NRC FORM 313 (5-85) 10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB 3150-0120 Expires: 5-31-87

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

FEDERAL AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

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

- [X] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER ________
- [ ] C. RENEWAL OF LICENSE NUMBER ________

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

Vermillion County Hospital
801 South Main Street
Clinton, Indiana 47842

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

Same

9001260003 890428
REG3 LIC30
13-26043-01 PDR

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION: **Ashwin Patel**

TELEPHONE NUMBER: **(312)520-5590**

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY ____ AMOUNT ENCLOSED $ **580.00**

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE—CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
D. Brawley	DON BRAWLEY	ADMINISTRATOR	4/6/89

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

[ ]	<$250K	[ ]	$1M–3.5M
[ ]	$250K–500K	[ ]	$3.5M–7M
[ ]	$500K–750K	[ ]	$7M–10M
[ ]	$750K–1M	[ ]	>$10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial—proprietary—information furnished to the agency in confidence)*

[ ] YES [ ] NO

RECEIVED
APR 10 1989
REGION III

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
appl	apr10	7C	7C(a) Cat #23	Cp
AMOUNT RECEIVED	**CHECK NUMBER**		CONTROL NO. 87211 (Check Not received)	**DATE** 4/12/89

ITEM 5 - RADIOACTIVE MATERIAL
AND
ITEM 6 - PURPOSE

TABLE I

	Byproduct Material	Amount	Purpose
5.a	Material in § 35.100	As needed	6.a Medical Use
5.b	Material in § 35.200	As needed	6.b Medical Use

ITEM 7

7.1 **Authorized Users for Medical Use**

For training and experience of the following users, please refer to the previous applications for license No. 12-13568-02.

Name	Proposed Uses
William Mason, M.D.	5a, 5b and 5c
Paul Jones, M.D.	5a, and 5b

ITEM	TOPIC	FOR DETAILED INFORMATION, PLEASE SEE ATTACHED
8.1	Training Program	ATT 8.1
8.2	Other Training Program	ATT 8.2
9.1	Annotated Drawings	ATT 9.1
9.2	Survey Instrument Calibration	ATT 9.2
9.3	Dose Calibrator Calibration	ATT 9.3
9.4	Personnel Monitoring Program	ATT 9.4
9.5	Imaging Equipment Q.A.	N / A
9.6	Other Equipment & Facilities	N / A
10.1	Radiation Safety Committee	ATT 10.1
10.2	ALARA Program	ATT 10.2
10.3	Leak Test	ATT 10.3
10.4	Safe Use of Radiopharmaceuticals	ATT 10.4
10.5	Spill Procedures	ATT 10.5
10.6	Ordering and Receiving	ATT 10.6
10.7	Opening Packages	ATT 10.7
10.8	Unit Dosage Records	N / A
10.9	Miltidose Vial Records	ATT 10.9
10.10	Mo99 Concentration Records	ATT 10.10
10.11	Implant Source Use Records	N / A
10.12	Area Survey Procedures	ATT 10.12
10.13	Air Concentration Control	N / A
10.14	Radiopharmaceutical Therapy	ATT 10.14
10.15	Implant Therapy	N / A
10.16	Other Safety Procedures	N / A
11.1	Waste Disposal	ATT 11.1
11.2	Other Waste Disposal	N / A

ATT 8.1

TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

8.1 TRAINING PROGRAM (OCCUPATIONAL PERSONNEL):

In accordance with U.S. Nuclear Regulatory Commission Regulations, instructions to workers will be carried out in the following manner:

1. All individuals working in or frequenting any portion of a restricted area shall be kept informed of the storage, transfer or use of radioactive materials or of radiation in such portions of the restricted area.

2. All individuals working in or frequenting any portion of a restricted area shall be instructed in the health protection problems associated with exposure to such radioactive materials, in precautions or procedures to minimize exposure, and in the proceses and functions of protective devises employed.

3. All individuals working in or frequenting any portion of a restricted area shall be instructed in, and instructed to observe, to the extent within the worker's control, the applicable provisions of the Commission to radiation or radioactive materials occuring in such areas.

4. All individuals working in or frequenting any portion of a restricted area shall be instructed of their responsibility to report promptly to the licensee, any conditions which may lead to or cause a violation of Commission Regulations and Licensee of unnecessary exposure to radiation or to radioactive material.

5. All individuals working in or frequenting any portion of a restricted area shall be instructed in the appropriate response to warnings made in the event of any unusual occurence or malfunction that may involve exposure to radiation or radioactive material.

The Nuclear Medicine Technologist will be classified as occupational employees. These individuals perform their duties from the radiation safety viewpoint under the direction of the physician at the hospital named on the license application.

Every effort will be made to find technologists educated in Nuclear Medicine Technology in an institution approved by the American Medical Association. Such employees will be certified or eligible for certification in Nuclear Medicine Technology and for licensure by U.S. Nuclear Regulatory Commission. Orientation of radiation safety and techniques of such personnel, for one or two days by the Radiation Safety Officer, will be considered sufficient.

Our Nuclear Medicine Department is surveyed periodically by a Consultant. The Consultant reviews the deficiencies in the program with the department employees (the Nuclear Medicine Technologists) and issues a written report of his findings, which is available for review by the technologists. The Consultant, who visits the department at least twice a year, also keeps the technologists up-dated with any changes in regulations regarding radiation safety, etc:

[a] New procedures and radiopharmaceuticals in Nuclear Medicine

[b] Radiation Safety Techniques

[c] U.S. NRC Rules and Regulations for the use of radioactive materials.

[d] Location of regulations, license, license applications, regulatory notices and dosimetry and bioassay reports. All of these documents and reports are available for employee inspection upon request to the R.S.O.

continued

8.2 OTHER TRAINING PROGRAM (NONOCCUPATIONAL PERSONNEL)

With regard to non-occupational personnel at hospitals and their contact with the Nuclear Medicine Department, the Staff Technologist will be instructed to restrict access to the department to those people having business there.

NON-OCCUPATIONAL PERSONNEL WHEN REQUIRED TO ASSIST THE TECHNOLOGIST WITH A PATIENT, WILL NEVER BE ALLOWED TO HANDLE ANY RADIOACTIVE MATERIAL.

Any person requested to assist with a patient will do so under the direction of the Nuclear Medicine Technologist who will ensure that the exposure to these persons is held to a minimum (through time, distance and shielding) during the performance of the Nuclear Medicine procedure.

The non-occupational personnel such as security, nursing, housekeeping, etc. who may be indirectly involved in Nuclear Medicine Department functions where radioactive materials are stored or used, will be given written instructions annually. The written instructions will include:

[a] Concepts of radiation safety - distance, time shielding.

