

HEARTLAND HOSPITAL WEST
801 FARAON STREET
ST. JOSEPH, MISSOURI 64501

August 27, 1985

Ms Evelyn Matson
U.S. Nuclear Regulatory Commission
Regional Licensing Section
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Re: Control #79080

Dear Ms. Matson:

This letter is in response to your recent request asking for additional information so that your review of our license renewal application can be completed. Our response to your questions is in the order asked. To facilitate your review of the Radioactive Materials License Application, we have enclosed a complete copy of the application. For some reason several of the pages were either left out when we mailed them or were lost at your facility. Particular attention should be given to items 19 and 20 of the application.

- Item #1. We do wish to have Dr. E. Reddy listed as an authorized user for Group VI sources and P-32. A copy of Dr. Reddy's American Board of Radiology Certification in Therapeutic Radiology is attached. Information related to the use of Group VI sources and P-32 is included in Items 19 and 20 of the application.
- Item #2. Please change our possession limit for xenon-133 to a possession limit of 150 mCi.
- Item #3. Please list Dr. Edward Stevens, M.D. as the person responsible for supervising Group V therapies. Dr. Stevens is currently authorized for Group V procedures under NRC license #24-18287-01. This license is issued to Heartland Hospital East, 5325 Faraon, St. Joseph, Missouri.
- Item #4. Groups IV and V therapies involving I-131 will routinely be performed with capsules. However, if liquid iodine is used, it will be opened in a fume hood which is exhausted to the outside. Personnel opening the iodine vials containing liquid iodine will wear gloves and work on absorbent paper.
- Item #4a. A bioassay program will be established in accordance with Reg. Guide 8.2. A copy of the bioassay form to be maintained on personnel handling liquid iodine is enclosed.
- Item #4b. Please review the information contained on pages 1-8 of item 9 of the enclosed license application. These procedures relate to the use of Group V therapies.

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24-13246-01 PDR

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REGION II

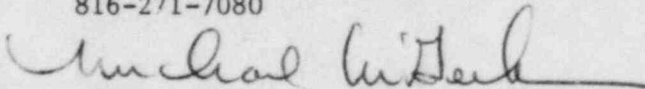
SEP 4 1985

Ms. Evelyn Matson
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Page 2

- Item #5. The lineator will be used for the performance of the linearity test.
- Item #6. A diagram of the Nuclear Medicine Department is enclosed.
- Item #7. I-125 sealed sources will be ordered on an as-needed basis. Routinely only the number of sources used for a specific patient will be ordered. However, if sources are ordered which are not used, they will be stored in their original shipping container behind lead bricks in the Nuclear Medicine Department. The Nuclear Medicine Department routinely is locked when Nuclear Medicine personnel are out of the area. The material will be held on site until it decays for at least ten half lives. After at least ten half lives, it will be surveyed with a low level survey meter and, if background readings are obtained, it will be disposed of as normal trash.
- Item #8. Prior to receiving your letter dated July 23, 1985, we had sent a letter to the NRC outlining the changes which were proposed for the use of a central pharmacy. If additional questions are necessary concerning this change from our original application, please do not hesitate to call.

Sincerely,

Mr. Mike McGeehan
Director, Radiology Services
816-271-7080



RADIUM AND CESIUM SHIELDED WORK STATION

- Provides optimum working conditions when using radium and cesium
- Designed for maximum protection and versatility

The Radium and Cesium Shielded Work Station is the ideal vehicle for the safe storage of radium and cesium. It provides optimum protection to personnel from radiation exposure when storing sources, and has sufficient work and storage area to allow flexibility when using its contents. Optional heavy-duty 5" swivel casters lend mobility to the work station and permit easy transport of sources to the point of use under hazardous free conditions.

As a guide to determine maximum isotope content for a desired surface radiation level, the following Tenth-Value-Layers (in lead) are provided.*

Radium	5.5 cm	Cesium-137	2.2 cm
Cobalt-60	4.1 cm	Iridium-192	2.0 cm
		Gold-198	1.1 cm

USED FOR GROUP VI STORAGE + HANDLING

Shielded Storage Safe

Constructed of steel and shielded with lead, these safes provide maximum protection from radiation exposure. Keylocked and fireproof. Stainless steel storage drawers. (4-drawer unit shown).

(See facing page for complete details.)

Steel Table Model ST-101

Provides solid support surface for components of work station. Smooth bevel-edged worktop offers adequate area for tool and instrument placement. Table support frame is solid steel with welded corner joints for maximum strength. 4" x 4" floor supports.

Dimensions: 28" x 36" x 33 3/4" High. Weight: 120 lbs.

L-Block Lead Shield Model Pb-212

Solid, heavy (410 lbs.) lead shielding (5.0 cm thick) protects head and torso from radiation. Tilted lead glass window (4" x 8") permits safe, unobstructed viewing of work area. Dimensions: 22" H x 14" W x 16 1/2" L.

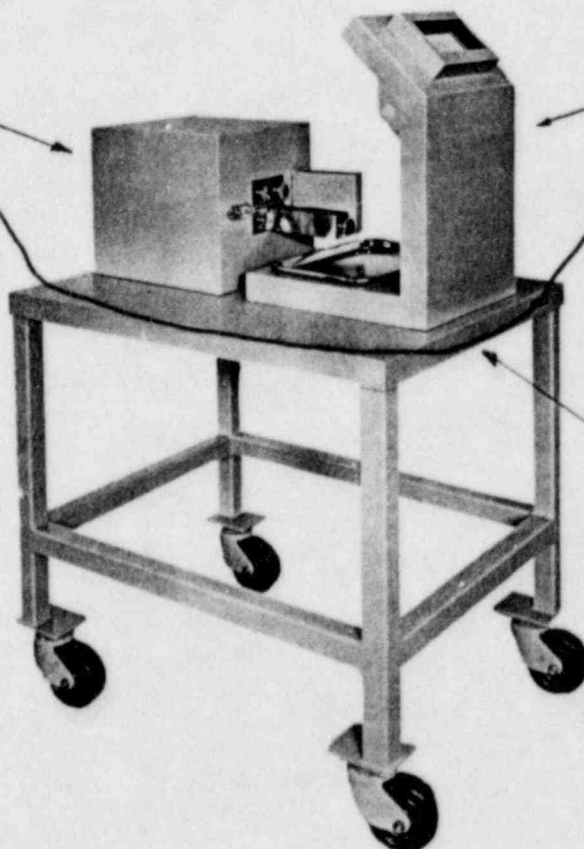
An optional 13 1/2" x 9 3/4" x 3/4" high Stainless Steel Tray, Model T-15F, for use with L-Block Shield is available.

Storage Drawer (optional) Model OSD-101

Fits under worktop. Dimensions: 24" L x 19 1/2" W x 7" H.

Swivel Casters (optional) Model OSC-101

Heavy duty, 5" casters provide complete mobility to the work station.

