

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

<b>1.a. NAME AND MAILING ADDRESS OF APPLICANT</b> (institution, firm, clinic, physician, etc.) INCLUDE ZIP CODE  St. Francis Hospital of New Castle 1000 S. Mercer St. New Castle, Pennsylvania 16101  TELEPHONE NO.: AREA CODE (412) 658 3511	<b>1.b. STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED</b> (if different from 1.a.) INCLUDE ZIP CODE  Same.
<b>2. PERSON TO CONTACT REGARDING THIS APPLICATION</b> Vincent A. Gargaro, Consultant Nuclear Medicine Associates, Inc.  TELEPHONE NO.: AREA CODE (210) 663 7000	<b>3. THIS IS AN APPLICATION FOR:</b> (Check appropriate item) a. <input type="checkbox"/> NEW LICENSE b. <input checked="" type="checkbox"/> AMENDMENT TO LICENSE NO. 37-07739-01 c. <input type="checkbox"/> RENEWAL OF LICENSE NO.
<b>4. INDIVIDUAL USERS</b> (Name individuals who will use or directly supervise use of radioactive material. Complete Supplements A and B for each individual.)  Refer to license #37-07739-01 amendment #32	<b>5. RADIATION SAFETY OFFICER (RSO)</b> (Name of person designated as radiation safety officer. If other than individual user, complete resume of training and experience as in Supplement A.)  Eugene T. Danko, M.D., with consultation from Nuclear Medicine Associates, Inc., Cleveland, Ohio 44125

**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	3.0	IODINE-131 AS IODIDE FOR TREATMENT OF HYPERTHYROIDISM		
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		
10 CFR 35.100, SCHEDULE A, GROUP II	X	AS NEEDED	PHOSPHORUS-32 AS COLLOIDAL CHROMIC PHOSPHATE FOR INTRACAVITARY TREATMENT OF MALIGNANT EFFUSIONS.		
10 CFR 35.100, SCHEDULE A, GROUP III	X	3,000	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		
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	400
10 CFR 35.100, SCHEDULE A, GROUP VI	X	400			

**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
The purpose of the application is to reflect the changes in the following: 1. RSO and Radiation Safety committee membership. 2. Instrument calibration. 3. Procedures for therapeutic use of radiopharmaceuticals. 4. Procedure for therapeutic use of sealed sources. 5. Add Xenon-133 and increase possession limit for Group III to 3000mCi and all other conditions will be adhered to.			

# **INFORMATION REQUIRED FOR ITEMS 7 THROUGH 23**

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

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

# 24. PERSONNEL MONITORING DEVICES

TYPE (Check appropriate box)		SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	FILM		
	TLD		
	OTHER (Specify)		
b. FINGER	FILM		
	TLD		
	OTHER (Specify)		
c. WRIST	FILM		
	TLD		
	OTHER (Specify)		
d. OTHER (Specify)			

Application No. **905918**  
 Amount, Fee **A 1104**  
 Type of Fee **Renewal**  
 Date Check Rec'd **6/3/82**  
 Received By **Brown**

Application No. **905621**  
 Amount, Fee **A 40.78**  
 Type of Fee **Renewal**  
 Date Check Rec'd **3/3/82**  
 Received By **Brown**

Date **2/12/82**  
 Log **Feb 6 Reg I**  
 By **Brown**  
 On **3/5/82**  
 Action

## 25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL		b. ATTACH A COPY OF THE AGREEMENT LETTER SIGNED BY THE HOSPITAL ADMINISTRATOR.
NAME OF HOSPITAL		
MAILING ADDRESS		
CITY	STATE	ZIP CODE
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>RECEIVED</b> 91 11 16 03/13/82		b. APPLICANT OR CERTIFYING OFFICIAL (Signature) X <i>Joseph S. Novello</i> (1) NAME (Type of Print) X Mr. Joseph S. Novello (2) TITLE X President
(1) LICENSE FEE CATEGORY:  7b		c. DATE X February 1, 1982
(2) LICENSE FEE ENCLOSED: \$ 40.00		

## PRIVACY ACT STATEMENT

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

1. **AUTHORITY** Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).
2. **PRINCIPAL PURPOSE(S)** The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30-36 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.
3. **ROUTINE USES** The information may be used: (a) to provide records to State health departments for their information and use; and (b) to provide information to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for a NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you. A copy of the license issued will routinely be placed in the NRC's Public Document Room, 1717 H Street, N.W., Washington, D.C.
4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION** Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed.
5. **SYSTEM MANAGER(S) AND ADDRESS** Director, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.



## 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:

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 any individual who uses radioactive material (including physicians, technologists, physicists, and pharmacists) and determine that the qualifications are sufficient to ensure 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 Section 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 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.

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.

## RADIATION SAFETY/MEDICAL ISOTOPES COMMITTEE

The membership of this committee will consist of at least three members and will include:

1. The radiation safety officer.
2. The hospital administrator or other administrative official directly responsible to the hospital administrator in the hospital's internal chain of command.
3. A physician specialist from each department where radioactive materials are used; and
4. A representative of the hospital's nursing staff.

The names and qualifications of the committee members will be documented in the committee's records, will be updated as necessary, and will be available for inspection by the NRC.

## CALIBRATION OF INSTRUMENTS

- A. The survey meter will be checked for operability prior to each use. This will be accomplished by holding the detector against an instrument check source or the dose calibrator sealed constancy source depending on the instrument or range to be tested. The highest reading obtainable will be included on all recorded surveys.

The units will be calibrated after servicing and at least annually by the manufacturer or by Nuclear Medicine Associates, Cleveland, Ohio, in accordance with the procedure outlined in application for NRC license #34-16272-01. Records of these calibrations will be maintained and recommendations for repair will be followed. In the event of multiple survey meters, no survey meter will be used beyond the anniversary of its last successful calibration.

Arrangements will be made for the availability of at least one survey meter while a unit is away for calibration or repair.

- B. The dose calibrator will be calibrated as follows:

1. Sealed sources will be used to establish accuracy. They will consist of:

<u>Nuclide</u>	<u>Mfr.</u>	<u>Model</u>	<u>Approx. Activity at Calib.</u>
Cs-137	NEN	NES356	0.2 mCi
Ba-133	NEN	NES358	0.2 mCi
Co-57	NEN	NES206	5.0 mCi

2. The accuracy of the assay of the above standards will be at least  $\pm 5\%$  and traceable to National Bureau of Standard sources.

3. The calibration procedure will be as follows:

a. The dose calibrator will be checked for accuracy at annual intervals and following repair using sealed sources having energies which encompass that portion of the spectrum of energies for which the dose calibrator is used. Nuclides that will be used are listed in item 1 above.

The activity displayed by the dose calibrator must agree with the stated assay within  $\pm 5\%$  of the limits of the standard's calibration accuracy. If the unit displays readings with an error greater than  $\pm 5\%$ , arrangements will be made for immediate repair or adjustment.



b. The dose calibrator will be checked for constancy each day of use. This will be accomplished using a Cs-137 standard. The sealed source will be placed in the chamber and the unit set to measure that nuclide. The activity displayed with background and decay considered, must fall within  $\pm 5\%$  of the predicted activity based on the value obtained at the time of the original accuracy test.

The daily constancy check will be extended to include verification of displayed activities using the same standard but with the dose calibrator set to measure each of the different nuclides to be assayed on that day. With background and decay considered, variation in displayed activities must fall within  $\pm 5\%$  of the activity shown at the time of the most recent accuracy check. If variations greater than  $\pm 5\%$  are noted, arrangements will be made for immediate repair or adjustment.

c. The dose calibrator will be checked for activity linearity at quarterly intervals and following repair. This test will be performed using the maximum dose received from a Radiopharmacy or the first elution from a new Mo/Tc generator. In the latter case, after assay of the entire contents of the generator elution vial, the concentration will be determined and a aliquot containing 200 mCi or up to 20% of the vial contents of the generator elution vial will be drawn. If 20% of the vial contents does not contain 200 mCi, then the activity it does contain will be the maximum drawn and assayed for preparation of kits for the following quarter. In this way, the accuracy of the unit will be assured in the measurement of activity from the maximum on hand to a quantity approximately the maximum amount drawn and assayed for kit preparation.