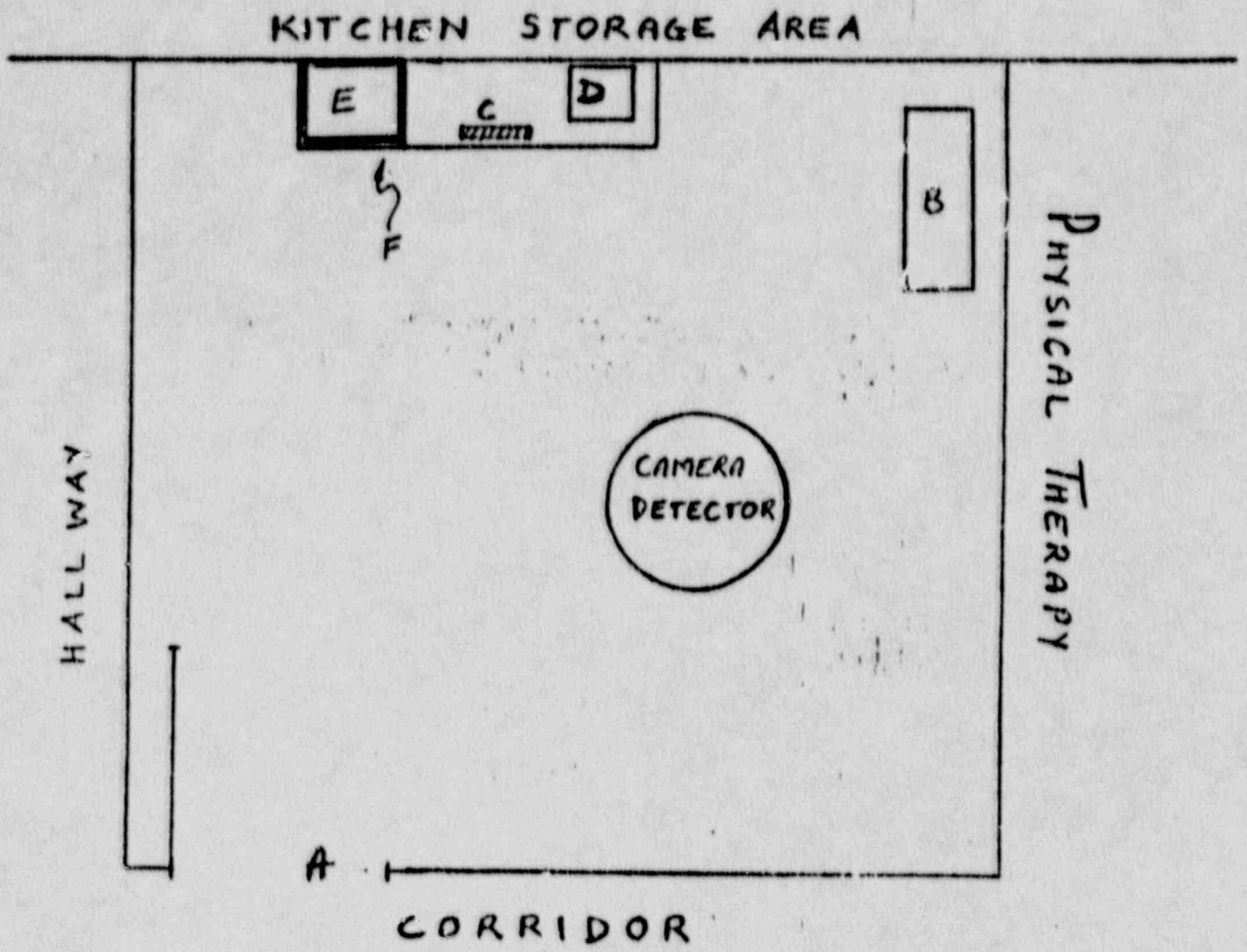
[b] Names and phone numbers of person(s) to contact in case of a radiation emergency.

[c] The radioactive material, if used (injected) in our Cardiac Stress Lab for Tl-201 stress studies, the access to the stress unit will be limited to the physician, the stress lab technologist(s) and the patient during the use of Tl-201. The stress lab technologists will be given a copy of "Emergency Procedures for Minor Spills" for posting in the stress unit room.

ITEM #9.1

VERMILLION CO. HOSP.

CLINTON, INDIANA.



SCALE: 1" = 3 ft.

A - SECURED DOOR

B - CAMERA CONSOL

C - DOSE PREP AREA : L BLOCK

D - DOSE CALIBRATOR.

E - Mo99/Tc99m GENERATOR & RADIOPHARMACEUTICAL STORAGE SHIELDED BY 2" THICK LEAD BRICKS

F - UNDER COUNTER STORAGE AREA SHIELDED BY 1/8" THICK LEAD FOR RADIOACTIVE WASTE STORAGE.

ITEM NO. 9 (4/89)

ITEM #9

INSTRUMENTATION

1. **SURVEY METER**
   - A. Manufacturer: Elscint *
   - B. Model Number: GSM-1
   - C. Number of Instruments Available: One
   - D. Minimum Range: 0 to 0.5 mr/hr
   - E. Maximum Range: 0 to 2,000 mr/hr

2. **DOSE CALIBRATOR**
   - A. Manufacturer: Capintec
   - B. Model Number: CRC-10
   - C. Number of Instruments Available: One

3. **SCINTILLATION CAMERA**

   General Electric Maxi II

* or equivalent

ATT 9.2

CALIBRATION OF INSTRUMENTS

Methods, Frequency, Standards

9.2 SURVEY INSTRUMENTS:

Calibration and repair of survey instruments will be done annually by Health Physics Associates, Ltd., 3312 Commercial Avenue, Northbrook, Illinois 60062, or any other organization approved by the NRC or an Agreement State..

The procedure used to calibrate survey meters is on file with the Nuclear Regulatory Commission, under Health Physics Associates Ltd.'s license No. 12-09160-01. When a survey meter is sent for repair or calibration, a "loaner" survey meter will be obtained.

Cs-137 reference standard or the check source on the instrument will be used to check the constancy of the GM survey meter prior to use. If a reading with the same geometry is not within ±20% of the reading measured after calibration, the instrument will be recalibrated.

9.3 DOSE CALIBRATOR:

The following checks will be performed on the dose calibrator:

A. Constancy - Daily
B. Linearity - Once Every Calendar Quarter
C. Accuracy - Annually
D. Geometrical Variation - At installation and after chamber replacement

A. Constancy

A Cs-137 standard, consisting approximately 200 µCi of activity will be assayed in the dose calibrator daily in the Cs-137 setting on the instrument. The dose calibrator initial assay of the standard should not differ by more than ±5% from the anticipated range of activity of the standard.