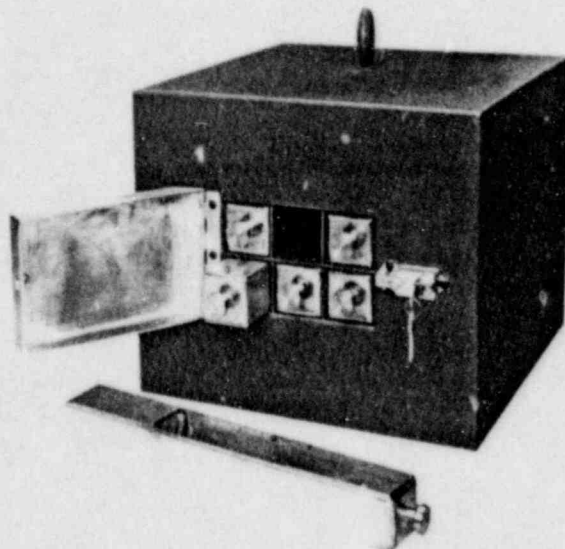


*National Council on Radiation Protection and Measurements. Report No. 40, "Protection Against Radiation from Brachytherapy Sources."

RADIUM AND CESIUM STORAGE SAFE

- Offers maximum protection
- Custom-designed storage drawers available
- Stainless steel drawers
- Keylock & fireproof

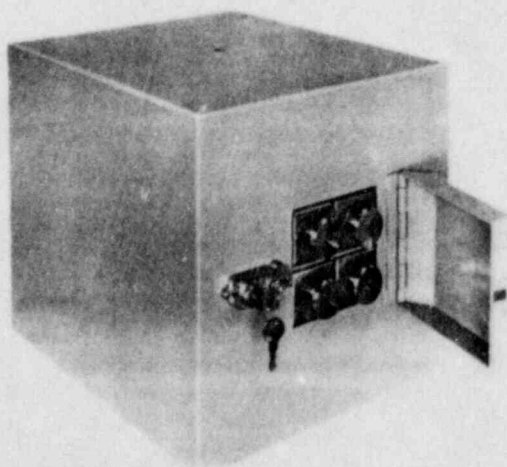
Constructed of steel and shielded with 4" of lead, this Storage Safe provides maximum protection against exposure to radiation. Each safe is fireproof and has a keylock door. The storage area in each drawer is 6" L x 1 3/4" W x 1 7/8" D.



Model RSS-106

Custom-Designed Drawers

For special requirements relating to drawers, source holders or other modifications, a separate quotation will be forwarded upon request.



Model RSS-104

Model No.	No. of Drawers	Safe Dimensions	Lead Thickness	Net Weight
RSS-104	4	12 3/4" H x 12 3/4" W x 14 1/2" D	4" (10.2 cm)	950 lbs.
RSS-106	6	12 3/4" H x 15" W x 14 1/2" D	4" (10.2 cm)	1150 lbs.

Item #9: Instrumentation

APPENDIX C

1. Survey Meters

a. Manufacturer's name: Nuclear Chicago

Manufacturer's model number:

Number of instruments available: One

Minimum range: 0.0 mr/hr to 0.1 mr/hr

Maximum range: 0.0 mr/hr to 0 - 100 mr/hr

b. Manufacturer's name: Tracer Lab

Manufacturer's model number: SUIH

Number of instruments available: One

Ranges:

Minimum range 0.0 mr/hr to 15 mr/hr

Maximum range 0.0 mr/hr to 1500 mr/hr

Date: 4/25/85

2. Dose Calibrator

Manufacturer's name: Squibb

Manufacturer's model number: CRC-6A

Number of instruments available: One

3. Diagnostic Instruments

TYPE OF INSTRUMENT	MANUFACTURER'S NAME	MODEL NO.
Gamma Camera	Siemens	ZLC-750
Micro Dot	Siemens	
Computer	ADAC	DPS-2800
Xe-133 Trap	Atomic Development	Xe-102
Uptake Probe	Picker	III A

4. Other

Well Counter	Nuclear Chicato	
Area Monitor	Victoreen	Frisker

Date: 4/25/85

CALIBRATION OF SURVEY INSTRUMENTS

Check appropriate items:

- ☒ 1. Survey instruments will be calibrated at least annually and following repair.
- ☒ 2. Calibration will be performed at two points on each scale. The two points will be approximately 1/3 and 2/3 of full scale. A survey instrument may be considered properly calibrated when the instrument readings are within $\pm 10\%$ of the calculated or known values for each point checked. Readings are within $\pm 20\%$ are considered acceptable if a calibration chart or graph is prepared and attached to the instrument.
- ☐ 3. Survey instruments will be calibrated.
- ☐ a. By the manufacturer.
- ☐ b. At the licensee's facility.
- ☐ i. Calibration source
Manufacturer's name:
Model #:
Activity in millicuries:
Accuracy:
Traceability to primary standard:
- ☐ ii. The calibration procedures in Appendix D, Section I will be used, or
- ☐ iii. The step-by-step procedures including radiation safety procedures are attached.
- ☒ c. By a consultant or outside firm.
- ☐ i. Name: Radiation Consultants of Mid-America, Inc.
- ☐ ii. Location: 5500 Buena Vista, Shawnee Mission, KS 66205
- ☐ iii. Procedures and sources
- ☒ have been approved by ^{Kansas} ~~NRC~~ and are on file in License #33-B429-01
- ☐ are attached

Date: 4/25/85

Item #10: CALIBRATION OF DOSE CALIBRATOR

A. Sources Used for Linearity Test:

Check as appropriate

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

☐ Other* (specify) #D Below

B. Sources Used for Instrument Accuracy and Constancy Tests:

Radionuclide	Activity (mCi)	Accuracy
57 Co	5.0	± 5%
133 Ba	.250	± 5%
137 Cs	.2	± 5%
Other		

C. ☒ The procedures described in Appendix D, Section 2, Regulatory Guide 10.8, Rev. , Dated , will be used for calibration of the dose calibrator. See next page.

or
☐ Equivalent procedures are attached.

D. ☒ An alternative to the linearity procedure described in Appendix D "A Guide for Applications for Medical Programs," dated 5/1/79 will be to use a calicheck system. This system is available from Calcorp, Inc. The manufacturer's instructions for use will be followed.

*Must be equivalent to the highest activity used.

Date: 4/25/85

CALIBRATION OF INSTRUMENTS

APPENDIX D

Section 1

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

- A. Calibration of survey meters shall be performed with radionuclide sources.
1. The sources shall be approximate point sources.
 2. The source activities or exposure rates at given distances shall be traceable by documented measurements to a standard source certified within 5% accuracy to the U. S. National Bureau of Standards (NBS) calibrations.
 3. The frequency shall be at least annually and after servicing.
 4. Each scale of the instrument shall be calibrated at least at two points located at approximately 1/3 and 2/3 of full scale.
 5. The exposure rate measured by the instrument shall differ from the true exposure rate by less than 10% at the two points on each scale (read appropriate section of the instrument manual to determine how to make necessary adjustments to bring instrument into calibration.) Readings within $\pm 20\%$ will be considered acceptable if a calibration chart, graph, or response factor is prepared, attached to the instrument, and used to interpret meter readings to within 10% for radiation protection purposes.

Note:

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

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

1. Before each use and also after each survey to ensure that the instrument was operational during the survey.
2. After each maintenance and/or battery change.
3. At least quarterly.