To reduce personnel exposure from a whole vial measurement of activity, an alternate method of obtaining a source for the activity linearity check may be used. An aliquot such as 0.5 to 1.0 ml will be withdrawn from the elution vial and assayed in a syringe. The concentration of the eluent can be determined by dividing the displayed activity by the volume in the syringe. A 200 mCi aliquot contained in the proper volume can then be withdrawn from the elution vial and used for the linearity test. If greater than 20% of the vial contents would be used up for linearity check purposes, the amount drawn may be restricted to 20% for this test with the same limitation given in the paragraph above. In this way, the accuracy of the dose calibrator will also be assured in the measurement of activities approximating the maximum quantities used for kit preparations.

The linearity test will be continued by repeating the assay of the test aliquot several times a day over a two to three day period until a measurement is made in which the activity displayed is approximately the minimum dose likely to be used in a patient study and also less than the activity displayed during the annual accuracy check utilizing the standard with the energy similar to that of Tc-99m. In this way, the accuracy of the dose calibrator will be assured in the measurement of individual doses throughout the entire ranges of doses drawn for kit preparation and patient studies.

The above linearity test data will be plotted as a function of activity vs. time and compared to predicted activities vs. the same time. The acceptable range of error will be  $\pm 5\%$ . If test result error exceeds  $\pm 5\%$ , arrangements will be made for immediate repair or adjustment. The unit may be used in the interim using predetermined correction factors.

As an alternative procedure, the linearity test can be performed with the use of the Calicheck kit from Calcorp, Inc. The manufacturer's instructions for use will be followed. The source used shall be the first elution of a new generator or of the activity of the largest dose obtained from a radiopharmacy if a radiopharmacy is used. Limits of acceptability and corrective actions will be as described above.

d. The dose calibrator will be tested for geometrical variation at the time of installation and following chamber of liner repair or replacement. This test will be performed using approximately 2mCi of Tc-99m in a geometrical configuration approximating that of a point source. The source geometry will then be changed by dilution with assays performed at each step. A comparison will also be made to quantify the reduction in displayed activity caused by assaying sources in plastic versus glass containers.

The data will be analyzed relating the various readings to the reading acquired while the test source was in the geometry of the Co-57 accuracy standard. Correction factors will be used in clinical assays when geometry induced errors exceed  $\pm 2\%$ .

In the event the dose calibrator should fail or if it is away for repairs, the nuclear medicine program will be continued through the implementation of the following procedure:

1. A substitute dose calibrator will be acquired.
2. Eluents and/or doses will be assayed in a dose calibrator located at the nearest cooperating institutions having a functional and properly calibrated unit. If activities must be transported for this purpose, they will be shielded with sufficient lead to reduce levels to 2.0mR/hr or less on contact with the shield, wrapped in sufficient absorbant toweling to absorb ten times the liquid volume contained in the vial or syringe, marked with labels indicating the

presence of radioactivity, and carried by one occupational person assigned to this task throughout the entire trip. This same person will perform the assay, record the data, and return the activity to the location of authorized use.

Method #2 will be depended upon only in cases of medical emergency and until a functional dose calibrator can again be acquired. If only the activity of the eluent is known, mathematical calculations will be used to determine activity needed for patient doses.

The above assay techniques will enable the measurement of Technetium 99m and its Molybdenum<sup>99</sup> contaminant to within  $\pm 10\%$  of the true assay. Every effort will be made to expedite repair and return of the dose calibrator.

Diagnostic instrumentation will be calibrated as follows:

1. The camera pulse height analyzer will be calibrated using Tc-99m and uniform flood check which will be performed each day of use.

## FACILITIES & EQUIPMENT DESCRIPTION

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

Mo-99/Tc-99m generator when used will be stored and eluted in the designated area. It will be shielded with lead bricks such that levels from all avenues of approach do not exceed 2.0mR/hr. Spent generators will be stored in the location identified in the previous 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 2.0mR/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 2mR/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 2.0mR/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

ITEM

PURPOSE

1. Warning tape, chalk, & signs.	posting of area
2. Plastic bags, small	shoe covers, wet containers
3. Disposable gloves	hand protection
4. Masking tape	fasten shoe covers, etc.
5. Forceps, tongs	safe handling
6. Large plastic bags	for contaminated material
7. Sponges, 4 x 4	sopping up
8. Paper towels	blotting & drying
9. Radiac wash or detergent	detergent
10. Scouring powder	friction
11. Tags	identification
12. Scissors	cut absorbent paper, etc.
13. Whatman #1 filter paper	taking swipes following decontamination.
14. Chux	cover area following decontamination
15. G-M survey meter	monitoring

## PERSONNEL TRAINING PROGRAM

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

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

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

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

If evaluation of the radiation handling techniques of a new technologist is found to be inadequate, arrangements will be made to send the employee for a 40 hour formal course from our consulting physicists, Nuclear Medicine Associates, Inc., Cleveland, Ohio. This course combines didactic and clinical training which will include points "b" through "i" listed above as well as quality control and patient procedures.

3. Our consulting physicists, mentioned in this addendum, will visit our facility quarterly to review all procedures, equipment and records. Personnel will receive refresher training relative to duties, regulations, or terms of the license during these visits or by the physician(s) named on this license application, or by supplementary training at least annually or more frequently, as needed.

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

## PROCEDURES FOR ORDERING AND RECEIVING RADIOACTIVE MATERIAL

1. The chief nuclear medicine technologist his/her designee will place all orders for radioactive material and will ensure that the requested materials and quantities are authorized by the license, and that possession limits are not exceeded. The receipt area identified in the Item #11 diagram is designed such that radiation levels in unrestricted areas do not exceed the limits specified in 10 CFR 20.105.

2. During normal working hours, carriers will be instructed to deliver radioactive packages directly to the Nuclear Medicine department. If this is not practical, responsible personnel (indicated in the memorandum below) will sign for packages containing radioactive materials and immediately take them to this location. Alternatively, trained nuclear medicine personnel will sign for and transport packages to the appropriate department.

3. During off-duty hours, supervisory personnel will arrange to have delivery of radioactive packages in accordance with the procedures outlined in the following directive:

TO: Managerial Personnel of:

Radiology  
Nuclear Medicine  
Security  
Receiving  
Nursing

FROM: Administration

SUBJECT: Delivery of packages containing radioactive materials  
to the Nuclear Medicine department.

If couriers or common carriers attempt delivery of packages containing radioactive materials, the supervisor on duty will be contacted. He/she will make arrangements to have the package delivered to the designated receipt area by specially trained personnel who have been assigned this duty. The packages will be secured against unauthorized removal. If packages are wet or appear to be damaged, the RSO is to be immediately contacted.\* The carrier should be requested to remain until it can be determined that neither he nor the delivery vehicle is contaminated.

Personnel not trained in the proper handling of radioactive materials are not to personally accept packages containing radioactive materials.

\*Radiation Safety Officer: Eugene T. Danko, M.D.

PROCEDURES FOR OPENING PACKAGES CONTAINING  
RADIOACTIVE MATERIALS \*

1. Visually inspect package for any sign of damage (e.g., wetness, crushed). If damage is noted, stop procedure and notify Radiation Safety Officer. If not, continue with procedure.
2. Measure exposure rate at three feet from package surface and record. If greater than 10 mR/hr, stop procedure and notify the Radiation Safety Officer.
3. Measure surface exposure rate and record. If greater than 200 mR/hr, stop procedure and notify the Radiation Safety Officer.
4. Put on gloves.
5. Open the outer package (following manufacturer's direction, if supplied) and remove packing slip. Open inner package to verify contents (compare requisition, packing slips, and label on bottle), check integrity of final source container (inspect for breakage of seals or vials, loss of liquid, discoloration of packing material). Check also that shipment does not exceed possession limits.
6. Wipe external surface of final shield of all sources with cotton swab or filter paper held with forceps, assay with G-M survey meter and record. Any containers producing wipes registering greater than background levels will be treated as contaminated taking necessary precautions to prevent the spread of contamination.
7. Monitor the packing material and packages for contamination before discarding and record results.
  - a. If contaminated, treat as radioactive waste.
  - b. If not, coliterate radiation labels before discarding in regular trash.