The Cs-137 source will be assayed daily in other radionuclide settings routinely used in the department. The assay of the sources will not vary by more than ±5%. Once a week, the Cs-137 source will be assayed in other radionuclide settings occasionally used in the department and the readings should not vary by more than ±5% If the constancy error exceeds 10%, the dose calibrator will be repaired or replaced.

B. Linearity will be performed using one of the following two methods

1] The linearity of the instrument will be established one every calendar quarter. The procedure employed will be such that it will cover the entire range of activity that the department may use. The maximum quantity of radioactivity that we may have on hand in a single container would be elution from Mo99/Tc99m generator (Tc99m pertechnetate).

Knowing the volume in the vial, the concentration of the activity can be calculated. One milliliter of eluent is drawn precisely into a syringe and it is assayed in the dose calibrator. The reading should be within ±5% to be acceptable.

Further linearity will be determined as follows: The same syringe is then further assayed at approximately 6 hours, 24 hours, 30 hours and 48 hours after the activity was drawn into the syringe. For acceptable linearity, all the assay results must be within ±5% of the calculated values. If the linearity error exceeds 10%, correction factors will be determined for any linearity error that exceeds 10%.

2] We may use a linearity check kit approved by the NRC (such as "Calicheck Kit" from Calcorp, Inc.). The initial linearity of the dose calibrator will be confirmed using the decay method as indicated above. The linearity check kit will be used according to the instructions from the supplier of the kit.

continued

C. Accuracy

The accuracy of the dose calibrator at various energy levels will be confirmed at installation, after repairs, and once a year thereafter, using three reference standards whose activity is traceable to the National Bureau of Standards.

RADIONUCLIDE	CATALOG No.	APPROXIMATE ACTIVITY	SOURCE TYPE
Cs-137	NES-356	200 µCi	Vial E
Ba-133	NES-358	250 µCi	Vial E
Co-57	NES-206	5.0 mCi	Vial E

Each standard will be assayed in the appropriate settings three times and the average of the three settings will be calculated. After subtracting the room backgrounds, the average source assay should be within ±5% of the anticipated range of activity of each source. If the accuracy error exceeds 10%, the dose calibrator will be repaired or replaced.

D. Geometric Independence - At Installation and After Chamber Replacement

Procedure -

(A) Syringe

[i] Take approximately 5 mCi of Tc99m in 0.5 cc volume in a 3 cc syringe.

[ii] Assay the syringe in the dose calibrator and record the volume and the dose calibrator assay reading.

[iii] Draw an additional 0.5 cc of non-radioactive saline in the same syringe (now a total volume of 1 cc in the syringe). Assay the syringe and record the volume (1cc) and the dose calibrator assay reading.

[iv] Draw an additional 0.5 cc of non-radioactive saline in the same syringe (now a total volume of 1.5 cc in the syringe) and assay again. Record the volume (1.5 cc) and the dose calibrator assay reading.

[v] Repeat the process until a volume of 2.0 cc has been assayed.

If necessary (more than five minutes interval between step [ii] and [v] above), correct for decay. Find the mean of the four dose calibrator assay values and determine the variation of each volume assay from the mean value. If the geometry error exceeds 10%, correction factors will be determined.

(B) Vial

[i] Take a 10 or 20 cc empty vial (vial size routinely used in the department for generator elution and radiopharmaceutical preparations).

[ii] Inject approximately 10 mCi Tc99m in a volume of 2 cc in the vial and assay the vial. Record the volume and millicuries indicated.

continued

[iii] Remove the vial from the dose calibrator and using a clean syringe and needle, inject 2 cc of nonradioactive saline into the vial and assay again. Record the volume and millicuries indicated.

[iv] Repeat the process until you have assayed a total volume of 9 cc for 10 cc vial or 16 cc for 20 cc vial.

Steps [ii] thru [iv] must be completed in less than seven to eight minutes, otherwise decay correction would be necessary.

Find the mean value of the dose calibrator assay readings and determine the variation between each dose calibrator assay reading and the mean value.

If the geometry error exceeds ten percent, correction factors will be determined and used for the volumes in question.

E. Acceptable Performance

If the error in constancy, linearity, accuracy and geometry exceeds 5%, the RSO will be notified. If the error exceeds 10%, the following actions will be taken:

[i] Constancy - Repair or replace the dose calibrator,

[ii] Accuracy - Repair or replace the dose calibrator,

[iii] Linearity - Correction factors will be used for the values that exceed 10% error.

[iv] Geometry - Correction Factors will be used for the values that exceed 10% error.

F. PATIENT DOSES

All patient doses will be assayed prior to administration to ensure that they are within ±10% of the prescribed dose.

DOSE CALIBRATOR CHECKS

Hospital_____; Dose Calibr. Make_____ Model_____

Source Used: Cs-137; Activity_____μCi; Calibration Date_____; Serial #_____

Anticipated Activity of the Cs-137 Source on_____is_____μCi; ±5% Range is_____to_____μCi

Date	Cs-137	Tc99m	I-131	I-123	Ga-67	Tl-201	In-111	Mo-99	Xe-133	Initial

ITEM 9.3 (4/89) CONTROL NO. 8721 1

ATT 9.4

9.4 PERSONNEL MONITOR PROGRAM -

1. All individuals who are occupationally exposed to ionizing photon radiation on a regular basis will be issued a film whole body monitor that will be processed by a contract service on a monthly basis.

2. All individuals who, on a regular basis, handle radioactive material that emits ionizing photons will be issued a TLD finger monitor that will be processed by a contract service on a monthly basis.

3. All individuals who are occupationally exposed to radiation on an occasional basis, such as nurses caring for radiopharmaceutical therapy patients, will be issued either a whole body film monitor or a pocket ionization chamber.

4. The RSO will promptly review all exposure reports to look for workers or groups of workers whose exposure is unexpectedly high or low.

5. Other individuals who are exposed to radiation on an occasional basis such as security personnel, housekeeping personnel, secretarial personnel and nurses who occasionally care for patients who have received diagnostic dosages will not normally be issued exposure monitors.

10.1 RADIATION SAFETY 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 in accordance with NRC regulations and 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 conditions of the license.

DUTIES:

The Committee shall -

1. Be familiar with all pertinent NRC regulations, the terms of the license, the 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, and pharmacists) and determine that the 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 Section 19.12 or 10 CFR Part 19.