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

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

The calibration may be done either:

1. As in Item A above with calibrated standards of radionuclides at or near the desired energies, or
2. As a relative intercomparison with an energy-independent instrument and uncalibrated radionuclides.

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

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

E. Use of Inverse Square Law and Radioactive Decay Law

1. A calibrated source will have a calibration certificate giving its exposure rate at a given distance, or its activity, measured on a specified date by the manufacturer or NBS.
 - a. The Inverse Square Law may be used with any point source to calculate the exposure rate at other distances.
 - b. The Radioactive Decay Law may be used to calculate the exposure rates or source activities at times other than the calibration date.

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

APPENDIX D
Section 2

METHODS FOR CALIBRATION OF DOSE CALIBRATOR*

All radiopharmaceuticals must be assayed for activity to an accuracy of 10%. The most common instrument for accomplishing this is an ionization-type dose calibrator. The 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 calibrator, repeat all the appropriate tests listed above (dependent upon the nature of the repairs).

C. Tests 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 day's use of the instrument. Preferably, at least two reference sources (for example, 3-5 mCi of Co-57 and 100-200 μ Ci of Cs-137 or 1-2 mg Ra-226 (with appropriate decay corrections) will be alternated each day of use to test the instrument's 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, plot net activity versus the day of the year on semilog graph paper.
5. Log the background levels.

6. Indicate the predicted activity of each source based on decay calculations and the $\pm 5\%$ limits on the graph.

7. Repeat the procedure used for the Cs-137 source for all the commonly used radionuclide settings.

8. Variations greater than $\pm 5\%$ from the predicted activity indicate the need for instrument repair or adjustment.

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

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

1. 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).

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

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

c. 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	1.998
30	1
48	0.126

Examples: If the net activity measured at 30 hours was 15.625 mCi, the calculated activities for 6 and 48 hours would be $15.625 \text{ mCi} \times 15.853 = 247.7 \text{ mCi}$ and $15.625 \text{ mCi} \times 0.126 = 1.97 \text{ mCi}$, respectively.

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

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. Repeat step 1 for a total of 3 determinations, and average results.
3. The average activity determined in step 2 should agree with the certified activity of the reference source within $\pm 5\%$ after decay corrections.
4. Repeat the above steps for other commonly used radionuclides for which adequate reference standards are available.
5. Keep a log of these calibration checks.
6. Calibration checks that do not agree within $\pm 5\%$ 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.
7. 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 #11: FACILITIES & EQUIPMENT

The following items are provided for handling radioactive material and will be used appropriately:

- a. disposable gloves
- b. syringe shields
- c. lead vial shields
- d. tongs and forceps
- e. 2" x 4" lead bricks
- f. work bench area with absorbent paper
- g. survey meters
- h. L-block shield

The area designated Hot Lab will be used for receipt, storage (including waste), preparation and measurement of radioactive material. Radioactive waste will be stored in the lead brick storage area in labeled containers. The Hot Lab will be locked when nuclear medicine personnel are off duty and will be made available only to those people authorized by Nuclear Medicine. A diagram of the nuclear medicine area is enclosed.

All radioactive sources are stored in such a manner (lead, concrete, or refrigerator) so as to not exceed 2 mR/Hr at the surface of the barrier.

Mo-99/Tc-99m generator will be stored and eluted in the designated area. Spent generators will be stored in the location identified in the attached diagram.

During elution, the eluate will be collected, assayed, and stored in a vial held in a quarter inch lead pig except during brief periods of transfer. Transfer of the eluate or portions of the eluate will be made by the use of syringes retained in lead shields designed for this purpose.

Eluates and compounds made from eluates will be drawn, synthesized, assayed and stored in lead vials or syringes such that levels as measured at contact with a low level survey meter do not exceed 2.0 mR/Hr except for brief periods during the actual transfer.

Radioactive materials obtained from radiopharmacy suppliers will be stored in their original shipping containers. If necessary, the doses will be placed behind additional shielding to reduce activity levels emitted from the container to 2 mR/Hr or less.

Syringe shields will be used on all accessories requiring the transfer of radiopharmaceuticals from vial to vial and in drawing up patient doses. Syringe shields will also be used in the administration of doses to patients except when the patients' well-being may be compromised. Under these circumstances the dose containing syringes will be kept shielded up to the moment of injection.

Steps in the preparation of compounds requiring periods of heating, shaking, agitation or mixing will be performed utilizing lead shielding and/or mechanical or ultrasonic agitation equipment and/or remote handling devices (tongs, forceps, etc.) such that levels during the above period as measured by a low level survey meter do not exceed 2.0 mR/Hr.

Protective outer garments, such as laboratory coats and rubber gloves will be worn while handling radioactivity in uncontained form.

All possible set-ups will be made on easily cleanable trays. All trays and all other work surfaces will be covered with disposable absorbant paper.

A decontamination kit will be maintained in the department. It will include the following items:

DECONTAMINATION KIT

<u>ITEM</u>	<u>PURPOSE</u>
Warning tape, chalk, & signs	Posting of area
Plastic bags - small	Shoe covers, wet containers
Disposable gloves	Hand protection
Masking tape	Fasten shoe covers, etc.
Forceps, tongs	Safe handling
Large plastic bags	For contaminated material
Sponges, 4 x 4	Sopping up
Paper towels	Blotting & drying
Radiac wash or detergent	Detergent
Scouring powder	Friction
Tags	Identification
Scissors	Cut absorbent paper, etc.
Whatman #1 filter paper	Taking swipes following decontamination
Chux	Cover area following decontamination
G-M survey meter	Monitoring

Item #12: PERSONNEL TRAINING PROGRAM

Nuclear Medicine Technologist

These individuals will be registered or registry eligible technologists by their respective registry group at this time, ARPT or ASCP.

Clinical, Nursing, Housekeeping, Nuclear Medicine Technologist, and Security Personnel

These individuals will be required to attend lectures before assuming their duties with or in the vicinity of radioactive materials, annually for refresher training, and whenever there is a significant change in duties, regulations or terms of the license. Lectures for presentation of this material will be two hours in duration. The training program will be of sufficient scope to insure that all personnel will receive proper instruction in the items specified in Section 1912 of 10 CFR, Part 19 and will include:

- A. Areas where radioactive material is 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 and unsafe conditions
- I. Their right to be informed of their radiation exposure and bio-assay results

Lectures will be given by the Nuclear Medicine Technologist, the Radiation safety Officer or a consulting physicist. Parts 19 and 20 of 10 CFR Regulatory Guide 10.8, Rev. , Dated , "A Guide for Preparation of Applications for Medical Programs" will be used as source material for these lectures.

Date: 4/25/85

Item #13: PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIALS

1. The Chief Nuclear Medicine Technologist, Nuclear Medicine Physician, or their designee will place all orders for radioactive materials and will insure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.
2. During normal working hours, carriers will be instructed to deliver radioactive packages directly to the Nuclear Medicine Department.
3. During off-duty hours, Security personnel will accept delivery of radioactive packages in accordance with the procedures outlined in the following memorandum.

