James A. Haley
Veterans Hospital

13000 Bruce B. Downs
Blvd.
Tampa FL 33612

Veterans Administration

JUL 27 1989

In Reply Refer To:

Nuclear Regulatory Commission
Region II
Suite 2900
101 Marietta Street, N.W.
Atlanta, GA 30323
ATTN: Carol Connell

Re: License Amendment for 09-15294-01

Request amendment to above referenced license to allow for the time between survey meter calibrations to conform to 10 CFR 35.51. This will be a change from semi-annual calibration to annual calibration using the current method and/or a commercial service so licensed in the state of Florida.

If further information is needed, please do not hesitate to contact this office.

Richard A Silver

RICHARD SILVER
Director

James A. Haley
Veterans Hospital

13000 Bruce B. Downs
Blvd.
Tampa FL 33612

Veterans
Administration

JUL 24 1989

Rec'd: 7/24/89 252932/-08879
252933/-29561

In Reply Refer To: 673/115

Nuclear Regulatory Commission
Region II
Suite 2900
101 Marietta Street, N.W.
Atlanta, GA 30323
ATTN: Carol Connell

Re: License Amendment for 09-15294-01 and 09-15294-03MD, Radiation Safety Guidelines

Please find attached the 1988 Revised Radiation Safety Guidelines entitled "Rules and Regulations Governing the Practice and Management of Radiation at the James A. Haley V.A. Medical Center, Tampa, Florida 33612." These have been approved by the Radiation Safety Committee to be the active and current edition superseding the previous edition.

Request your approval via license amendment to utilize these Rules and Regulations at this facility.

If further information is needed, please do not hesitate to contact this office.

Richard A Silver

RICHARD SILVER
Director

TABLE OF CONTENTS

INTRODUCTION

This guide is divided into seven chapters.

We are subject to periodic inspections by the Compliance Division of the Nuclear Regulatory Commission to insure compliance with the stipulations of the license. These inspections include monitoring checks of the laboratory areas for radiation levels, inspection of procurement use and disposition records and review of the qualifications of individual users. Violation of these or similar license requirements can result in revocation of the license. Thus it is imperative that all personnel comply with the precepts and instructions contained herein.

No Policy can cover every situation, or substitute for judgment or basic knowledge of radiation safety. Please discuss freely any questions or problems with the Radiation Safety Officer and the nuclear medicine professional staff. These people are here to help you make safe and effective use of radioactive mateials for patient care and research.

Some parts of this document outline administrative technical matter which may not necessarily apply at the time of initial promulgation of the document and may therefore be omitted from your copy.

Please remember these Rules and Regulations have the same force as Hospital Policy Memoranda. They are enforced by the United Nuclear Regulatory Commission (USNRC) which is backed by legislative and congressional authority.

ARTICLE II

GENERAL

1. The name of this Committee shall be James A. Haley Veterans' Administration Hospital Radiation Safety Committee.

2. The address and location of the Committee shall be:

   Chairman, Radiation Safety Committee
   Nuclear Medicine Service (115)
   James A. Haley Veterans Hospital
   13000 Bruce B. Downs Blvd.
   Tampa, FL 33612

3. The Radiation Safety Committee shall consist of members appointed by the Hospital Director upon the recommendation of the Chairperson of the Radiation Safety Committee and members mandated by federal requirements.

4. The following executive officers shall be named to the Committee:

   4.1. Chairman, who shall be the Chief of the Nuclear

8.1. loss of eligibility.

8.2. failure to attend Committee meetings.

8.3. inadequate participation in the Committee's affairs.

9. Under circumstances where alternates are permitted by the Committee's Rules and Regulations, all such alternates must be named and elected to the Committee. A member and alternate cannot attend the same meeting.

10. By a two-thirds majority of voting members, the Committee may appoint certain officers with properly approved credentials to carry out specific tasks within the scope of the Committee's authority. However, these powers are subject to the veto power of the Chairman and in addition must receive the Chairman's approval.