4. Review and approve all requests for the 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 systems.

7. Recommend remedial action to correct any deficiencies identified in the radiation safety program.

8. Maintain written record of all Committee meetings, actions, recommendations and decisions.

9. Ensure that the Byproduct Material License is amendmed, when necessary, prior to any changes in facilities, equipment, policies, procedures and personnel.

10. Review dosimetry reports with reference to ALARA program.

CONTROL NO. 8721 1

continued

RADIATION SAFETY OFFICER:

Among the specific responsibilities of the Radiation Safety Officer, or his deputy, are the following:

1] To ensure that the institution is in compliance with pertinent Federal, State and Local Regulations.

2] To establish and supervise operating procedures and to review them periodically to assure their conformity with the recommendations.

3] To instruct personnel in proper radiation protection practices.

4] To conduct, or have conducted, radiation surveys and source leak tests where indicated and to keep records of such surveys and tests, including summaries of corrective measures recommended and/or instituted.

5] To assure that personnel monitoring devices are used where indicated and that records are kept of the results of such monitoring.

6] To investigate each known or suspected case of excessive or abnormal exposure to determine the cause and to take steps to prevent its recurrence.

The Radiation Safety Officer or his deputy will be available at the hospital during working hours and by phone for all emergency situations after normal working hours.

MEETING FREQUENCY

The Radiation Safety Committee shall meet as often as necessary to conduct its business, but not less than once in every calendar quarter.

ATT 10.1

10.1 RADIATION SAFETY COMMITTEE

William Mason, M.D.	Director of Nuclear Medicine and Radiation Safety Officer
Steve Tryon	Assistant Administrator

Director of Nursing (or representative

Nuclear Medicine Technologist

ATT 10.2 - ALARA PROGRAM

Model Program for Maintaining Occupational Radiation Exposures at Medical Institutions ALARA

_____

(Licensee's Name)

_____

(Date)

I. Management Commitment

a. We, the management of this (medical facility, hospital, etc.) are committed to the program described in this paper for keeping exposures (individual and collective) as low as reasonably achievable (ALARA). In accord with this commitment, we hereby describe an administrative organization for radiation safety and will develop the necessary written policy, procedures and instructions to foster the ALARA concept within our institution. The organization will include a Radiation Safety Committee (RSC) and a Radiation Safety Officer (RSO).

b. We will perform a formal annual review of the radiation safety program including ALARA considerations. This shall include reviews of operating procedures and past exposure records, inspections, etc., and consultations with the radiation protection staff or outside consultants.

c. Modification to operating and maintenance procedures and to equipment and facilities will be made where they will reduce exposures unless the cost, in our judgment, is considered to be unjustified. We will be able to demonstrate, if necessary, that improvements have been sought, that modifications have been considered, and that they have been implemented where reasonable. Where modifications have been recommended but not implemented, we will be prepared to describe the reasons for not implementing them.

d. In addition to maintaining doses to individuals as far below the limits as is reasonably achievable, the sum of the doses received by all exposed individuals will also be maintained at the lowest practicable level. It would not be desirable, for example, to hold the highest doses to individuals to some fraction of the applicable limit if this involved exposing additional people and significantly increasing the sum of radiation doses received by all involved individuals.

II. Radiation Safety Committee (RSC)

a. Review of Proposed Users and Uses

1. The RSC will thoroughly review the qualifications of each applicant with respect to the types and quantities of materials and uses for which the applicant has applied to assure that appropriate measures are taken to maintain exposure ALARA.

2. When considering a new use of byproduct material, the RSC will review the efforts of the applicant to maintain exposure ALARA. The user should

have systematized procedures to ensure ALARA, and shall have incorporated the use of special equipment such as syringe shields, rubber gloves, etc., in his proposed use.

3. The RSC will ensure that the user justifies his procedures and that dose will be ALARA (individual and collective).

b. Delegation of Authority

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

1. The RSC will delegate authority to the RSO for enforcement of the ALARA concept.

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

c. Review of ALARA Program

1. The RSC will encourage all users to review current procedures and develop new procedures as appropriate to implement the ALARA concept.

2. The RSC will perform a quarterly review of occupational radiation exposure with particular attention to instances where Investigational Levels in Table I below are exceeded. The principle purpose of this review is to assess trends in occupational exposure as an index of the ALARA program quality and to decide if action is warranted when Investigational Levels are exceeded. (See Paragraph VI)

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

III. Radiation Safety Officer (RSO)

a. Annual and Quarterly Review

1. Annual review of the Radiation Safety Program: The RSO will perform an annual review of the Radiation Safety Program for adherence to ALARA concepts. Reviews of specific procedures may be conducted on a more frequent basis.

2. Quarterly review of Occupational Exposures: The RSO will review at least quarterly the external radiation exposures of authorized users and workers to determine that their exposures are ALARA in accordance with the provisions of paragraph VI of this program.

3. Quarterly review of records of Radiation Level Surveys: The RSO will review radiation levels in unrestricted and restricted areas to determine that they were at ALARA levels during the previous quarter.

b. Education Responsibilities for an ALARA Program

1. The RSO will schedule briefings and educational sessions to inform workers of ALARA program efforts.

2. The RSO will assure that authorized users, workers and ancillary personnel who may be exposed to radiation will be instructed in the ALARA philosophy and informed that management, the RSC and the RSO are committed to implementing the ALARA concept.

c. Cooperative Efforts for Development of ALARA Procedures

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

1. The RSO will be in close contact with all users and workers in order to develop ALARA procedures for working with radioactive material.

2. The RSO will establish procedures for receiving and evaluating the suggestions of individual workers for improving health physics practices and encourage the use of those procedures.

d. Reviewing Instances of Deviation for Good ALARA Practices

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

IV. Authorized Users

a. New Procedures Involving Potential Radiation Exposures

1. The authorized user will consult with, and receive the approval of, the RSO and/or RSC during the planning stage before using radioactive materials for a new procedure.

2. The authorized user will evaluate all procedures before using radioactive materials to ensure that exposures will be kept ALARA. This may be enhanced through the application of trial runs.

b. Responsibility of the Authorized User to Those Supervised

1. The authorized user will explain the ALARA concept and the commitment to maintain exposures ALARA to all of those supervised.

2. The authorized user will ensure that those under supervision who are subject to occupational radiation exposure are trained and educated in good health physics practices and in maintaining exposures ALARA.

V. Persons Who Receive Occupational Radiation Exposure

a. The worker will be instructed in the ALARA concept and its relationship to the working procedures and work conditions.

b. The worker will know what recourses are available if it is determined that ALARA is not being promoted on the job.