\*Not applicable to prepackaged invitro kits, except that radiation labels will be obliterated.

Item #14  
Prepared: 12-10-81  
Lic# 37-07739-01



## LABORATORY RULES FOR THE 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 uncontained radioactive materials.
3. Monitor hands and clothing for contamination after each procedure or before leaving the area.
4. Use syringe shields for preparation of patient doses and administration to patients except in circumstances, such as pediatric cases, where their use would compromise the patient's well-being.
5. Do not eat, drink, smoke or apply cosmetics in any area where radioactive material is stored or used.
6. Assay each patient dose in the dose calibrator prior to administration.
7. Wear personnel monitoring devices (film badge or TLD) at all times while in areas where radioactive materials are used or stored. These should be worn at chest or waist level.
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 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.

## RECORDS

In accordance with 10 CFR 20.501, authorization is being requested to dispose of the following records following any NRC inspection of these records:

1. Dose calibrator accuracy, constancy and linearity checks.
2. Survey meter calibration records.
3. Instrument calibration and quality control records
4. Records of training for occupational and non-occupational personnel.
5. Minutes of meetings of the Medical Isotope Committee and/or Radiation Safety Committee.

## EMERGENCY PROCEDURES

### Minor Spills

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

### Major Spills: Activity $> 1\text{mCi}$ and $T_{1/2} > 20$ hrs or Activity $> 30\text{mCi}$ and $T_{1/2} < 20$ hr:

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: Eugene T. Danko, M.D.

OFFICE PHONE: (412)658-3511

HOME PHONE: Through hospital operator.

Item #16  
Prepared 12-10-81  
Lic# 37-07739-01

## SURVEY PROCEDURES

- A. All elution, preparation and injection areas will be surveyed daily with a G-M survey meter and decontaminated, if necessary.
- B. Laboratory areas where only small quantities of radioactive material are used (less than 200 uCi) will be monitored monthly, via wipe test.
- C. All other laboratory areas will be surveyed weekly.
- D. The weekly and monthly survey will consist of:
  - 1. A measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.1mR/hr.
  - 2. A series of wipe tests to measure contamination levels. The method for performing wipe tests will be sufficiently sensitive to detect 200 dpm.
- E. A permanent record will be kept of the weekly or monthly survey results, including negative results. The record will include:
  - 1. Location, date, and type of equipment used.
  - 2. Name of person conducting the survey.
  - 3. Drawing of area surveyed, identifying relevant features such as active storage areas, active waste areas, etc.
  - 4. Measured exposure rates, keyed to location on drawing (point out rates that require corrective action).
  - 5. Detected contamination levels, keyed to locations on drawing.
  - 6. 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.
- F. Area will be cleaned if the contamination level exceeds 200 dpm/100cm<sup>2</sup>, except in the case of some Tc-99m spill where less radiation exposure would be received by personnel if the area is secured and contamination is allowed to decay.

Item #17  
Prepared: 12-10-81  
Lic# 37-07739-01



## WASTE DISPOSAL PROCEDURES

### 1. Liquid Waste will be disposed of

Check as appropriate

- ☐ By commercial waste disposal service (See also No. 4 below)
- ☒ In the sanitary sewer system in accordance with Section 20.303 of 10 CFR Part 20.
- ☒ Held for decay until radiation levels as measured 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.
- ☐ Other (specify): \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### 2. Mo-99/Tc-99m generators will be:

Check as appropriate

- ☒ Returned to the manufacturer for disposal
- ☒ Held for decay until radiation levels as measured 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 disposed of as normal trash. (Note: this method of disposal may not be practical for generators containing long-lived radioactive contaminants).
- ☐ Disposed of by commercial waste disposal service (See also No. 4 below).
- ☐ Other (specify): \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

3. Other Solid Waste will be:

Check as appropriate

X Held for decay until radiation levels as measured 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 No. 4 below)

\_\_\_ Other (Specify): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. The commercial waste disposal service used will be: \_\_\_\_\_

\_\_\_\_\_  
(Name) (City, State)

NRC/Agreement State License No. \_\_\_\_\_

THERAPEUTIC USE OF RADIOPHARMACEUTICALS

Special precautions for patients treated with byproduct material listed in Groups IV or V, Schedule A, Section 35.100 of 10 CFR Part 35 are as follows:

- 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 2.0mR/hr at a distance where occupational workers can conveniently stand. Only capsules will be used since no fume hood is available. Patients requiring therapeutic amounts of I-131 less than 30mCi will be dosed in the hot lab, held for 30 minutes for observation and sent home or to their room. Hospitalized patients receiving greater than 30mCi will be dosed in their rooms.
- b.(1) All patients who have been administered I-131 for therapy 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.
- b.(2). Patients will use disposable items whenever possible (e.g., dishes, utensils, etc.).
- c.(1). 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, three feet away and the entrance to the room. The Radiation Safety Officer or his designate will then determine how long a person may remain at these positions and will post these times in 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. (Refer to Item #19, Form A). Radiation levels in unrestricted areas will be maintained less than the limits specified in Section 20.105(b), 10 CFR Part 20. (i.e., 2mrems in any one hour or 100mrems in any seven consecutive days) Refer to Item #19, Form A.
- c.(2). All linens will be surveyed for contamination before being removed from the patient's room and will, if necessary, be held for decay. 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. Non-disposable items used for these patients will be held in plastic bags in the patient's room, and checked for contamination by the Radiation Safety Officer or his designate. Items may be returned for normal use, held for decay or decontaminated, as appropriate.
- d. The form, Nursing Instructions for Patients Treated with Phosphorus-32 or Iodine-131, (Item #19, Form B) will be completed immediately after administration of the treatment dose. A copy will be posted in the patient's chart. 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 in the patient's chart. Nurses should

read these instructions before administering to the patients. Call the Nuclear Medicine Department if you have any questions about the care of these patients. Visitors will be limited to those 18 years of age or over, unless other instructions are noted on the precautions sheet in the patient's chart. Patients must remain in bed while visitors are in the room and visitors should remain at least three feet from the patient. Radioactive patients are to be confined to their rooms except for special medical or nursing purposes approved by the Nuclear Medicine Department. 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. Attending personnel must 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. The gloves must be left in the patient's room in the designated waste container. These gloves need not be sterile or surgical in type.

e.(1). Therapy patients will be allowed to use the toilet facilities since human excreta is exempt from waste disposal considerations. The patient will be instructed, however, to flush the toilet, urinal or bed pan several times after use. If the nurse helps to collect the excreta, she should wear disposable gloves. Afterwards she should wash her hands 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 Nuclear Medicine Department. Vomiting within 24 hours after oral administration, urinary incontinence, or excessive sweating within the first 48 hours may result in contamination of linen and/or floor. If radioactive urine or feces is collected or spilled during collection, call the Nuclear Medicine Department, Ext. \_\_\_\_\_. Meanwhile, handle all contaminated material with disposable gloves and avoid spreading contamination. All vomitus must also be kept in the patient's room for disposal by the Nuclear Medicine Department. Urine or 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). Precautions must be taken to see that no urine or vomitus, is spilled on the floor or the bed. If any part of the patient's room is suspected to be contaminated, notify the Nuclear Medicine Department. If a nurse, attendant or anyone else knows or suspects that his skin, or clothing, including shoes, is contaminated, notify the Nuclear Medicine Department immediately. This person should remain in the patient's room and not walk about the hospital. If the hands become contaminated, wash immediately with soap and water. If a therapy patient should need emergency surgery or should die, notify the Nuclear Medicine Department immediately. When the patient is discharged call the Nuclear Medicine Department and request that the room be surveyed for contamination before remaking the room.

e.(2) Surgical dressings should be changed only as directed by the physician. 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.

e.(3) 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 Nuclear Medicine Department for proper disposal of the contents of the designated waste container. Disposable plates,



cups, and eating utensils will be used by patients who are treated with Iodine-131. All clothes and bed linens used by the patient should be placed in the laundry bag provided and left in the patient's room to be checked by a member of the Nuclear Medicine Department. All nondisposable items should be placed in a plastic bag and left in the patient's room to be checked by a member of the Nuclear Medicine Department.

f. See attached GUIDELINES FOR EMERGENCY SURGERY OR DEATH OF THE RADIO-ACTIVE PATIENT.

g.(1) 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.(2) Instructions for Patient & Family - Patient will not be discharged until radioactivity reaches approximately 30 mCi. This will be determined by measuring the dose rate at 2 hours post dose from a distance of no less than a 3 meter arc allowing the patient to act as much like a uniform geometric source during the course of treatment. Patient will be discharged when reading at identical location and circumstances reaches a percentage reflecting approximately 30 mCi.

