby describe an administrative organization for radiation safety and will develop the necessary written policy, procedures and instructions to foster the ALARA concept within our institution. The organization includes a Radiation Safety Committee (RSC) and a Radiation Safety Officer (RSO).
- b. We will perform a formal annual review of the radiation safety program including ALARA considerations. This shall include reviews of operating procedures and past exposure records, inspections, etc., and consultations with the radiation protection staff or outside consultants. Since management is represented on the RSC, management's review will coincide with the RSC's annual review of Section II. C.3.
- c. Modification to operating and maintenance procedures and to equipment and facilities will be made where they will reduce exposures unless the cost, in our judgement, is considered to be unjustified. We will be able to demonstrate, if necessary, that improvements have been sought, that modifications have been considered, and that they have been implemented where reasonable. Where modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.
- d. In addition to maintaining doses to individuals as far below the limits as is reasonable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

ALARA, 11-21-84

II. Radiation Safety Committee (RSC)

a. Review of Proposed Users and Uses

1. The RSC will thoroughly review the qualifications of each applicant with respect to the types and quantities of materials and uses for which he has applied to assure that the applicant will be able to take appropriate measures to maintain exposure ALARA.
2. When considering a new use of byproduct material, the RSC will review the efforts of the applicant to maintain exposure ALARA. The user should have systematized procedures to ensure ALARA, and shall have incorporated the use of special equipment such as syringe shields, rubber gloves, etc., in his proposed use.
3. The RSC will ensure that the user justifies his procedures and that dose will be ALARA (individual and collective).

b. Delegation of Authority

(The judicious delegation of RSC authority is essential to the enforcement of an ALARA program.)

1. The RSC will delegate authority to the RSO for enforcement of the ALARA concept.
2. The RSC will support the RSO in those instances where it is necessary for the RSO to assert his authority. Where the RSO has been overruled, the Committee will record the basis for its action in the minutes of the Committee's quarterly meeting.

c. Review of ALARA Program

1. The RSC will encourage all users to review current procedures and develop new procedures as appropriate to implement the ALARA concept.
2. The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances where Investigational Levels in Table I below are exceeded. The principle purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when Investigational Levels are exceeded (see paragraph VI).

3. The RSC will evaluate our institution's overall efforts for maintaining exposures ALARA on an annual basis. This review will include the efforts of the RSO, authorized users, and workers as well as those of management.

III. Radiation Safety Officer (RSO)

a. Annual and Quarterly Review

1. Annual review of the Radiation Safety Program. The RSO will perform an annual review of the Radiation Safety Program for adherence to ALARA concepts. Reviews of specific procedures may be conducted on a more frequent basis.
2. Quarterly review of Occupational Exposures. The RSO will review at least quarterly the external radiation exposures of authorized users and workers to determine that their exposures are ALARA in accordance with the provisions of paragraph VI of this program.
3. Quarterly review of records of Radiation Level Surveys. The RSO will review radiation levels in unrestricted and restricted areas to determine that they were at ALARA levels during the previous quarter.

b. Education Responsibilities for an ALARA Program

1. The RSO will schedule briefings and educational sessions to inform workers of ALARA program efforts.
2. The RSO will assure that authorized users, workers, and ancillary personnel who may be exposed to radiation will be instructed in the ALARA philosophy and informed that management, the RSC and the RSO are committed to implementing the ALARA concept.

c. Cooperative Efforts for Development of ALARA Procedures

Radiation workers will be given opportunities to participate in formulation of the procedures that they will be required to follow.

1. The RSO will be in close contact with all users and workers in order to develop ALARA procedures for working with radioactive materials.
2. The RSO will establish procedures for receiving and evaluating the suggestions of individual workers for improving health physics practices and encourage the use of those procedures.

d. Reviewing Instances of Deviation from Good ALARA Practices

The RSO will investigate all known instances of deviation from good ALARA practices; and, if possible, determine the causes. When the cause is known, the RSO will require changes in the program to maintain exposures ALARA.