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

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

TABLE I

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

* Not normally applicable to nuclear medicine operations except those using significant quantities of beta emitting isotopes.

The Radiation Safety Officer will review the results of personnel monitoring, not less than once in any calendar quarter, as is required by 10 CFR 20.§20.401. The following actions will be taken at the Investigational Levels as stated in Table I.

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

b. Personnel exposures equal to or greater than Investigational Level I but less than Investigational Level II.

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

c. Exposure equal to or greater than Investigational Level II

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

d. Re-establishment of an Individual Occupational Worker's Investigational Level II Above That Listed in Table I

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

TABLE I

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

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

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

VII. Signature of Certifying Official

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

_____
Signature

_____
Name (Print or Type)

_____
Title

_____
Institution name and address

The individual who is authorized to make commitments for the administration of the institution (e.g. hospital administrator, etc) is considered the Certifying Official.

ATT 10.3

10.3 LEAK TEST

The sealed sources required to be wipe tested by regulations, will be wipe tested at semi-annual intervals and the wipes will be mailed to a contract service for analysis. This contract service will be authorized by the NRC and/or an Agreement State to analyze the wipes in accordance with the existing regulations. At present we are using Health Physics Associates, Ltd., Northbrook, Illinois

The leak/wipe certificate will be available for inspection.

ATT 10.4

10.4 SAFE USE OF RADIOACTIVE MATERIALS

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

2. Wear disposable gloves while handling radioactive materials.

3. Monitor hands and clothing if contamination is suspected after handling radioactivity.

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

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

6. 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%.

   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 sheilded receptacles.

10. Never pipette by mouth.

11. Survey generator, kit preparation, and injection areas for contamination 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.

14. Mo99/Tc99m generator eluent will be assayed to determine Mo99 concentration and the eluent will not be used if Mo99 concentration is equal to or exceeds 1 uCi Mo99 per 1 mCi of Tc99m; or if a dose contains more than 5 uCi of Mo99.

SAFE USE OF Mo99/Tc99m GENERATOR & ELUENT

The Mo99/Tc99m generator will be eluted according to the instructions described in the package insert from the radiopharmaceutical company. This will provide an eluent of pharmaceutical quality.

99mTc and 99Mo assay of the eluted material from the generator will be performed after each elution according to the instructions described in the package insert from the radiopharmaceutical company. The assay, along with the assay of compounds synthesized from technetium eluates, will be accomplished through the use of a dose calibrator device. When the dose calibrator is sent away for repairs, a "loaner" will be obtained.

The purity of the eluted material will be determined by the above assay. The eluted sources containing more than 1.0 uCi of 99Mo per millicurie of 99mTc or final patient dose containing more than 5.0 uCi of 99Mo, will not be used directly or in compounding.

Compounds formulated using kits and technetium from the above generator will be prepared by following the kit manufacturer's directions, exactly as outlined in the package insert. No alterations or substitutions will be permitted. In this way a product or pharmaceutical quality will be insured. Syringe shields and lead containers for vials will be used during formulation of these compounds.

All patient doses will be assayed with a dose calibrator to assure that the dose is within ±10% of the prescribed dose.

10.5 EMERGENCY PROCEDURES FOR RADIOACTIVE SPILLS

Unsealed radioactive liquids are handled routinely in the Nuclear Medicine Department. The potential for spillage is always present. It is imperative that individuals handling radioactive materials respond properly to these spills so as to limit their radiation exposure and prevent the spread of contamination.

MINOR SPILLS: (tracer activities)

1. Notify persons in the immediate area that a spill has occurred.
2. Cover the spill with absorbent paper.
3. Limit access to area to only those persons dealing with the spill.
4. Survey (GM survey meter) potentially contaminated personnel before they disperse; and decontaminate as necessary.
5. Notify the Radiation Safety Officer of the incident.

MAJOR SPILLS: (therapy activities)

1. Notify all persons not involved in the spill to vacate the room at once. Limit the movement of displaced persons to confine the spread of contamination.
2. Cover spill with absorbent paper.
3. Switch off all fans. Close windows.
4. Vacate room.
5. Close the door to the room. Prevent entry into the room.
6. If the spill is on the skin, flush thoroughly.
7. If the spill is on the clothing, discard outer or protective clothing at once.
8. Notify the Radiation Safety Officer immediately.
9. Survey (GM survey meter) personnel involved. Immediately initiate decontamination of personnel as necessary, using mild soap and luke warm water.

FIRE AND / OR EXPLOSIONS

1. In the event of fire, explosion or similar catastrophy, the emergency within the hospital must be given attention first. Patients must be immediately cared for.

2. Should the catastrophe occur within the Department of Nuclear Medicine, vacate the area and all surrounding areas immediately.

   HOWEVER, DO NOT LET THE LOCATION OF OCCURRANCE PREVENT ADEQUATE AND IMMEDIATE PATIENT PROTECTION.

3. Block off the area with ropes, chairs or whatever is available until such time as fire or other emergency personnel arrive.

4. Notify the Radiation Safety Officer immediately.

5. Monitor area to determine extent of contamination.

6. Take necessary steps to decontaminate the area according to instructions of the Radiation Safety Officer.

LOSS OR THEFT OF RADIOACTIVE MATERIALS
OR
DAMAGE TO A RADIOACTIVE SOURCE

If the radioactive source is damaged, the precaution to prevent the spread of the contamination will be taken. The area concerned will be decontaminated and the damaged source will be stored in adequate shielding.

If a source is lost or stolen, the Radiation Safety Officer and the U.S. Nuclear Regulatory Commission or the appropriate State authorities will be notified.

If a source is involved in a fire and/or explosion and if a source is damaged, the appropriate State authorities will be notified.

U.S. NUCLEAR REGULATORY COMMISSION (312) 790 - 5500

ATT 10.6

PROCEDURES FOR ORDERING AND RECEIPT OF RADIOACTIVE MATERIAL

ORDERING

Radiopharmaceuticals will be ordered from suppliers licensed by the NRC or State according to 10CFR32 or Agreement State Regulations. Ordering will be initiated by the Nuclear Medicine Technologist who will ensure the inventory is adequate for planned and anticpated procedures, but not in excess of possession limits where applicable.

RECEIVING

Instructions will be issued to the carrier delivering radiopharmaceuticals to effect delivery directly to the Nuclear Medicine Department. Radiopharmaceutical packages are not to be left unattended in the unrestricted areas.

In the event that the radiopharmaceuticals arrive during off duty hours, the appointed employees on duty will escort the carrier to the Nuclear Medicine section, unlock the door, direct the carrier to place the shipment on the designated counter and resecure the area against unauthorized removal of the shipment.