MEMORANDUM FOR
Security Personnel

FROM: Mike McGeehan, Director, Radiology Services
SUBJECT: Receipt of Packages Containing Radioactive Material

Any packages containing radioactive material that arrive between 4:00 p.m. and 7:30 a.m. or on Saturday or Sunday shall be signed for by the Security Guard on duty and taken immediately to the Nuclear Medicine Department. Unlock both doors and place the package on the work bench in the Hot Lab, and relock both doors.

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

RADIATION SAFETY OFFICER: Dr. Edward Stevens

OFFICE PHONE: 816-271-7558

HOME PHONE: 816-279-4953

Date: 4/25/85

Item #14: PROCEDURES FOR SAFELY OPENING PACKAGES
CONTAINING RADIOACTIVE MATERIALS

Procedures for safely opening packages will be in accordance with Regulatory Guide 10.8, "A Guide for Preparation of Applications for Medical Programs," Rev. , Dated .

APPENDIX F

1. Special requirements will be followed for packages containing quantities of radioactive material in excess of the Type A quantity limits as specified in paragraphs 20.205(a)(1) and (c)(1) of 10 CFR Part 20 (more than 10 Ci for Mo99 and Tc-99m). They will be monitored for surface contamination and external radiation levels within 3 hours after receipt if received during working hours or within 18 hours if received after working hours, in accordance with the requirements of paragraphs 20.205(a) through (c). All shipments of liquids greater than exempt quantities will be tested for leakage. The NRC Regional Office will be notified in accordance with the regulations if removable contamination exceeds 0.01 uCi/100 cm² or if external radiation levels exceed 200 mR/hr at the package surface or 10 mR/hr at 3 feet (or 1 m).

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

- a. Put on gloves to prevent hand contamination.
- b. Visually inspect package for any sign of damage (e.g., wetness, crushed). If damage is noted, stop procedure and notify Radiation Safety Officer.
- c. Measure exposure rate at 3 feet (or 1m) from package surface and record. If 10 mR/hr, stop procedure and notify Radiation Safety Officer.
- d. Measure surface exposure rate and record. If 200 mR/hr, stop procedure and notify Radiation Safety Officer.
- e. Open the package with the following preliminary steps:
 - (1) Open the outer package (following manufacturer's directions, if supplied) and remove packing slip).
 - (2) Open inner package and verify that contents agree with those on packing slip. Compare requisition,* packing slip, and label on bottle.
 - (3) Check integrity of final source container (i.e., inspect for breakage or seals on vials, loss of liquid, and

Item #15: LABORATORY RULES FOR USE OF RADIOACTIVE MATERIAL

We will follow the laboratory rules described in Regulatory Guide 10.8, Rev , Dated .

APPENDIX G

GENERAL RULES FOR SAFE USE OF RADIOACTIVE MATERIAL

1. Wear laboratory coats or other protective clothing at all times in areas where radioactive materials are used.
2. Wear disposable gloves at all times while handling radioactive materials.
3. Monitor hands and clothing for contamination after each procedure or before leaving the area.
4. Always use syringe shields for routine preparation of patient doses and administration to patients, except in circumstances such as pediatric cases when their use would compromise the patient's well-being. In these exceptional cases, use other protective methods such as remote delivery of the dose (e.g., through use of a butterfly valve).
5.
 - a. Do not eat, drink, smoke, or apply cosmetics in any area where radioactive material is stored or used.
 - b. Do not store food, drink, or personal effects with radioactive material.
6.
 - a. Assay each patient dose in the dose calibrator prior to administration. Do not use any doses that differ from the prescribed dose by more than 10 percent.
 - b. For therapeutic doses, also check the patient's name, the radionuclide, the chemical form, and the activity vs. the order written by the physician who will perform the procedure.
7. Wear personnel monitoring devices (film badge or TLD) at all times while in areas where radioactive materials are used or stored. These devices should be worn at chest or waist level. Personnel monitoring devices when not being worn to monitor occupational exposures should be stored in a designated low background area.
8. Wear TLD finger badges during elution of generator and preparation, assay, and injection of radiopharmaceuticals.
9. Dispose of radioactive waste only in specially designated and properly shielded receptacles.

10. Never pipette by mouth.

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

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

13. Always transport radioactive material in shielded containers.

Date: 4/25/85

Item #16: EMERGENCY PROCEDURES

Emergency Procedures will be posted in all laboratory areas where radioactive materials are used. The Emergency Procedures in Appendix H of Regulatory Guide 10.8, Rev. , Dated , will be used for this purpose.

APPENDIX H

Minor Spills

1. NOTIFY: Notify persons in the area that a spill has occurred.
2. PREVENT THE SPREAD: Cover the spill with absorbent paper.
3. CLEAN UP: Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose of in the radioactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable gloves.
4. SURVEY: With a low-range, thin-window G-M survey meter, check the area around the spill, hands, and clothing for contamination.
5. REPORT: Report incident to the Radiation Safety Officer.

Major Spills

1. CLEAR THE AREA: Notify all persons not involved in the spill to vacate the room.
2. PREVENT THE SPREAD: Cover the spill with absorbent pads, but do not attempt to clean it up. Confine the movement of all personnel potentially contaminated to prevent the spread.
3. SHIELD THE SOURCE: If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.
4. CLOSE THE ROOM: Leave the room and lock the door(s) to prevent entry.
5. CALL FOR HELP: Notify the Radiation Safety Officer immediately.
6. PERSONNEL DECONTAMINATION: Contaminated clothing should be removed and stored for further evaluation by the Radiation Safety Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

RADIATION SAFETY OFFICER: Dr. Edward Stevens

OFFICE PHONE: 816-271-7558

HOME PHONE: 816-279-4953

ALTERNATE NAMES AND TELEPHONE NUMBER DESIGNATED BY RADIATION
SAFETY OFFICER:

Cris Crandall (816-271-7558 work)

Mike McGehan (816-271-7558 work) (816-279-5502 home)

Date: 4/25/85

Item #17: AREA SURVEY PROCEDURES

Area surveys will be done in accordance with Appendix I of Regulatory Guide 10.8, Rev. , Dated .

APPENDIX I

1. All elution, preparation and injection areas will be surveyed daily with an appropriately low-range survey meter and decontaminated if necessary.*
2. Laboratory areas where only small quantities of radioactive material are used (less than 200 uCi) will be surveyed monthly.
3. Waste storage areas and all other laboratory areas will be surveyed weekly.
4. The weekly and monthly surveys will consist of:
 - a. A measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.1 mR/hr.
 - b. A series of wipe tests to measure contamination levels. The method for performing wipe tests will be sufficiently sensitive to detect 200 dpm per 100 cm² for the contaminant involved. Wipes of elution and preparation areas or other "high background" areas will be removed to a low background area for measurement.
5. A permanent record will be kept of all survey results, including negative results. The record will include:
 - a. Location, date, and identification of equipment used, including the serial number and pertinent counting efficiencies.
 - b. Name of person conducting the survey.
 - c. Drawing of area surveyed, identifying relevant features such as active storage areas, active waste areas, etc.
 - d. Measured exposure rates, keyed to location on the drawing (point out rates that require corrective action).
 - e. Detected contamination levels, keyed to locations on drawing.
 - f. Corrective action taken in the case of contamination or excessive exposure rates, reduced contamination levels or exposure rates after corrective action, and any appropriate comments.