11. A conflict of interest situation shall exist when the Committee deliberates and recommends action regarding a particular authorized user who is also a member of the Committee. Such a member shall be excluded from profferment of motions and from voting by excusing himself from Committee deliberations of the matter. Conflict of interest shall not occur in the case of users who are certified by the USNRC as users in the institutional license and have American Board of Nuclear Medicine, American Board of Nuclear Medicine Sci-

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CHAPTER I

RULES AND REGULATIONS GOVERNING THE ACTIONS AND COMPOSITION OF THE RADIATION SAFETY COMMITTEE AND EXECUTIVE OFFICERS

ARTICLE I - PREAMBLE

The James A. Haley Veterans' Hospital, through its Director and the United States Nuclear Regulatory Commission (USNRC), has required the establishment of a Radiation Safety Program and a governing body, the Radiation Safety Committee, composed of specialists in the fields, representatives of the administration and main hospital services.

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2. The address and location of the Committee shall be:

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Tampa, FL 33612

3. The Radiation Safety Committee shall consist of members appointed by the Hospital Director upon the recommendation of the Chairperson of the Radiation Safety Committee and members mandated by federal requirements.

4. The following executive officers shall be named to the Committee:

4.1. Chairman, who shall be the Chief of the Nuclear

Medicine Service.

4.2. Vice Chairman shall be Associate Chief of Nuclear Medicine Service.

4.3. Secretary or Assistant Radiation Safety Officer.

5. There shall be both permanent and three-year term appointments to the Committee.

6. A description of each member's TRAINING and EXPERIENCE shall be on file and must be available for inspection by the relevant authorities. (See Appendix I for the titles of the individuals presently appointed to the Committee and their terms of office.) All members shall be approved by the USNRC.

7. A Committee Member may resign at any time upon written notice to the Committee Chairman at least 15 days prior to the effective date.

8. A Committee Member shall be removed only for good cause and only by the USNRC upon the recommendation of the Committee. This vote shall be by secret ballot.

Good cause shall include but is not limited to:

8.1. loss of eligibility.

8.2. failure to attend Committee meetings.

8.3. inadequate participation in the Committee's affairs.

9. Under circumstances where alternates are permitted by the Committee's Rules and Regulations, all such alternates must be named and elected to the Committee. A member and alternate cannot attend the same meeting.

10. By a two-thirds majority of voting members, the Committee may appoint certain officers with properly approved credentials to carry out specific tasks within the scope of the Committee's authority. However, these powers are subject to the veto power of the Chairman and in addition must receive the Chairman's approval.

11. A conflict of interest situation shall exist when the Committee deliberates and recommends action regarding a particular authorized user who is also a member of the Committee. Such a member shall be excluded from profferment of motions and from voting by excusing himself from Committee deliberations of the matter. Conflict of interest shall not occur in the case of users who are certified by the USNRC as users in the institutional license and have American Board of Nuclear Medicine, American Board of Nuclear Medicine Sci-

ence, or American Board of Radiology certification with special competence in nuclear radiology as their main, primary, or only certification (subspecialty certification is excluded) unless the said member is offering research.

ARTICLE III

REGULATIONS REFERABLE TO THE COMPOSITION OF THE COMMITTEE

The James A. Haley Veterans' Hospital Radiation Safety Committee shall be composed by:

1. Those members mandated by regulatory agencies including but not limited to the USNRC. It will include:

   1.1. A representative of the institution's top management.

   1.2. A representative of Nursing Service.

   1.3. A representative of each Service that uses by-product material.

   A representative of each type of use NRC Group I through VI.

   1.4. The institution's Radiation Safety Officer.

2. Scientists and physicians with special competence in radiation and its effects and individuals who by nature of their work may interact with radiation sources, may serve on the Committee.

ARTICLE IV

AUTHORITY OF THE COMMITTEE

GENERAL:

1. The Radiation Safety Committee, established by the authority of the Director of the Hospital and the USNRC is the administrative body responsible for the safe use of radiation within the Hospital and establishes the radiation protection requirements for ALL hospital employees and officials. The Committee is directly responsible to the Hospital Director and to the USNRC to which body all nominations are submitted. The main function of the Committee is the administration governance and surveillance of the Hospital's radiation protection program. The Committee has the authority and responsibility for approval and disapproval of all proposals for radionuclide use prior to the purchase of the materials from the standpoint of radiological health and safety of patients or working personnel, the consideration of the adequacy of the facilities and equipment and the user's knowledge of safe practices and emergency procedures. It prescribes special conditions that will be required during the proposed use of radioactivity such as bioassay of users and a minimal level of certification, training, and experience of users. It is further required to insure that all users are familiar with good practice of and teach the basic precepts of radiation protection to all coworkers and to those workers who may be dependent upon the actions of users and coworkers.