If the radioactive package appears damaged or damp, the carrier will be instructed to place the radioactive package on absorbant pads on a clean surface, in an area capable of being secured. Also the carrier will be requested to remain on the premises until the Radiation Safety Officer can determine that neither he nor the delivery vehicle is contaminated. The Radiation Safety Officer will be notified immediately by security if the package appears damaged.

D R A F T

To be transcribed on hospital stationery

10.6 (continued)

TO: **Department Head Of:**

Purchasing
Receiving
Switchboard
Emergency Room
Radiology
Nuclear Medicine

FROM: Administration

SUBJECT: Receipt of Packages Containing Radioactive Materials Bearing White I, Yellow II or III Hazardous Materials

1. During normal working hours of the Nuclear Medicine Department, all couriers or common carriers delivering packages for Nuclear Medicine are to notify a Technolgoist to inspect and accept packages.

2. After working hours of the Nuclear Medicine Department, all packages containing radioactive materials shall be brought to the Emergency Room Supervisor by the carrier.

3. Emergency Room Supervisor visually checks outside containers for damage, wetness and overall condition. If container is felt to be in good condition, container may be signed for. **At no time** open any packages containing radioactive material.

4. If package is damaged or wet, Nursing Supervisor is immediately called to contact Radiation Protection Officer. Emergecy Room Supervisor to isolate area to keep area from becoming contaminated. Radiation Protection Officer to survey container to ascertain leakage. If leak is present, take proper steps to isolate and notify proper agencies.

5. If container is acceptable, place the package in the Nuclear Medicine Department and relock the door to the room.

RADIATION SAFETY OFFICER: William Mason, M.D.

Phone Numbers: Regular Work Hours - Call "X-Ray"
After Work Hours - Call Switchboard Operator

ITEM 10.6
(7/89)

PROCEDURE FOR SAFELY OPENING PACKAGES CONTAINING RADIOACTIVE MATERIAL

1. Wear gloves during package inspection and opening to prevent contamination.

2. Inspect and open all packages **IMMEDIATELY** upon receipt. Should package arrive when the Nuclear Medicine Department is closed, this procedure will receive top priority as soon as the Nuclear Medicine personnel returns. If visual inspection shows any signs of damage (if wet or crushed, etc.) stop procedure and notify the Radiation Safety Officer.

3. All radioactive packages will be surveyed at surface and at three feet to verify that the radiation levels on the surface of the package are not in excess of 200 millirems per hour, or at three feet from the external surface of the package in excess of 10 millirems per hour. If the levels are in excess of the ones indicated above, the NRC Region III will be notified by telephone.

4. Open package, remove packing slip and verify that the contents agree in name and quantity with the packing slip. Check also that shipment does not exceed possession limits.

5. If a wipe test of the package is required to be done as specified in 10CFR20.205, the wipe will be performed and analyzed as instructed in "Wipe Test Procedure" which follows.

6. Check the possible breakage of seals or container's loss of liquid or change in color of absorbing material. Wipe test the final source container to rule out contamination. (For wipe test procedure, refer to next page.)

7. Place the radioactive source in its shield and store in the Isotope Storage Area.

8. Monitor the shipment packing material for contamination after removal of the sources. Deface labels and discard.

9. Record type of activity, quantity present, date of receipt and invoice number on the radiopharmaceutical inventory form (attached).

10. If the material was packaged in dry ice, refrigerate immediately.

11. If excessive radiation levels, contamination, leakage or shortages are observed, notify the final delivering carrier and by telephone or telegraph contact the Regional Office of the Nuclear Regulatory Commission. Also notify the Radiation Safety Officer of any damage or leakage resulting in contamination.

WIPE TEST PROCEDURE

1. To be performed on all shipments, specified in Part 10CFR20.205, and on final containers of all radioactive sources.

2. To be performed as soon as practicable after receipt. If recieved during working hours, wipe test must be performed within three (3) hours; if received at some other time, within eighteen (18) hours after receipt.

3. PROCEDURE -

   a] Wipe the surface of the container over its entirety with an alcohol swab.

   b] Check the wipe using a low level GM survey meter probe with window open. The wipe should be placed in a small plastic or paper cup and the base of the cup should be centered on the open window of the probe and held in place, in contact with the probe, for approximately 10 to 15 seconds. Record the reading in mR/hr.

   If the radiation level is higher than the natural background levels in an unrestricted area, a scintillation camera detector without collimator will be used to determine the level of contamination.

ATT 10.9

RADIOPHARMACEUTICAL INVENTORY

HOSPITAL________________

	RADIATION LEVELS mR/hr		DATE OR TIME	PATIENT NAME	PATIENT No.	ACTIVITY (mCi)	VOLUME (ml)	ACTIVITY ADMINISTERED (mCi)	VOLUME ADMINISTERED (ml)	VOLUME REMAINING (ml)
DATE RECEIVED:	WIPE									
RADIOPHARMACEUTICAL:	EMPTY									
MANUFACTURER:	3 FT									
LOT #:										
EXPIRATION DATE:	SURFACE									
			ALL OF THE ABOVE RESIDUE WAS PUT IN STORAGE FOR DECAY					DATE: / /	INITIALS:	
DATE RECEIVED:	WIPE									
RADIOPHARMACEUTICAL:	EMPTY									
MANUFACTURER:	3 FT									
LOT #:										
EXPIRATION DATE:	SURFACE									
			ALL OF THE ABOVE RESIDUE WAS PUT IN STORAGE FOR DECAY					DATE: / /	INITIALS:	
DATE RECEIVED:	WIPE									
RADIOPHARMACEUTICAL:	EMPTY									
MANUFACTURER:	3 FT									
LOT #:										
EXPIRATION DATE:	SURFACE									
			ALL OF THE ABOVE RESIDUE WAS PUT IN STORAGE FOR DECAY					DATE: / /	INITIALS:	

FORM # I-9

ITEM 10.9 (4/89)

ATT 10.10

Mo99/Tc99m GENERATOR INVENTORY FORM

Mo99 CONCENTRATION LIMITS:
NO MORE THAN 0.15 µCi Mo99/1 mCi Tc99m

	RADIATION LEVEL mr/hr	DATE	TIME	Tc99 PERTECHNETATE QUANTITY (mCi)	VOLUME (ml)	CONCENTRATION mCi/ml	NET Mo99 ACTIVITY	µCi Mo99 / mCi Tc99m	DATE GENERATOR DISPOSED	GM READING mr/hr	INITIAL
DATE RECEIVED:	WIPE										
RADIOPHARMAC:	EMPTY										
MANUFACTURER:	3 Ft.										
LOT #:	SURFACE										
EXPIR. DATE:											
DATE RECEIVED:	WIPE										
RADIOPHARMAC:	EMPTY										
MANUFACTURER:	3 Ft.										
LOT #:	SURFACE										
EXPIR. DATE:											
DATE RECEIVED:	WIPE										
RADIOPHARMAC:	EMPTY										
MANUFACTURER:	3 Ft.										
LOT #:	SURFACE										
EXPIR. DATE:											

ITEM 10.10 (4/89)

CONTROL NO. 8721-1

ATT 10.12

AREA SURVEY PROCEDURES

1. All elution, preparation and injection areas will be surveyed daily with a GM survey meter and decontaminated if necessary. Results will be recorded on the form attached: "DAILY RADIATION SAFETY RECORD".