Item #18: WASTE DISPOSAL PROCEDURES

APPENDIX J

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

☒ In the sanitary sewer system in accordance with sect. 20.303 of 10 CFR Part 20.

☐ By commercial waste disposal service (see also Item 4)

☒ Other (Specify) (see Item 3) _____

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

☒ Returned to the manufacturer for disposal.

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

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

☐ 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 Item 4)

☐ Other (specify) _____

4. The commercial waste disposal service used will be:

NRC/Agreement State License No.: _____

*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.

Date: 4/25/85

ALARA PROGRAM

The administration of Heartland Hospital West is committed to maintaining radiation exposures to employees as low as reasonably achievable (ALARA). This commitment applies not only to maintaining individual exposures ALARA, but also to maintaining the sum of the doses received by all individuals ALARA. This philosophy and our commitment to it will be maintained by the Radiation Safety Committee (RSC) and the Radiation Safety Officer (RSO). The RSC and The RSO will be responsible for maintaining a radiation safe (ALARA) environment within the hospital. The RSC will delegate sufficient authority to the RSO so that enforcement of the ALARA philosophy is not impaired. The RSC will support the RSO in those instances where it is necessary to assert authority until a formal RSC review has been held. The RSC review of the RSO's action will be maintained in the quarterly RSC minutes.

Administrative input and participation will be through an administrative appointment to the RSC. The RSC and RSO will perform/participate in the following items:

1. Perform an annual review of the radiation safety program. This review will include reviews of operating procedures, exposure histories, inspections, and consultations between the radiation protection staff and outside consultants. An evaluation will also be made of the institution's overall effort to maintain radiation exposures ALARA.
2. Modification of procedures, equipment, and facilities when such changes will significantly reduce radiation exposures unless the cost of such changes is unjustified.
3. Review the qualifications and proposed uses of radioactive material of each applicant to insure that exposures will be ALARA. This review should include reviewing the types and quantities of material to be used, operating procedures, and equipment (shields, gloves, etc).
4. Perform a quarterly review of occupational radiation exposures to assess trends in radiation exposures to personnel. Particular attention will be given to those instances where the levels outlined in Table I are exceeded. When the exposures are less than those of level I of Table I, no action is required.

When the exposure falls between level I and level II, the RSC will decide if a formal review of the exposure is needed. If the RSC deems a formal review necessary, the RSO will be responsible for seeing that this review is performed and that appropriate action is taken.

When the exposure exceeds level II, the RSO will be responsible for seeing that a formal review is performed and that appropriate action is carried out which will possibly

prevent the exposure from occurring in the future. The review and action will be presented at the next RSC meeting.

In those cases where the exposure levels cannot be reduced to less than level II limits, the RSC may establish levels higher than level II if it can demonstrate that good ALARA practices are being followed.

Table I

Investigational Levels - mRem
Per Calendar Quarter

	Level I	Level II
a. Whole body; head & trunk; active blood forming organs, lens of eyes, gonads	125	375
b. Hands and forearms, feet and ankles	1875	5625
c. Skin of whole body	750	2250

5. Encourage all users to review current procedures and develop new ones as appropriate to implement the ALARA philosophy.

6. The Radiation Safety Officer will be responsible for seeing that the following items are performed:

a. quarterly review of radiation level surveys. These must be reviewed with the ALARA philosophy in mind.

b. briefings and educational sessions are held for individuals using or coming into contact with radioactive material. Participants will be instructed on the ALARA philosophy and informed that the administration, the RSC, and the RSO are committed to the concept.

c. investigations of known instances of deviation from good ALARA practices will be instituted. When the cause is known, the RSO will initiate changes which will maintain exposures ALARA.

There will be a cooperative effort between the RSC, the RSO, and radiation workers to participate in the formulation and institution of the ALARA philosophy. A procedure for receiving and evaluating suggestions from radiation workers will be instituted.

Persons authorized by the RSC to use radioactive material will consult with the RSO prior to initiating a new procedure. The user will also review all operating procedures prior to starting a

Item #19: THERAPEUTIC USE OF RADIOPHARMACEUTICALS

APPENDIX K

I. Patients treated with Group V activities will be handled in accordance with the procedures described in Appendix K of Regulatory Guide 10.8, Rev. , Dated 1980.

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

B. The patient's room will be properly posted or attended in accordance with sects. 20.203 or 20.204 of 10 CFR part 20.

C. 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.

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

E. Radiation levels in unrestricted areas will be maintained less than the limits specified in paragraph 20.105(b) of 10 CFR Part 20.

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

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

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

I. Urine and vomits from I-131 therapy patients will not be collected. Patients will be instructed to use the sanitary sewer system.

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

K. Nursing Instructions

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

2. 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.

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

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

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

6. Attending personnel should wear rubber or disposable plastic gloves when handling urinals, bedpans, emesis basins, or other containers having any material obtained from the body of the patient. Wash gloves before removing them then wash hands. The gloves should be left in the patient's room in the designated waste container. These gloves need not be sterile or surgical in type.

7. 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.

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

9. 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.

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

11. For I-131 patients:

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

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

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

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

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

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

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

L. Waste Disposal

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

II. Miscellaneous information

A. Method for preparation and administration of therapeutic doses of Iodine-131. Therapeutic doses of I-131 will be ordered from reputable suppliers and received precalibrated, ready for dispensing to patients. These materials will be stored until time for use in the isotope storage area behind sufficient shielding to reduce the radiation levels to 2.0 mR/hr at a distance where occupational workers can conveniently stand. All liquid sources will be opened in a fume hood with the fan activated. Patients requiring therapeutic amounts of I-131 less than 30 mCi will be dosed in the Nuclear Medicine Department, held for observation and sent home or to their room. Hospitalized patients receiving greater than 30 mCi will be dosed in their rooms.

B. Only patients treated with greater than 12 mCi I-131* or 23 mCi Au-198* who require hospitalization will be placed in a private room with a toilet. Attempts will be made to use a corner room in a low traffic section of hallway.

C. Surgical dressings should be changed only as directed by the physician. Gold-198 leaking from a puncture wound will stain the dressings dark red or purple. Such dressings should not be discarded, but should be collected in plastic bags and turned over to the Nuclear Medicine Department. Handle these dressings only with tongs or tweezers. Wear disposable gloves.

- D. Instructions for Patient & Family - Patient will not be discharged from the hospital until the residual radioactivity reaches 30 mCi. This will be determined by taking measurements at 3 feet from the patient from the time the activity is administered until the radiation level reaches a radiation level proportional to 30 mCi. For some patients the determination of 30 mCi will be made by direct measurement of urinary excretion ($\mu\text{Ci/ml} \times \text{decay}$.)

1) The patient will be instructed not to have intimate contact with his/her spouse for a period of 2 weeks.

2) The patient will be instructed to wash his hands and bathe frequently.

3) The patient will be instructed not to prepare food for other people for a period of 2 weeks.

4) Other restrictions may be specified by the physician.