(i) In the event that all persons in the household of the radioactive patient, and hence all those persons with whom the patient will have appreciable contact, are over age of 45 years:

-The patient should be instructed to remain at distances greater than 3 feet from other people, except for brief periods for necessary procedures.

-Babies and young people (of ages less than 45 years) should not visit the patient, but if they do, the visits should be brief, and a distance of at least 9 feet from the patient should be maintained.

(ii) In the event that a person under the age of 45 years lives in the household of the patient:

-Stricter precautions shall be observed than when all contacts are with persons over 45 years of age.

-Children and persons under 45 years of age shall not be allowed in the same room, nor at a distance of less than 9 feet, for more than a few minutes a day. Observance of these conditions will insure that persons under 45 years of age will not be exposed to more than 0.5 R/year from the radioactive individual.

-Other restrictions may be specified by the physician.

All restrictions will be removed when the activity is reduced to 1 mCi.



GUIDELINES FOR EMERGENCY SURGERY OR DEATH OF THE  
RADIOACTIVE PATIENT \*

Item #19  
3 of 10 pages  
Prepared: 12-10-81  
Lic# 37-07739-01

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 tag 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 5mCi. need no precautions for any type of handling. Those containing between 5 and 30mCi 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 30mCi. 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.

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 25cm. 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.

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

The dose of I-131 administered in the treatment of thyroid disease rarely exceeds 100mCi. Within an hour after a patient has received this dose, measurements with an ionization chamber type survey meter may be expected to indicate a surface exposure rate over the abdomen on the order of 0.3 R/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.

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.

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 be 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 an 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.

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.

a. 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 radioactive reducing possible exposure.

b. 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.

Radioactive Iodine 131 Orally or Intravenously Administered.

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

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.

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.

SUMMARY

In general, most procedures performed in nuclear medicine involve the use of Technetium 99m. Due to this radionuclides 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 dose of 5mCi 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.

# RADIATION SURVEY FORM

Item #19, Form A  
OR  
Item #20, Form D  
5 of 10 pages  
Prepared: 12-10-81  
Lic# 37-07739-01

## Room Diagram

## Film Badges Issued to:

	Time Limit
Nurse @ Bedside	min/hr
Visitor @ Chair	min/hr.
Pt. Bed #	hrs
Pt. Bed #	hrs
Pt. Bed #	hrs
Pt. Bed #	hrs

Name	Date	mRem

CERTIFIED BY \_\_\_\_\_ DATE/TIME \_\_\_\_\_

IMPORTANT: THIS RECORD MUST BE PERMANENTLY MAINTAINED

10272



## CALCULATIONS

Show line drawing of patients and neighboring rooms on other side of this form. Indicate location of patient and neighboring beds, patient orientation, visitors chair, hallways, doors, and outside walls. Room must be a private one, preferably with two outside walls and patients feet oriented to outside wall. Use G-M (low level) and ion (high level) chamber survey meter to determine radiation levels. Record obtained values on drawing at location of measured readings. Readings should be taken at (1) patients bedside, (2) visitors chair, and (3) mid-bed on all neighboring beds. Query for recently performed nuclear medicine procedures if elevated readings are obtained.

NURSES - limited to 2.0mRms/hr.  $(2.0 + \text{bedside reading}) \times 60 \text{ min.}$   
per hr = maximum minutes of bedside care each (but every)  
hour.

VISITORS - should be limited to 100mRms/total treatment time. If  
visitor's chair mr/hr  $\times$  total treatment time is greater  
than 100mRms, limit visiting time as  $(100 + (\text{total}$   
 $\text{treatment time} \times \text{visitor's chair reading}) \times 60 \text{ min.}$   
per hr. = maximum minutes/hour for each hour.

### NEIGHBORING

PATIENTS - should be limited to 100mRms. Readings taken at mid-  
bed  $\times$  total treatment time can usually be limited to  
less than 100mRms either through distance or shield-  
ing. Neighboring patients should be transferred if  
this is not possible when the total exposure approaches  
100mRms.



NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH PHOSPHUS-32,

IODINE-I-131

6 of 10 pages  
Prepared: 12-10-81  
Lic# 37-07739-01

Patient's Name: \_\_\_\_\_

Room No.: \_\_\_\_\_ Physician's Name: \_\_\_\_\_

Radioisotope Administered: \_\_\_\_\_

Date and Time of Administration: \_\_\_\_\_

Dose Received: \_\_\_\_\_ Method of Administration: \_\_\_\_\_

Exposure Rates in mR/hr

Date \_\_\_\_\_ 3 feet from bed \_\_\_\_\_ 10 feet from bed \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Comply with all Check Items)

- \_\_\_\_ 1. Visiting time permitted: \_\_\_\_\_
- \_\_\_\_ 2. Visitors must remain \_\_\_\_\_ from patient.
- \_\_\_\_ 3. Patient may not leave room.
- \_\_\_\_ 4. Visitors under 18 not permitted.
- \_\_\_\_ 5. Pregnant visitors not permitted.
- \_\_\_\_ 6. Film badges must be worn.
- \_\_\_\_ 7. Use and complete the following tags:
- \_\_\_\_ door
- \_\_\_\_ bed
- \_\_\_\_ chart
- \_\_\_\_ wrist
- \_\_\_\_ 8. Gloves must be worn while attending patient.
- \_\_\_\_ 9. Patient must use disposable utensils.
- \_\_\_\_ 10. All items must remain in room until OK'd by Radiation Safety.
- \_\_\_\_ 11. Smoking is not permitted.
- \_\_\_\_ 12. Do not release room to admitting until OK'd by Radiation Safety.
- \_\_\_\_ 13. Other instructions.

In case of Emergency Contact:

RSO

On/off duty telephone #

Specific Instructions to Reduce Radiation Exposure During Embalment

(to be filled out by Radiation Safety Officer and forwarded  
to funeral director)

The following procedures should be implemented during the embalming  
of \_\_\_\_\_.

- ( ) This body does not contain significant amounts of  
radioactive material. No special precautions are  
necessary if standard embalming procedures are  
employed.

This body contains radioactive material. The following  
procedures should be observed:

- ( ) A closed system should be used to drain fluids.  
Use suction if necessary. Fluid can be disposed  
of via sewer, flush with copious amounts of  
water.

- ( ) Blood and urine should be removed via closed  
systems. Dispose via sewer with copious amounts  
of water.