2. Laboratory areas where only small quantities of radioactive material are used (less than 200 μCi) will be surveyed monthly.

3. All the areas in the Nuclear Medicine Department will be surveyed once a week using a low-level GM survey meter. Results will be recorded. The areas surveyed are:

   A. Dose Preparation Area
   B. Generator
   C. Radioactive Material Storage
   D. Radioactive Material Waste Storage
   E. Floor Near the Dose Prep Area
   F. Tl-201 Stress Unit (if Tl-201 is used during the week)
   G. Injection Area

4. Wipe tests of areas (listed above) A-E, and F if used during the week, and injection areas will be taken once a week. The wipe will be checked in an unrestricted area (natural background radiation levels) using a low level GM survey meter with the window on the probe open. The wipe will be held for approximately 20 seconds as close to the probe as possible, without actually touching the probe.

   If the wipe indicates radiation levels above 0.10 mr/hr, the area will be secured and/or decontaminated until a wipe indicates radiation levels of 0.10 mr/hr.

ATT 10.12

DAILY RADIATION SAFETY RECORD

YEAR_____ HOSPITAL_____

Monitor your clothing and shoes, dose preparation, injection and elution areas prior to leaving the department for the day. Use a low level GM survey meter and record and initial the survey meter readings below. If radiation contamination is detected in any of the surveys, remonitor after decontamination. Record levels in mR/hr.

NATURAL BACKGROUND RADIATION LEVELS ARE: _____mR/hr

DATE	CLOTHING & SHOES	DOSE PREP AREA	INJ. AREA	ELUTION AREA	INITIAL	DATE	CLOTHING & SHOES	DOSE PREP AREA	INJ. AREA	ELUTION AREA	INITIAL

ATT ·· 12

WEEKLY AREA SURVEYS & WIP·· TESTS - [For Hospital Use]

All Levels in mR/hr U..ess Stated Otherwise

HOSPITAL _____ YEAR _____

SURVEY INSTRUMENT: Mfg _____ Model _____ Due for Calibr _____ Natural Background _____ mR/hr

Checks Source Used: _____ ;Nuclide _____ ;Activity _____ µCi; Date _____

Probe Window Open, Centered Over The Top Of The Source And In Contact With The Source

	AREA SURVEYS										WIPES									
	DOSE PREP										DOSE PREP									
DATE	L BLOCK	FLOOR	RADIO PHARM STORAGE	RADIO ACTIVE WASTE STORAGE	WORK AREA	SINK AND TRAP	INJ. AREAS	CAMERA ROOMS	STRESS LAB	GENER-ATOR	L BLOCK	FLOOR	RADIO PHARM STORAGE	RADIO ACTIVE WASTE STORAGE	WORK AREA	INJ. AREAS	STRESS LAB	ELUT-ION	SURVEY INSTR. CHECK	INITIA
	A	B	C	D	E	F	G	H	I		A	B	C	D	E	G	I			

ITEM 10.12 (4/89)

N - NOT APPLICABLE

ATT 10.14

PROCEDURES FOR USE OF IODINE 131 FOR THERAPY

1. Ordering and Handling I-131 Therapy Dose

   A. Ordering -

   The I-131 therapy dose will be ordered in capsule form.

   B. Upon receipt of the therapy dose package, it will be monitored in accordance with conditions of the NRC license.

   C. The source will then be stored in its lead shielding, in the radiopharmaceutical storage area until the time of administrating therapy.

2. Patients requiring hospitalization, and if treated with 8 mCi or more of I-131, will be placed in a private room with a toilet or a semi-private room without another patient.

3. The patient's room will be properly posted in accordance with Section 20.203, 10 CFR Part 20.

4. 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 items in the patient's chart and on the door. The results of daily surveys will be used to recalculate peritted times which will be posted on the patient's chart and on his door.

5. The form, "NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH I-131", will be completed immediately after administration of the treatment dose. A copy will be posted on the patient's chart.

6. Radiation levels in unrestricted areas will be maintained less than the limits specified in Section 20.105(b), 10 CFR Part 20.

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

8. Disposable plates, cups, eating utensils, tissue, 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 designate), checked for contamination, and disposed of as normal for radioactive waste, as appropriate.

9. 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.

10. The patient's urine will not be collected. The patient will be instructed to use the toilet and flush the toilet at least three times after each use.

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

12. If liquid I-131 is used, bioassay procedures will be done (thyroid uptake) on all employees who handle the liquid dose. This bioassay procedure will be done at 24 hours after handling the liquid dose.

    If the dose is in the capsule form, to prevent contamination of the skin (absorption of I-131 through the skin and taken up by the thyroid), the capsule will not be directly handled by the employees. Disposable gloves will be worn during the entire procedure.

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 care. 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.

2. Patients must remain in bed while visitors are in the room and visitors should remain at least three feet from the patient.

3. Radioactive patients are to be confined to their rooms except for special medical or nursing purposes, approved by the Nuclear Medicine Department.

4. No nurse, visitor or attendant who is pregnant or under the age of 18 years, 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.

5. 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 them 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.

6. 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 designatd waste container.

7. All clothing 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.

8. All non-disposable 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.

9. The patient will be instructed to void in the toilet and flush the toilet at least three times after use. If the patient is bedridden, a separate urinal or bedpan should be provided. The urinal or bedpan should be flushed several times with hot soapy water after use.

10. 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.

11. Disposable plates, cups, and eating utensils will be used by patients who are treated with Iodine-131.

12. 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. In any such situations, or if radioactive urine and/or feces is spilled during collection, call the Nuclear Medicine Department. Meanwhile, handle all contaminated material with disposable gloves and avoid spreading contamination.

13. All vomitus must also be kept in the patient's room for disposal by the Nuclear Medicine Department. 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.

14. Utmost 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.

15. 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. The 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.