All restrictions will be removed when the activity reduces to a point that will result in no greater than 0.5R to persons in the family from that point until total decay. For I-131, that will be the time where the radioactivity in the thyroid gland reaches 8 mCi. An effective half life of 6 days will be used for this computation. For Au-198, those values will be 23 mCi. An effective half life of 65 hours will be used for this computation.

III. GUIDELINES FOR EMERGENCY SURGERY OR DEATH OF THE RADIOACTIVE PATIENT

In most hospitals, deceased patients with large amounts of radionuclides will be encountered only rarely, since in principle, radionuclide therapy is not given to moribund patients. If several days intervene between treatment and subsequent surgery or

death, the radiation hazard is usually considerably reduced. In most hospitals, the number of patients receiving large internal doses of radionuclides in any one week is small. The need for emergency surgery would not be usual, nor would the death of one of these patients.

The identification of a particular patient as radioactive is the responsibility of the physician in charge of the case. The radioactive patient shall be properly identified at all times. If a radioactive patient dies in the hospital, the physician who pronounces him dead should be responsible for attaching a radioactivity precautions tags to the body. The physician in charge of the case and the Radiation Protection Officer shall be notified at once.

In general bodies containing less than 5 mCi need no precautions for any type of handling. Those containing between 5 and 30 mCi may be buried or cremated with no preparation or embalmed according to standard injection procedures without special precautions. If the body is to be subjected to autopsy, the Radiation Safety Officer will designate any special precautions. The body containing more than 30 mCi can be buried or cremated with no preparation, but if embalming is to be carried out, it should be with the guidance of a Radiation Safety Officer. Among patients that die outside the hospital, the funeral director will seldom encounter bodies with hazardous exposure rates.

A. Preparation for Burial or Cremation Without Autopsy:

Consider first the cases in which no autopsy is to be performed and the body need not be opened. Embalming will be by the injection method, and the likelihood of contamination of the embalmer is small. Nevertheless, even in these cases, rubber gloves shall be worn by all who are involved in the procedures in order to avoid the possibility of contamination by radioactive fluids from the body. The exposure rate at about 25 cm from the center of the radioactive material should be measured. If this is less than 0.25 R/h, no further precautions are necessary as far as the gamma radiations are concerned. Item #19, Form C and D will be completed.

B. Radioactive Iodine, I-131, Administered Orally or Intravenously; No Autopsy

If a 100 mCi dose of I-131 is administered in the treatment of thyroid disease, within an hour after a patient has received this dose, measurements with an ionization chamber type survey meter taken one hour after the administration may be expected to indicate a surface exposure rate over the abdomen on the order of 0.3 mR/h. During the first 24 hours after administration of I-131, the blood and urine may contain considerable radioactivity. These fluids should accordingly be removed into closed systems and later flushed directly into the sewer, followed by an adequate volume of water.

The day after administration, the general distribution of radiation is greatly modified, both by urinary excretion of a large part of the radionuclide and by concentration of the remaining part in functioning thyroid tissue. At this time only radiation from these regions of iodine storage need be considered. Any region of high activity which is not to be removed should be marked by the Radiation Protection Officer so that it can be avoided.

C. Any Radionuclide Injected Interstitially or in Seeds: No Autopsy

Various colloidal radioactive preparations may be injected interstitially into tumors. Radon seeds, radioactive gold wires, radium wires, and other preparations may be implanted in limited regions. If the nuclide emits only beta rays, it is unlikely that there will be any appreciable external irradiation. If it is a gamma emitter, the active tissues may be extirpated or the region can be identified and avoided.

D. Body to be Opened for Surgery or Autopsy

The usual precautions for preventing the spread of an infectious material should aid in keeping the radioactive material localized. At autopsy the general principle is to remove the main source of radiation hazard as early as possible, without causing general contamination. At surgery this cannot usually be done, hence regions of high activity should be avoided or shielded. Item #19, Form D and E will be completed.

As long as the body remains unopened, the radiation received by anyone near it is due almost entirely to gamma rays. The change in emphasis when the operation or autopsy is to be performed is due to the possible exposure of the hands and face to relatively intense beta radiation. Beta radiation is readily absorbed by material interposed between its source and the operator. Even rubber gloves are useful in this regard. The gamma rays are not absorbed appreciably by rubber gloves.

E. Any radionuclide in a Body Cavity Which is to be Opened

The Radiation Protection Officer will evaluate the radiation hazard and suggest suitable procedures regarding the safety of personnel during the entire operation.

1. Autopsy

As much body fluid as possible should be removed before the body is opened. The remaining radioactive material may be expected to be widely distributed over the surfaces of the cavity and of the organs within it. The use of bare hands will not be permitted because of the contamination of skin and nails that would result and the difficulty of complete removal of such contamination.

Monitoring the body after removal of the viscera may indicate a radiation level low enough so that subsequent procedures can be carried out without special precautions. Regions of high activity, if present, can be indicated and avoided or approached with precautions. If the removed organs are to be dissected immediately, each one should be monitored and treated in accordance with the findings. After desired small samples

have been taken, the radioactive tissues that are to be retained should immediately be placed in appropriately shielded vessels for storage, or for disposal according to procedures approved by the Radiation Protection Officer. Where adequate cold storage facilities are available, the organs may be stored for several days without significant alteration, or the viscera may be fixed. This would allow for the natural decay of the radioactivity reducing possible exposure.

2. Emergency Surgery

If surgery must be carried out within a highly radioactive cavity, speed is desirable. Accordingly, an experienced surgeon should perform the operation. The surgeon and his assistants should wear gloves and glasses or goggles for the protection of the eyes from possible splashing of foreign material, as well as from beta radiation.

F. Radioactive Iodine-131 Orally or Intravenously Administered

1. Autopsy

Urine should be drained away and blood disposed of, if possible, in the same manner as if no autopsy were to be performed.

2. Surgery

Precautions are essentially the same as for autopsy. During the first day after administration, the blood may be expected to contain considerable radioactivity, and care should be taken not to let it accumulate on gloves or gowns. After the first day, the circulating radioiodine has greatly decreased and regions of high activity can be identified and usually avoided.

G. Interstitial Implants and Colloidal Interstitial Infiltration

At surgery or autopsy these regions can be readily identified and avoided as far as possible. At autopsy, if the entire block of tissue containing the radionuclide can be removed readily, this should be done first. If only a sample of the treated region is to be taken, this part of the body should be avoided until the rest of the autopsy has been carried out.

H. Accident or Injury During Surgery or Autopsy

If an injury occurs during surgery or autopsy, where the rubber gloves are cut or torn, radioactivity may be introduced into the wound. In addition to ordinary treatment of the wound, the Radiation Protection Officer shall be consulted with regard to any possible radiation hazard.