- ( ) Other \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signed \_\_\_\_\_  
Radiation Safety Officer

Date \_\_\_\_\_

Radiation Hazard Evaluation Form

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

Name \_\_\_\_\_ Date and \_\_\_\_\_

Time of Death \_\_\_\_\_

Radioisotope \_\_\_\_\_

Amount administered \_\_\_\_\_

Route of Administration \_\_\_\_\_

Amount present \_\_\_\_\_

Distribution within  
body \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Indicate Distances \_\_\_\_\_

Suggest ring badges if exposure

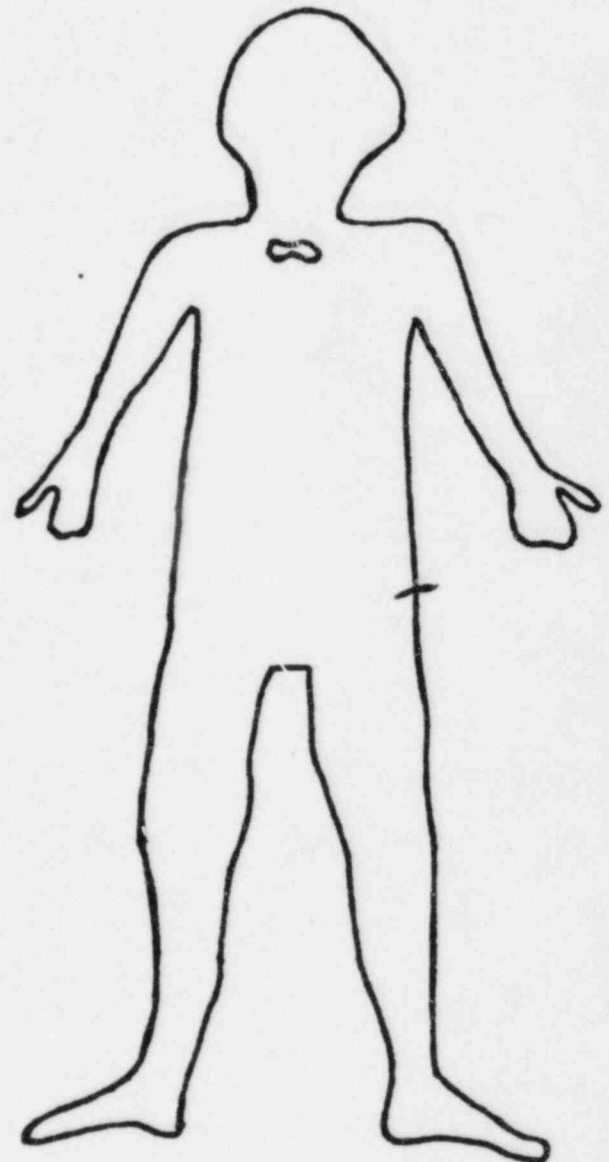
0.25 R/hr @ 25 cm

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 Ringer Badge No. \_\_\_\_\_ Exposure \_\_\_\_\_

Signed \_\_\_\_\_  
Radiation Safety Officer

Date: \_\_\_\_\_

THIS REPORT MUST BE SAVED !

## INSTRUCTIONS FOR FAMILY OF 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 other 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 WITH THE PATIENT'S RECORD.



THERAPEUTIC USE OF SEALED SOURCES

Special procedures\* for patients treated with byproduct material listed in Group VI, Schedule A, Section 35.100 of 10 CFR Part 35, are as follows:

- a. Areas where sealed sources will be stored can be found in the map submitted in application for license #37-07739-01.
- b. See "Safety Precautions in Clinical Applications". (Item #20, Form E)
- c. The form, Nursing instructions for Patients Treated with Radioactive Sources, (Item #20, Form A), will be completed immediately after sources are implanted and placed in the patient's chart. Nurses will be instructed via Item #20, Form F.
- d. Nurses caring for brachytherapy patients will be assigned personnel monitoring devices. TLD finger badges will also be assigned to nurses who must provide extended personal care to the patient and to personnel handling sealed sources.
- e. Sources will be transported from the storage site to place of use via the original shipping container or an equivalent lead container which is at least 1" thick.
- f. At the initiation of treatment, an inventory will be performed on all therapy sources to insure total accountability. At the conclusion of treatment, another inventory will be performed to insure that all sources have been returned. (Refer to Item #20, Form B). In addition, a survey will be performed to ensure that all sources have been removed from the patient and that no sources remain in the patient's room or any other area occupied by the patient. At the same time, all radiation signs will be removed and all personnel monitoring devices assigned to nurses will be collected. Item #20, Form C will be used as a check-off procedure.
- g. 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 the patient's bedside, three feet away and at the entrance to the room. The Radiation Safety Officer or his designate will then determine how long a person may remain at these positions and will post these times in the patient's chart. Refer to Item #20, Form D. Radiation levels in unrestricted areas will be maintained less than the limits specified in Section 20.105(b), 10 CFR Part 20. (i.e., 2 mrem in any one hour or 100 mrem in any seven consecutive days).

\*In using some sealed sources for therapy (e.g., I-125 seeds), the radiation levels are often less than these limits at the surface of the body following their implantation. In these cases, there is virtually no hazard to nursing personnel and health physics considerations can be discontinued.

RSO \_\_\_\_\_, \_\_\_\_\_/\_\_\_\_\_  
(Name) on duty/off duty telephone number

FORM B

RECEIPT/SHIPMENT RECORD  
RADIATION SOURCE THERAPY APPLICATIONS

Patient \_\_\_\_\_ ID# \_\_\_\_\_ RM \_\_\_\_\_

PRE-TREATMENT INVENTORY

Subtotal

_____	sources of	_____	mg	_____
_____	sources of	_____	mg	_____
_____	sources of	_____	mg	_____
_____	sources of	_____	mg	_____

Applicator(s) \_\_\_\_\_ Total \_\_\_\_\_ mg.

POST TREATMENT INVENTORY

_____	sources of	_____	mg	_____
_____	sources of	_____	mg	_____
_____	sources of	_____	mg	_____
_____	sources of	_____	mg	_____

Applicator(s) \_\_\_\_\_ Total \_\_\_\_\_ mg.

COMMENTS:

Certified by: \_\_\_\_\_ Date \_\_\_\_\_

IMPORTANT: THIS RECORD MUST BE PERMANENTLY MAINTAINED.

Patient \_\_\_\_\_ I.D. \_\_\_\_\_ Rm \_\_\_\_\_

Ordering Physician \_\_\_\_\_

Applicator(s) used \_\_\_\_\_ Sources \_\_\_\_\_

mR/hr at 1 meter from applicator (not after loading) \_\_\_\_\_ mR/hr

Date and time of insertion \_\_\_\_\_ a.m./p.m. \_\_\_\_\_

	Yes	See Comments
Lead aprons not worn during insertion?	( )	( )
X-ray techs informed prior to obtaining localizing films?	( )	( )
Recovery room nurses instructed to use time/distance?	( )	( )
Patient assigned private room?	( )	( )
Film Badges issued to nursing personnel?	( )	( )
Safety instruction given to nurses?	( )	( )
Safety procedures placed in patients chart?	( )	( )
Caution sign placed on patients chart?	( )	( )
Caution signs placed on patients room door?	( )	( )
Nursing care rotated?	( )	( )
Known pregnant nurses not attending patient?	( )	( )
Pregnant visitors prohibited?	( )	( )
Visitors under 18 prohibited?	( )	( )
Safety survey performed and recorded?	( )	( )
Limits of nursing care time posted?	( )	( )

Removal notice posted in patients chart prior to removal of all posted signs? ( ) ( )

All signs removed? ( ) ( )

Room surveyed and background rad. levels present? ( ) ( )

Date/Time of Removal \_\_\_\_\_ a.m./p.m. \_\_\_\_\_

Applicator \_\_\_\_\_ Sources \_\_\_\_\_

COMMENTS:

CERTIFIED BY \_\_\_\_\_ Date \_\_\_\_\_

IMPORTANT: THIS RECORD MUST BE PERMANENTLY MAINTAINED

## SAFETY PRECAUTIONS IN CLINICAL APPLICATIONS

## I. Transfer and Preparation of Sources

- a. Forms will be used to record pre and post-use inventory. (Item #20, Form B)
- b. Sources will be dispensed with suitable protective devices and techniques, to include long forceps & TLD finger badges.

## II. Application of Sources to the Patient

- a. Distance, time, and when possible shielding, will be used to reduce radiation exposure to personnel attending the patient.
- b. Appropriate signs will be used to indicate levels of radiation exposure.
- c. Consideration will be given to the proximity of patients in adjoining rooms.
- d. A patient being treated with brachytherapy sources will wear suitable identification.
- e. Patient will not be allowed to leave his room unless accompanied by a hospital attendant.
- f. Persons who have short-lived sources which are not removable from their bodies will be allowed to leave the hospital provided precautions necessary to prevent other persons from receiving more than the permissible dose of radiation are observed.