IV. Authorized Users

a. New procedures Involving Potential Radiation Exposures

1. The authorized user will consult with, and receive the approval of, the RSO and/or RSC during the planning stage before using radioactive materials for a new procedure.
2. The authorized user will evaluate all procedures before using radioactive materials to ensure that exposures will be kept ALARA. This may be enhanced through the application of trial runs.

b. Responsibility of the Authorized User to Those He Supervises

1. The authorized user will explain the ALARA concept and his commitment to maintain exposures ALARA to all of those he supervises.
2. The authorized user will ensure that those under his supervision who are subject to occupational radiation exposure are trained and educated in good health physics practices and in maintaining exposures ALARA.

V. Persons Who Receive Occupational Radiation Exposure

- a. The worker will be instructed in the ALARA concept and its relationship to his working procedures and work conditions.
- b. The worker will know what recourses are available if he feels that ALARA is not being promoted on the job.

VI. Establishment of Investigational Levels in Order to Monitor Individual Occupational External Radiation Exposures

This institution hereby established Investigational Levels for occupational external radiation exposure which, when exceeded, will initiate review or investigation by the Radiation Safety Committee and/or the Radiation Safety Officer. The Investigational Levels that we have adopted are listed in Table 1 below. These levels apply to the exposure of individual workers.

Table 1

Investigational Levels - (mrems per calendar quarter)		
	<u>LEVEL I</u>	<u>LEVEL II</u>
1. Whole body; head and trunk active blood-forming organs; lens of eyes; or gonads	125	375
2. Hands and forearms; feet and ankles	1875	5625
3. Skin of whole body	750	2250

The Radiation Safety Officer will review and record on Form NRC-5, Current Occupational External Radiation Exposures, or an equivalent form (e.g. dosimeter processor's report), results of personnel monitoring, not less than once in any calendar quarter, as is required by 10 CFR 20, 20.401. The following actions will be taken at the Investigational Levels as stated in Table 1:

- a. Quarterly exposure of individuals to less than Investigational Level I.

Except when deemed appropriate by the RSO, no further action will be taken in those cases where an individual's exposure is less than Table 1 values for the Investigational Level I.

- b. Personnel exposures equal to or greater than Investigational Level I, but less than Investigational Level II. The RSO will review the exposure of each individual whose quarterly exposures equal or exceed Investigational Level I. He will report the results of his reviews at the first RSC meeting following the quarter when the exposure was recorded. If the exposure does not equal or exceed Investigational Level II, no action related specifically to the exposure is required unless deemed appropriate by the Committee. The Committee will, however, consider each such exposure in comparison with those of others performing similar tasks as an index of ALARA program quality and will record the review in the Committee minutes.

- c. Exposure equal to or greater than Investigational Level II.

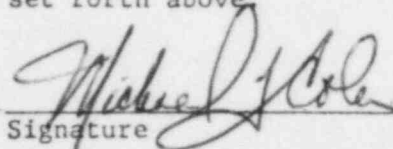
The RSO will investigate in a timely manner the cause(s) of all personnel exposures equaling or exceeding Investigational Level II and, if warranted, take action. A report of the investigation, actions taken, if any, and a copy of the individual's Form NRC-5 or its equivalent will be presented to the RSC at the first RSC meeting following completion of the investigation. The details of these reports will be recorded in the Committee minutes. Committee minutes will be sent to the management of this institution for review. The minutes, containing details of the investigation, will be made available to NRC inspectors for review at the time of the next inspection.

- d. Re-establishment of an individual occupational worker's Investigational Level II Above That Listed in Table I.

In cases where a worker's or group of worker's exposures need to exceed Investigational Level II, a new, higher Investigational Level II may be established on the basis that it is consistent with good ALARA practices for that individual or group. Justification for a new Investigational Level II will be documented.

The Radiation Safety Committee will review the justification for, and will approve, all revisions of Investigational Levels II. In such cases, when the exposure equals or exceeds the newly established Investigational Level II, those actions listed in paragraph c above will be followed.

I hereby certify that this institution has implemented the ALARA program set forth above.


Signature

Michael Coler

Name

Vice-President, Administration

Title

The Jewish Hospital of Cincinnati

Institution Name & Address

3200 Burnet Avenue
Cincinnati, Ohio 45229

ALARA, 11-21-84

CONTROL NO. 77863