- IV. Patients Treated with Group IV activities and isotopes will be handled in accordance with the procedures below.
- A. Patients treated with between 12 mCi and 30 mCi of I-131 will be placed in a private room that has a toilet.
 - B. The patient's room must be properly posted (See attached form).
 - C. Surveys of the area around the patient room will be taken as soon after administration as possible. Measure the exposure rate at patient's bedside, 3 feet from the patient and at the entrance to the patient's room. Also check the surrounding rooms. Length of time a person may remain at these positions will be determined by the Radiation Safety Officer or his designee.
 - D. The Nursing Instruction Form will be completed immediately after administration of the treatment dose. A copy will be posted on the chart.
 - E. All wastes, i.e. disposable plates, cup, dressings, tissues will be placed in special containers. This material will be picked up daily by the Radiation Safety Officer or his designee. The material will be disposed of as normal trash.
 - F. Before a therapy patient's room is reassigned to another patient, the room will be surveyed for contamination and decontaminated if necessary, and all radioactive waste and waste containers will be removed.
 - G. Nurses should spend only that amount of time deemed necessary for ordinary patient care. Please note any special restrictions on the precaution sheet on the patient's chart. Nurses should read these restrictions before administering to the patients. Nursing personnel who attend the patient will wear personal monitoring devices as advised by the Radiation Safety Officer. If any questions call the Nuclear Medicine Department or the Radiation Safety Officer.
 - H. Patients must remain in bed while visitors are in the room and visitors should remain at least 3 feet from the patient. Patients containing radioactive material are to be confined to their rooms except for special medical or nursing proposed approved by the Nuclear Medicine Department.
 - I. Attending personnel should wear rubber or disposable plastic gloves when handling urinals, bedpans, emesis basins or other containers having any material obtained from the body of the patient. Wash gloves before removing and then wash hands after removing gloves. Leave gloves in the patient's room in the designated waste container. These gloves need not be sterile or surgical in type.

- J. Disposable items should be used in the care of these patients whenever possible. These items should be placed in designated waste containers. All clothes and bed linen used by the patient should be placed in the laundry bag and should be left in the patient's room. All nondisposable items should be placed in a plastic bag and should be left in the patient's room.
- K. Surgical dressing should be changed only as directed by the physician. Discard only into plastic bags and turn over to the Radiation Safety Officer or his designee. Handle these dressings with tongs or tweezers. Wear disposable gloves.
- L. If a nurse, attendant or anyone else knows or suspects that his or her skin or clothing, including shoes is contaminated, notify the Radiation Safety Officer or his designee immediately. This person should remain in an adjacent area to the room and should not walk about the hospital. If the hands become contaminated, wash them immediately with soap and water several times.

V. Summary

In general, the most procedures performed in Nuclear Medicine involve the use of Technetium 99m. Due to this radionuclide's short half-life, six hours, a period of 24 hours should reduce even the highest dose encountered in Nuclear Medicine to a safe level. Most other procedures generally encountered in Nuclear Medicine involving nuclides other than Technetium 99m require doses of 5 mCi or less. As indicated in the opening paragraph, activities at this level require little or no special procedures. Those situations involving special precautions and procedures are generally limited to quantities of radioactivity introduced into the patient during therapy treatment. The Radiation Protection Officer should be consulted to establish proper precautions and procedures for each individual case.

Item #19: Form D

Radiation Hazard Evaluation Form
(to be filled out by Radiation Safety Officer for his use)

Name _____ Date _____

Radioisotope _____ Time of Death _____

Amount administered _____

Route of administration _____

Amount present _____

Distribution within body _____

Item #19: Form D

Radiation Hazard Evaluation Form
(to be filled out by Radiation Safety Officer for his use)

Name _____ Date _____

Time of Death _____

Radioisotope _____

Amount administered _____

Route of administration _____

Amount present _____

Distribution within body _____

Indicate Distances _____

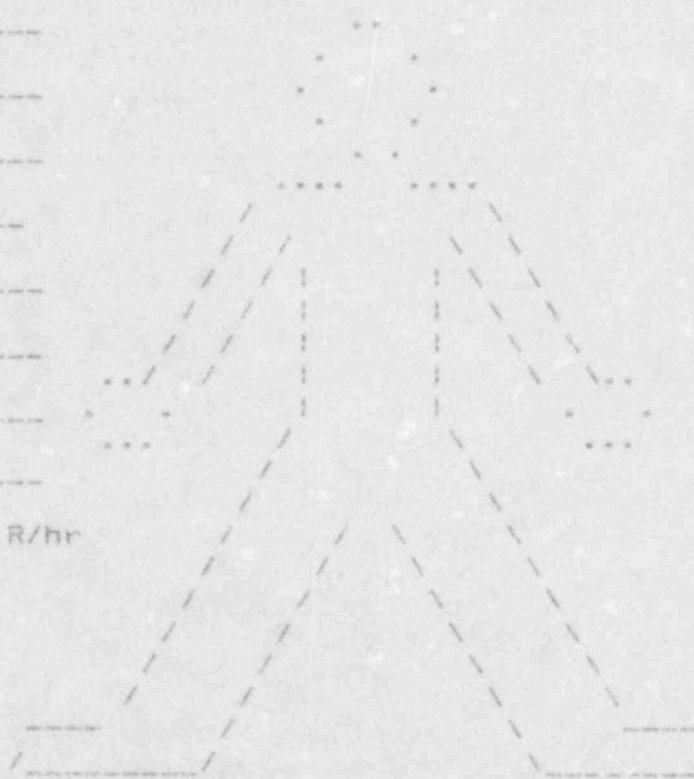
Suggest ring badges if exposure 0.25 R/hr

@ 25 cm. See NCRP #37 p. 27.

Limit hand exposure to 1.5 Rems.

Date of Survey _____

Instrument Used _____



Signed _____
Radiation Safety Officer

Date _____

Specific Instructions for Autopsy

(To be filled out by Radiation Safety Officer)

The following procedures should be followed if so indicated:

- () Wear safety glasses.
- () Wear plastic (non-absorbant) gown.
- () Cover floor with bench liner.
- () Wear double thickness autopsy gloves.
- () Wear whole body film badge.
- () Wear ring badge.
- () Remove the _____ area or tissue first before proceeding further. Identify it as radioactive.
- () Leave the _____ area or tissue untouched until last.
- () Cover the _____ area or tissue with shielding as provided.
- () Use only long instruments - 8" or greater.
- () Fluids, blood, urine should be removed via closed system. Flush with copious amounts of water.
- () Small specimens need -- need not -- be handled with special precautions.
- () Waste container needs to be provided for contaminated sponges, gowns, and instruments.
- () Organs are to be kept in storage for _____ days before fixation.

Autopsy performed by _____

Patient name _____

Whole body or ring badge number _____

Exposure _____

Signed _____

Radiation Safety Officer

Date _____

THIS REPORT MUST BE SAVED:

INSTRUCTIONS FOR FAMILY OR RELEASED PATIENT

Name of Patient _____
Name of Hospital _____ Address _____ Tel.No. _____
For further information contact _____ Tel.No. _____

Please show this form to every physician consulted concerning the patient
until _____ (date)

_____ was treated on _____, 19____.
(Name of patient)
with _____ millicuries of _____ in the form of _____

NO SPECIAL RADIATION SAFETY PRECAUTIONS ARE NECESSARY AFTER _____
(date)

UNTIL THAT DATE:

Persons under 45 years of age should not remain closer than the following
distances from the patient, for the time period indicated:

a) _____ to _____
(date) (date)
Permissible distance _____ feet or more, for _____ hours/week.
(At other times remain farther than 6 feet.)