## III. Removal of Sources from Patient

- a. Sources will be removed with same safety precautions as those used in their application.
- b. No linens, dressings, clothing or equipment will be removed from room until all sources are accounted for.
- c. Assurance of complete removal of all sources will be obtained using a G-M survey meter held in the treatment area of the patient.
- d. Should the patient die before brachytherapy is complete, the sources will be removed at once.

## IV. Return of Sources to Storage

- a. Following cleaning, sources will be returned immediately to their storage place.
- b. Post-use inventory forms will be completed to insure complete return of all sources to storage.
- c. Inventory of all sealed sources will be performed on a quarterly basis and recorded.



## INSTRUCTIONS TO NURSES

1. Special restricts may be noted on the precaution sheet in the patients chart. Nurses should read these instructions before administering to the patient. Call the Nuclear Medicine Department if you have any questions about the care of these patients.
2. Nurses should spend only the minimum necessary time near a patient for routine nursing care, but must obtain and wear a film badge.
3. When a nurse receives an assignment to a therapy patient, a film or TLD badge should be obtained immediately from the Nuclear Medicine Department. The badge shall be worn only by the nurse to whom it is issued and shall not be exchanged between nurses.
4. Pregnant nurses should not be assigned to the personal care of these patients.
5. 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 the Nuclear Medicine Department at once.
6. Bed bath given by the nurse should be omitted while the sources are in place.
7. Perineal care is not given during gynecologic treatment; the perineal pad may be changed when necessary, unless orders to the contrary have been written.
8. 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 radiologist or member of the Nuclear Medicine Department.

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

9. No special precautions are needed for sputum, urine, vomitus, stools, dishes, instruments, utensils or bedding unless specifically ordered.
10. These patients must stay in bed unless orders to the contrary are written.
11. Visitors will be limited to those 18 years of age or over, unless other instructions are noted on the precaution sheet in the patient's chart.
12. Visitors should sit at least three feet from the patient and should remain no longer than the times specified on the form posted on the patient's door and in his chart.
13. No nurse, visitor or attendant who is pregnant should be permitted in the room of a patient while brachytherapy sources are implanted in the patient. Female visitors should be asked whether they are pregnant.
14. Emergency Procedures:
  - a. If an implanted source becomes loose or separated from the patient,  
or

ITEM #20, FORM F (continued)

b. If the patient dies, or

c. If the patient requires emergency surgery, immediately call

\_\_\_\_\_. Phone NO. (days) \_\_\_\_\_ (nights) \_\_\_\_\_.

15. At the conclusion of treatment, call the Radiation Safety Officer and request that the patient and room be surveyed to be sure all radioactive sources have been removed.

NUCLEAR MEDICINE DEPARTMENT

Item #21

Procedures and Precautions for use of Radioactive Gases

1. Quantities

- a. An average of 10 exams per week may be done.
- b. Average activity per exam is 10 mCi.
- c. Possession limit of 400 mCi is requested.

2. Use and Storage:

- a. Xenon-133 will be stored in the camera room. It will be stored in its original shipping safe until used. Accessory lead shielding will be used (i.e., 1/8" - 1/14" lead vials or sheet) whenever survey measurements are 2.0 mR/hr or more.
- b. The camera room where Xenon is stored is under negative pressure. The exhaust rate is at 1200 cfm. Air is supplied to the camera room at a rate of 1100 cfm. Therefore, the entire camera room is under negative pressure. The hood will be on at all times that Xe-133 is in storage or use.

The exhaust fans, located on the roof, discharge air which is at least 30 feet from any other air intake louvers.

3. Procedure for Routine Use:

- a. The camera room door will be slightly ajar.

The patient will be fitted with the rebreathing and collection apparatus, and then instructed as to the procedure. Trial runs without Xenon will be conducted whenever patient condition permits.

The Xenon will be administered and three to four views obtained. During the washout phase, the Xenon will be collected in the gas trap until practically no Xenon remains in the patient as evidenced by the camera persistence scope.

Whole body film badges and TLD finger badges will be worn by occupational personnel handling Xenon. Visitors will be excluded from the camera room during Xenon use unless their presence is required for patient care or desired for educational or observational purposes.

- b. An activated charcoal gas trap will be used for patient studies. An Atomic Products, Pulmonex delivery system with gas trap or equivalent is used. This system will be used in accordance with manufacturer's instructions.

Face masks that cover both mouth and nose or nose clamps for use with the mouthpiece delivery system will be employed to reduce leakage of the Xenon into the camera room.

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1 of 4 pages  
Prepared 12/10/81  
Lic. #37-07739-01

c. On a semiannual basis, the exhaust flow rates from the camera room will be checked to assure that a change in exhaust rate has not occurred and a check of the air supply will be made to assure negative pressure in the rooms.

#### 4. Emergency Procedures:

In the event there is an accidental patient associated loss of Xenon into the camera room, the exhaust system will clear the room to levels less than  $1 \times 10^{-5}$  uCi/ml in less than 10 minutes.

$$\text{Activity per loss (A)} = 10 \text{ mCi} = 1 \times 10^4 \text{ uCi}$$

$$\begin{aligned} \text{Room Volume (V)} &= 3897 \text{ ft.}^3 \\ &= 1.1 \times 10^8 \text{ ml} \end{aligned}$$

$$\begin{aligned} \text{Clearance rate } (\lambda) &= \frac{1200 \text{ cfm}}{3897 \text{ ft.}^3} \\ &= 30 \text{ min.}^{-1} \end{aligned}$$

$$\begin{aligned} \text{Initial Concentration (C}_0) &= \frac{1 \times 10^4 \text{ uCi}}{1.1 \times 10^8 \text{ ml}} \\ &= 9.1 \times 10^{-5} \text{ uCi/ml} \end{aligned}$$

$$\text{Evacuation time (t)} = 10 \text{ minutes}$$

$$\begin{aligned} \text{Final Concentration } C &= C_0 e^{-\lambda t} \\ &= (9.1 \times 10^{-5}) e^{-.30 \times 10} \\ &= 4.5 \times 10^{-6} \text{ uCi/ml} \end{aligned}$$

This value is less than  $1 \times 10^{-5}$  uCi/ml.

All unnecessary personnel will evacuate the room. The camera room door will be guarded against inadvertent entry during this time period.

A survey meter will be placed on the floor so it can be observed from the door. When no significant reduction in exposure level is noted, the room may be re-entered. Alternatively, the camera may be turned on periodically to collect counts for a present time. When no significant reduction in count rate is noted, the room may be re-entered.

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2 of 4 pages  
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5. Air concentration of Xe-133 in Restricted Areas:

a. Camera room

1. It is estimated that 100 mCi will be used per week (A).
2. 15% of the Xenon will be lost into the camera room due to patient associated losses and the inability of the gas trap to trap 100% of the Xenon (f).
3. The room exhaust rate of 1200 cfm will be used in this calculation.

$$V = 1200 \text{ cfm} \times 2.83 \times 10^4 \text{ ml/cfm} \times 10 \text{ studies/wk} \times 20 \text{ min/study.}$$

$$V = 1200 \times 2.83 \times 10^4 \text{ ml/cfm} \times 10 \times 20$$

$$V = 6.8 \times 10^9 \text{ ml/wk}$$

4. The average concentration (C) will be:

$$\begin{aligned} C &= \frac{A \times f}{V} \\ &= \frac{100 \text{ mCi} \times 1 \times 10^3 \text{ uCi/mCi} \times .15}{6.8 \times 10^9 \text{ ml/wk}} \\ &= 2.2 \times 10^{-6} \text{ uCi/ml} \end{aligned}$$

This value is less than required for restricted areas ( $1 \times 10^{-5} \text{ uCi/ml}$ ).

6. Methods of Xenon-133 Disposal:

a. All Xenon unused will be disposed of by decay in storage. Containers and apparatus will be surveyed unshielded with the low level survey meter held in contact with source containing device. If levels are the same as background, the containers will be disposed after defacing the labels.

All escaped Xenon will be vented through the exhaust system on the roof top to the atmosphere.