16. If a therapy patient should need emergency surgery or should die, notify the Nuclear Medicine Department immediately.

17. When the patient is discharged, call the Nuclear Medicine Department and request that the room be surveyed for contamination before remaking the room.

NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH I-131

PATIENT'S NAME_____

ROOM #_____PHYSICIAN'S NAME_____

RADIOISOTOPE ADMINISTERERD_____

DATE AND TIME OF ADMINISTRATION_____

EXPOSURE RATES IN MR/HR

DATE	3 FEET FROM BED	10 FEET FROM BED
_____	_____	_____
_____	_____	_____
_____	_____	_____

COMPLY WITH ALL CHECKED ITEMS

_____1. Visiting Time Permitted_____
_____2. Visitors must remain_____from patient.
_____3. Patient may NOT leave room.
_____4. Visitors under 18 NOT permitted.
_____5. Pregnant vistors NOT permitted.
_____6. Dosimeter Badges or Pocket Ionization Chambers must be worn.
_____7. Use and complete the following tags:
  _____door
  _____bed
  _____chart
  _____wrist

_____8. Gloves must be worn while attending patients.
_____9. Patient must use disposable utensils.
_____10. All items must remain in room until ok'd by RSO
_____11. Smoking is NOT permited.
_____12. Do not release room to admitting until ok'd by RSO.
_____13. Other instructions:

IN CASE OF EMERGENCY CONTACT THE RADIATION SAFETY OFFICER

_____RSO PHONE #_____

ITEM 10.14 (4/89)

ATT 11.1 WASTE DISPOSAL

Mo99/Tc99m GENERATOR

RADIOACTIVE WASTE, STORAGE AND DISPOSAL

Radioactive waste storage and disposal can be broken down into three categories:

1. Molybdenum-99 Technetium-99m generators
2. Technetium 99m residues
3. "Long-lived" radionuclides: radionuclides with relatively longer (greater than six hours) half-life such as Selenium-75, I-131, etc.

1. Mo99m/Tc99m GENERATOR DISPOSAL

A. The current Mo/Tc99m generator used for daily elution will be stored behind the lead bricks in the hot lab. Generator systems, one week old and older, can be safely stored in their original lead shipping containers for the balance of the decay necessary to reduce levels from the generator core to those of background.

It is estimated that Mo99/Tc99m generators will be decayed for approximately two months from the date of assay; that is, about 25 half-lives. The generator core will be monitored with a low level GM survey meter and, upon reaching background level, will either be incinerated or the labels defaced and discarded.

B. In the event a return program is initiated, the generator may be sent to the supplier intact according to directions received with shipment. The date of the disposal will be recorded on the "RADIOPHARMACEUTICAL INVENTORY FORM". If returned to the supplier, the date will be recorded.

2. Tc99m COMPOUNDS

Ninety percent or more of the radioactivity used in this hospital will be associated with the use of Tc99m in its various chemical forms.

Tc99m sources and residues, i.e. contaminated syringes, needles, vials of unused Tc99m preparation and Tc99m eluents, will be stored in a plastic bag behind the lead bricks. At the beginning of the following week, the plastic bag containaing the Tc99m contaminated sources will be sealed and held in the Nuclear Medicine Department behind lead shielding. At the end of the week, the contents of the plastic bag containing the decayed compounds (every item in the bag now has been decayed for a minimum of seven days, 24 half-lives) will be brought out from their lead shielding.

The low level survey meter probe will be brought into contact with the unshielded vials and/or syringes. If the meter needle does not deflect above background levels, these formerly contaminated items will be discarded, after defacing or removing the "radioactive" labels . The date of disposal and the survey meter reading indicating background levels will be recorded on the isotope disposition form.

3. UNIT DOSE FROM A RADIOPHARMACY

All used syringes, needles and unused doses will either be stored for decay or will be returned to the radiopharmacy in containers in which the doses were received. A representative from the radiopharmacy will pick up the containers from the hospital. Records of such disposal will be maintained. Applicable Department of Transportation Regulations will be followed.

4. "LONGER HALF-LIFE RADIONUCLIDES

Radionuclides having half-lives up to and including I-131:

Such nuclides and their residues will be stored behind lead bricks. A survey will be conducted with the probe held against the unshielded source. After a period of decay of from one to three months, depending upon the nuclide's half-life, levels as measured with the lowest range on the GM survey meter in excess of background will indicate the need for a continuing period of decay. Finding levels the same as that of background will result in discarding these sources.

Radionuclides having half-lives in excess of I-131 will be diluted via the sewer as early as convenient (in compliance with 10 CFR 20.303).

A measurement of the quantity of radioactivity will be made using the dose calibrator prior to disposing of the radioactivity down the drain. Syringes, needles and vials contaminated with such radionuclides will then be rinsed three or four times and then they will be surveyed unshielded in contact with a low level GM survey meter prior to disposal.

If levels in excess of background are noted, the contaminated articles will be further rinsed until background levels are achieved. In-vitro test wastes in the laboratory will be recorded as 100% sewer-deluted, based on receipt quantity. No measurement with the dose calibrator will be made. The date and quantity of radioactivity sewer-diluterd, will be entered on the isotope disposition form. To comply with 10 CFR 20.303(b), a sample calculation for Se-75 is attached. Similar procedures will be followed for other radionuclides.

To comply with 10 CFR 20.203(d), a separate record of all types of activity sewer-diluted by this institution will also be maintained to ensure that the gross quantity of licensed and other radioactive material released into the sewer system does not exceed one curie per year.

Calculation for the quantity of Se-75 which can be sewer-diluted daily:

As specified in 10 CFR 20.303(b)(1), the average concentration for Se-75 as give in Appendix B, Table 1, Column 2, is 9×10^{-3} uCi/ml.

Quantity of Se-75 which can be sewer-diluted:

= number of beds occupied $\times 10^6 \times$ Appendix B, Table 1, Column 2, limits for Se-75

= $100 \times 10^6 \times 9 \times 10^{-3}$ uCi/day

= 900×10^3 uCi/day

= 900 mCi/day

The total quantity of all types of radioactivity sewer-diluted is not to exceed 1000 mCi/year.

RADIOACTIVE WASTE DISPOSAL RECORDS

DATE DISPOSED	RADIONUCLIDES IN WASTE (Includes Gloves Needles, Syringes Swabs, etc.)	DATES DURING WHICH THE WASTE WAS PUT IN THIS CONTAINER		GM READING (mR/hr) At time of Disposal	NATURAL BACKGROUND (mR/hr)	COMMENTS	INITIALS
		FROM	TO				

ITEM 11.1 (4/89)

CONTROL NO 8721 1