Note: During the above times brief periods of closer contact (for
example, while shaking hands, or kissing the patient) are
permissible.

SPECIAL PRECAUTIONS:

a) Spouse or the person caring for patient: _____

b) Children or pregnant women: _____

c) Sleeping arrangements: _____

IF THE PATIENT IS TO BE HOSPITALIZED OR IF DEATH SHOULD OCCUR, NOTIFY THE
FOLLOWING INDIVIDUAL(S) IMMEDIATELY:

A COPY OF THIS FORM SHOULD BE KEPT IN THE PATIENT'S RECORD.

Item #20: Therapeutic Use of Sealed Sources

A. Sources used for Group VI procedures are stored in a lead safe (manufacturer & model #) located in the room shown on the attached drawing. Radiation levels in the surrounding areas are such that an individual will receive less than 2 mRem in an hour or 100 mRem in seven consecutive days.

B. Sealed sources are handled behind an L-block shield. Tongs and forceps are used when handling the sources.

C. Ring badges are worn by all personnel handling sealed sources. These badges are changed on a monthly basis.

D. Sources are transported to and from the patient areas via a Tracerlab Isotope Carrier which is a 3" thick lead container mounted on wheels. The carrier is equipped with a 3' handle.

E. A sign in/sign out log is maintained in the storage area. The number of sources removed from the storage safe is logged at the beginning of a treatment. When the sources are returned, an entry is made in the log showing the number of sources returned. The number returned must be the same as that removed.

A quarterly inventory will be performed/recorded of all the sealed sources.

F. Radiation safety procedures for therapeutic use of sealed sources.

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

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

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

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

5. Radiation levels in unrestricted areas will be maintained less than the limits specified in paragraphs 20.105(b)(1) and (b)(2) of 10 CFR Part 20, i.e., 2 mRems in any one hour or 100 mRems in any 7 consecutive days.

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

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

8. Instructions to nurses

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

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

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

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

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

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

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

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

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

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

G. Radiation safety precautions for therapeutic use of I-125 seeds

General

1. Personnel who prepare, insert or retrieve I-125 seeds shall wear a finger or wrist type monitoring device to monitor radiation exposure to the extremities.

2. To maintain accountability of the seeds, a source inventory should be performed at the following times: a) when the seeds are removed from storage; b) before and after the seeds are loaded in the applicator; c) before and after surgery.

3. In transporting seeds from storage/preparation areas to the place of use, adequate shielding must be employed to insure compliance with 10 CFR 20.105(b).

Instructions to Nurses (for hospitalized patients)

1. Nurses will be given a description of the size and appearance of the seeds.

2. Handle dislodged seeds with a spoon or forceps, never by hand. Place the dislodged seeds in a shielded container provided by the Radiation Safety Officer.

3. Surgical dressings and bandages used to cover the area of the insertion may be changed only by the attending physician. Dressings should be kept in a basin until checked by the Radiation Safety Officer or his designee.

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

5. No special precautions are needed for sputum, vomitus, stool, dishes, instruments, or utensils unless specifically ordered.

6. Urine should be collected and surveyed by the Radiation Safety Officer or his designee to insure no seeds have been excreted.

7. The Foley catheter should be surveyed by the Radiation Safety Officer or his designee after removal from the patient to insure no seeds have become lodged in it.

8. Emergency Procedures

- a) If a seed becomes loose or dislodged from the patient, or
- b) If the patient dies, or
- c) If the patient requires emergency surgery, immediately call **Dr. EDWARD STEVENS (ASO)**
Telephone No. **816-271-7558** (Days)
Telephone No. **816-271-4953** (Nights)

9. When the patient is discharged, call the Radiation Safety Officer and request a radiation survey of the room.

Item #8: USERS' TRAINING AND EXPERIENCE

Name	Previous License Number	Authorized Uses
Edward M. Stevens, M.D.	24-13246-01	I, II, III, IV, Invitro Xe-133
Joseph L. Fisher, M.D.	24-13246-01	I, II, III, IV, Invitro Xe-133
Phillip Acuff, M.D.	24-13246-01	I, II, III, IV, Invitro Xe-133
Donald E. Heins, M.D.	24-13246-01	I, II, III, Invitro
Stephen C. Tines, M.D.		I, II, III, Invitro Xe-133, I-131 Iodine for Therapy
Eshwar K. Reddey, M.D.	24-16178-01	I-125 implants, Rad 192, Cs-137, P-32

Dated 4/25/85

Item #7: MEDICAL ISOTOPES COMMITTEE

Committee Members:

Member	Specialty
Edward Stevens, M.D.	Radiology (RSO)
Mike McGeenan, R.T.	Radiology
Mr. Cris Crandell, R.T.	Nuclear Medicine
Mr. Emory Larimore, M.S.	Radiation Physicist
Donald Hines, M.D.	Radiologist
	Administration*
	Nursing*
Ms. Jacki Schackelford	Lab*

*The committee representatives from these departments change periodically and as such we have indicated only the departments. The committee will have representatives appointed from these departments at all times.

The responsibilities, duties and meeting frequency will be as described in Appendix B, of "A Guide for Preparation of Applications for Medical Programs," Regulatory Guide 10.8 Rev. _____, Dated _____ See next page.

Date: 4/25/85

APPENDIX B

MEDICAL ISOTOPES COMMITTEE

Responsibility

The committee is responsible for:

1. Ensuring that all individuals who work with or in the vicinity of radioactive material have sufficient training and experience to enable them to perform their duties safely and in accordance with NRC regulations and the conditions of the license.
2. Ensuring that all use of radioactive material is conducted in a safe manner and in accordance with NRC regulations and the conditions of the license.

Duties

The committee shall:

1. Be familiar with all pertinent NRC regulations, the terms of the license, and information submitted in support of the request for the license and its amendments.
2. Review the training and experience of all individuals who use radioactive material (including physicians, technologists, physicists, and pharmacists) and determine that their qualifications are sufficient to enable them to perform their duties safely and in accordance with NRC regulations and the conditions of the license.
3. Establish a program to ensure that all individuals whose duties may require them to work in the vicinity of radioactive material (e.g., nursing, security, and housekeeping personnel) are properly instructed as required by sect. 19.12 of 10 CFR Part 19.
4. Review and approve all requests for use of radioactive material within the institution.
5. Prescribe special conditions that will be required during a proposed use of radioactive material such as requirements for bioassays, physical examinations of users, and special monitoring procedures.
6. Review the entire radiation safety program at least annually to determine that all activities are being conducted safely and in accordance with NRC regulations and the conditions of the license. The review shall include an examination of all records, reports from the radiation safety officer, results of NRC inspection, written safety procedures, and the adequacy of the institution's management control system.

7. Recommend remedial action to correct any deficiencies identified in the radiation safety program.
8. Maintain written records of all committee meetings, actions, recommendations, and decisions.
9. Ensure that the byproduct material license is amended, when necessary, prior to any changes in facilities, equipment, policies, procedures, and personnel, as specified in the license.

Meeting Frequency

The Medical Isotopes Committee shall meet as often as necessary to conduct its business but not less than once in each calendar quarter.