1. It is anticipated that 1.0 Curies of Xenon will be vented to the atmosphere per year. This includes activity liberated as accidental losses and leakage.
2. An air flow rate of 1200 cfm will be used in the calculation:
3. Air flow per year\* is: (V)

$$V = 1200 \text{ cfm} \times 1.484 \times 10^{10} \text{ ml/yr/cfm}$$

$$V = 1.78 \times 10^{13} \text{ ml/yr}$$

\*Calculations are extrapolated to show a yearly average as allowed per CFR 20.106(a).



4. The average concentration of air to the environment is: (C)

$$\begin{aligned} C &= \frac{A}{V} \\ &= \frac{1.0 \text{ Ci} \times 10^6 \text{ uCi/Ci}}{1.78 \times 10^{13} \text{ ml}} \\ &= 5.6 \times 10^{-8} \text{ uCi/ml} \end{aligned}$$

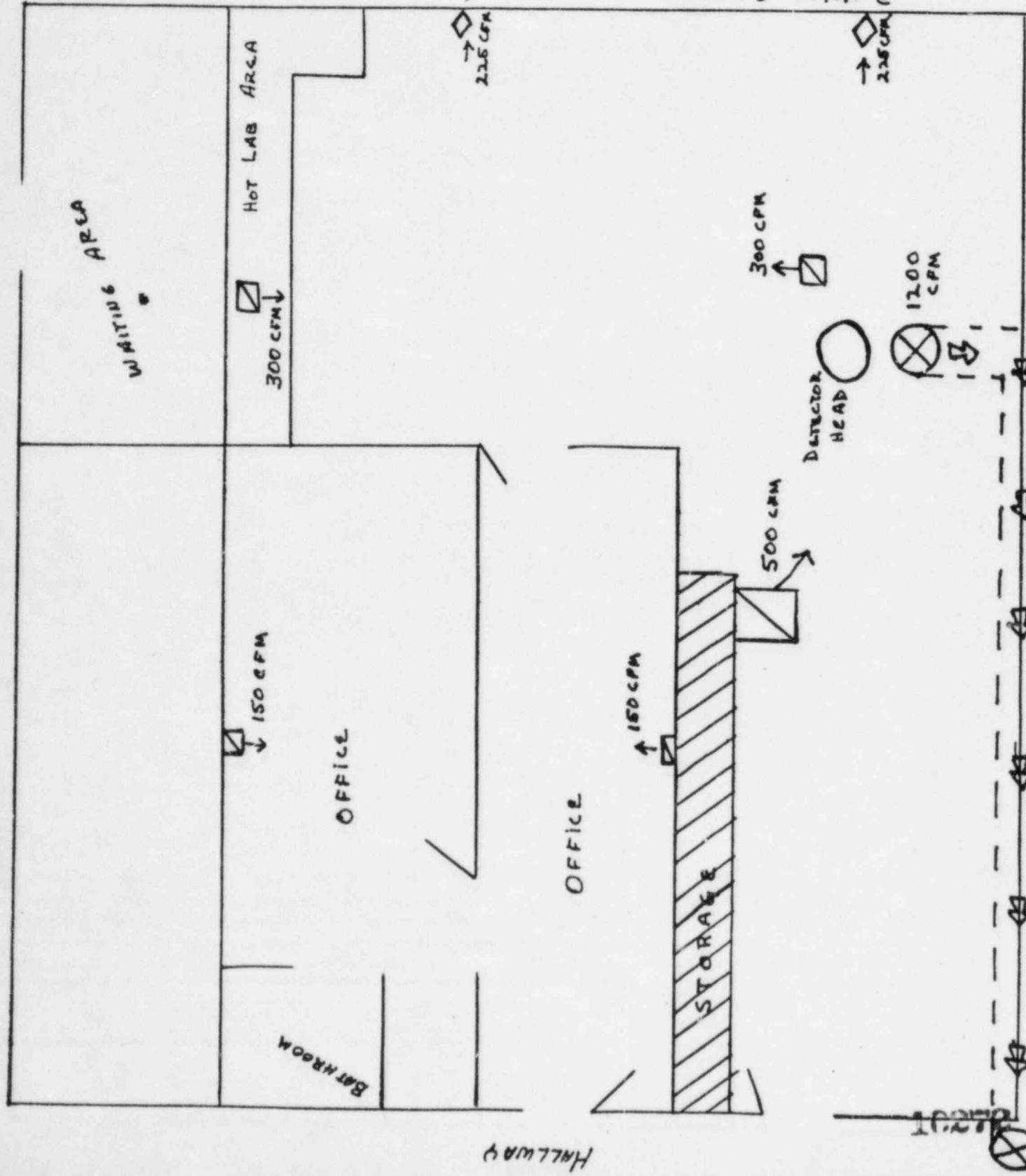
This value does not exceed the quantity  $3 \times 10^{-7} \text{ uCi/ml}$  permitted in 10 CFR 20.106 for unrestricted areas.

b. At weekly intervals, the discharge air from the gas trap will be monitored with the G-M survey meter held against the tubing to detect Xenon "pass through". When discharge air readings each 1/10 of air intake maximum readings during the equilibrium phase of the study, it will be assumed the charcoal trap efficiency has fallen to less than 90%. At that time, the cartridge will be exchanged.

Saturated filters will be stored for decay in the cabinet such that levels do not exceed 2.0 mR/hr at the exterior. A survey will be conducted without the benefit of shielding and if levels are those of background, the filter may be discarded.

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4 of 4 pages  
Prepared 12/10/81  
Lic. #37-07739-01

HALLWAY



ST. FRANCIS  
Hospital  
New Castle, Pa.

Scale: 1/4" = 10'

December 10, 1981

*Nuclear  
Medicine  
Associates, Inc.*

Dean Rombach, Chief  
Nuclear Medicine Dept.  
St. Francis Hospital of New Castle  
1000 S. Mercer St.  
New Castle, Pennsylvania 16101

Re: Changes in Radiation  
Safety program.

Add Xe-133.

Dear Dean:

Attached please find an application for your NRC license. In order that the application be complete, it must be supported with the information checked below:

- ☐ 1. Complete page 3 of Item #7 by listing the members of the isotope committee. (Identify the Radiation Safety Officer.)
  - ☒ 2. Read the application carefully for completeness and accuracy. If any changes are made, please be sure we have a copy of the changes as submitted.
  - ☒ 3. Have the Certifying Official of the organization named on the license application sign and date Item #26 on page 3 of form NRC 313M.
  - ☒ 4. Attach a copy of your ALARA Program, if not submitted.
  - ☐ 5. You sign and date Item #26 on page 3 of form NRC 313M.
  - ☒ 6. Attach a check for \$40.00, payable to: U.S. Nuclear Regulatory Commission.
  - ☒ 7. Retain one copy for your files and send 2 complete copies of all material to the address below marked with the "X".
- |   |  |
|---|--|
| <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> X William Walker, Jr.<br>Materials Branch<br>Office of Nuclear Material<br>Safety & Safeguard<br>U.S. Nuclear Regulatory Commission<br>Washington, D.C. 20555 | <input type="checkbox"/> Bruce Mallett, Ph.D.<br>Regional Licensing Section<br>U.S. Nuclear Regulatory<br>Commission<br>799 Roosevelt Road<br>Glen Ellyn, Illinois 60137 |
|---|--|

Additional Remarks:

This application should take care of the changes necessary to show the current status of your Radiation Safety program.

If you have any questions, please do not hesitate to contact me.

Sincerely,

*Vince Gargaro*  
Vincent A. Gargaro  
Consultant

VAG/mrw  
Enclosure

10272

APPENDIX C  
INSTRUMENTATION

1. Survey Meters

- a. Manufacturer's Name: Picker  
Manufacturer's Model Number: CDV - 700  
Number of Instruments Available: 1  
Minimum Range: .01 mR/hr to .5 mR/hr  
Maximum Range: 10 mR/hr to 50 mR/hr
- b. Manufacturer's Name: Victoreen  
Manufacturer's Model Number: CDV - 700  
Number of Instruments Available: 1  
Minimum Range: .01 mR/hr to .5 mR/hr  
Maximum Range: 10 mR/hr to 50 mR/hr
- c. Manufacturer's Name: Victoreen  
Manufacturer's Model Number: CDV - 715  
Number of Instruments Available: 1  
Minimum Range: .01 R/hr to .5 R/hr  
Maximum Range: 10 R/hr to 500 R/hr

2. Dose Calibrator

- a. Manufacturer's Name: Capintec  
Manufacturer's Model Number: CRC - 30  
Number of Instruments Available: 1
- b. Manufacturer's Name: Mallinkrodt Rad X  
Manufacturer's Model Number: Mark V  
Number of Instruments Available: 1

3. Instruments used for diagnostic procedures:

<u>Type of Instrument</u>	<u>Manufacturer's Name</u>	<u>Model No.</u>
a. Scintillation Camera	Picker	415
b. Magnascanner/uptake probe	Picker	2806F
c. Computer	A.D.A.C.	System I

4

a. Scintillation counter	Picker	2804F
b. Spectroscaler	Picker	4R(628438-1

## 24. PERSONNEL MONITORING DEVICES

TYPE <small>(Check appropriate box)</small>		SUPPLIER	EXCHANGE FREQUENCY
a. WHOLE BODY	<input checked="" type="checkbox"/> FILM	Landauer	Monthly
	<input type="checkbox"/> TLD		
	<input type="checkbox"/> OTHER <i>(Specify)</i>		
b. FINGER	<input type="checkbox"/> FILM		
	<input checked="" type="checkbox"/> TLD	Landauer	Monthly
	<input type="checkbox"/> OTHER <i>(Specify)</i>		
c. WRIST	<input type="checkbox"/> FILM		
	<input type="checkbox"/> TLD		
	<input type="checkbox"/> OTHER <i>(Specify)</i>		

d. OTHER *(Specify)*

## 25. FOR PRIVATE PRACTICE APPLICANTS ONLY

a. HOSPITAL AGREEING TO ACCEPT PATIENTS CONTAINING RADIOACTIVE MATERIAL			
NAME OF HOSPITAL		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.	
MAILING ADDRESS			
CITY	STATE    ZIP CODE		

## 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 <small>(See Section 170.31, 10 CFR 170)</small>	b. APPLICANT OR CERTIFYING OFFICIAL <i>(Signature)</i>  (1) NAME <i>(Type of Print)</i>
(1) LICENSE FEE CATEGORY:	(2) TITLE
(2) LICENSE FEE ENCLOSED: \$ _____	c. DATE



St. Francis Hospital  
New Castle, Pennsylvania  
Facilities and Equipment  
Diagram

Nuclear Medicine Department

KEY FOR ATTACHED DIAGRAM

Item #11

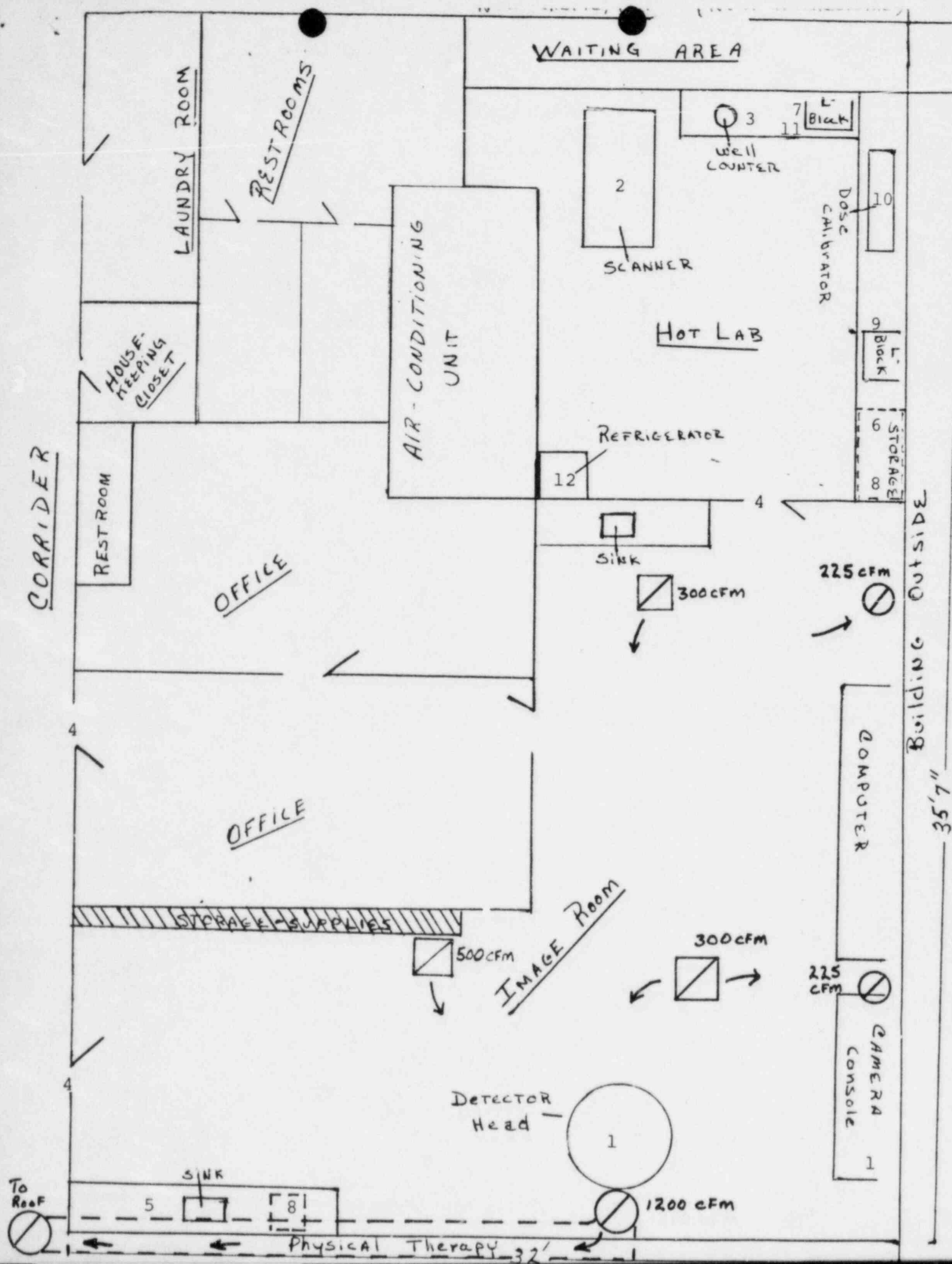
1 of 1 pages

Prepared 6/29/82

Lic. #37-07739-01

BY: L=Length, W=Width, H=Height, T=Thickness, N/A=Not Applicable

		Isotope Receipt Area	Adjacent Areas	Shielding
Air Supply	<u>5</u>	Generator		
Air Exhaust	<u>6</u>	Kit Preparation		
Sink	<u>7</u>	Isotope Storage		<u>6</u>
Lead Castle	<u>8</u>	Dose Preparation		<u>2' L x 1.5' W x 1' H x 2" T</u>
1 Camera	<u>9</u>	Waste Storage		<u>8</u> Camera Room
2 Scanner	<u>8</u>	Dose Calibrator		<u>1.5' L x 1.5' W x 1' H x 2" T</u>
Uptake	<u>10</u>	Monitoring Equipment		<u>7-9</u>
3 Well	<u>11</u>	Decontamination Kit		<u>1' L x 1.5' W x 1.5' H x 1/4" T</u>
3 Scaler	<u>11</u>	Refrigerator		
Clerical/desk	<u>12</u>	Ceiling Height		
File		Ceiling Height		
4 Lockable Door				



radiation  
therapy

Nuclear

New Castle, Pa.

physical  
therapy

BATHROOM

Medicine

Office

ELEVATORS

Corridor

Storage

ELECTRICAL  
BREAKER  
Room

Men's  
locker  
Room

STORAGE

CORRIDOR

Respiratory

Storage

Storage

Office

Medical  
Records

CORRIDOR

Records

Office

X-RAY  
File  
Rooms

MACHINE  
SHOP

Storage

Brachytherapy  
Storage

Storage

PURENASE  
Office

STAIRS

Storage

Storage

MORGUE

CORRIDOR

WASTE  
ROOM

LAUNDRY

Office