The Radiation Safety Committee also has the responsibility for approval and supervision of all equipment that produces radiation in excess of 0.5 mrem per hour at 5 cm. from any accessible surface of such equipment averaged over an area of 10 cm^2. The Committee is responsible to insure compliance with all rules and regulations as described in applicable parts of Title 10 Code of Federal Regulations and the Institution's by-product materials license including the ALARA philosophy. The Committee will govern and control the activities of its Executive Officers.

2. The Chairman shall preside at all meetings of the Committee and shall appoint the membership of all subcommittees and shall designate the subcommittee chairman. The Chairman may assign such additional duties to other members or groups of members of the Committee as deemed necessary to assist him/her in the conduct of the work of the Committee.

3. The Vice Chairman shall preside should the Chairman be unavoidably absent. Otherwise the Vice Chairman shall assist the Chairman as required.

4. The Radiation Safety Officer (RSO) shall assist the Chairman in the scheduling and correspondence activities of the Committee. In addition, he will have liason duties with the hospital Director to ensure the proper and timely interaction between the Committee and the hospital administration. The Radiation Safety Officer shall

also have duties assigned elsewhere in these Rules and Regulations which shall offer scope for judgement and initiative. (See Article V). The Radiation Safety Officer with the concurrance of the Chairman of the Committee may delegate the recording secretary function to another person so that the Radiation Safety Officer's business may be conducted more expeditiously.

5. The Committee will establish general policies, rules, regulations and procedures to govern the use of ionizing radiation at the hospital.

6. The Committee will oversee the education of users in the field of radiation handling, in the ALARA principle and in good radiation protection procedures in the use of radioactivity in diagnosis, therapy, research, and teaching. This includes the education of all members of the hospital community in the proper habits of thought regarding radiation protection at all times, including such times of radiation accident and/or disaster.

7. The Committee will provide a program of area and personnel monitoring to insure good radiation health practice throughout the hospital and to maintain individual and collective exposure below action levels as determined by the Committee consistent with the ALARA Program. The Committee shall determine the action levels and the nature of action to be carried out should exposure or practices exceed any given level. The Committee's action will be determined

by the extent that the given level is exceeded and the RSO appropriately instructed in regard to remedial action.

8. The Committee will direct activities of the RSO. The RSO will have the authority to act on behalf of the Committee and independently in an urgent situation.

9. The Committee will determine and elaborate a Radiation Disaster Response Plan and the coordination of this plan with other hospitals in the local community as required by regulatory agencies and in cooperation with the Florida State safety agencies.

10. The Committee will perform an annual review and update, as necessary, of the "Rules and Regulations Governing the Practice and Management of Radiation" which will be reviewed by the Committee at its November meeting.

11. The Secretary of the Committee will hold an agenda meeting with the Chairman (see Article V.5,7,8,9,10) three weeks prior to each Committee meeting date so that the agenda may be distributed for the convenience of members. Minutes of the Committee will be available in rough draft within two weeks of the Committee's meeting.

12. At the option of the Committee Chairman, certain proposals which require urgent consideration may receive temporary approval by the use of a mechanism of telephone poll (see appendix IV for details

and procedures).

ARTICLE V

THE RADIATION SAFETY OFFICER (RSO)

1. The RSO as Director of the Radiation Safety Program shall be a scientist from the Nuclear Medicine Service. He may delegate certain duties to an assistant if required.

2. The RSO shall be qualified by training and experience in radiation protection. He shall be available for advice and assistance on all radiological safety matters.

3. The RSO is responsible directly to the Chairman of the Radiation Safety Committee and through him directly to the Hospital Director and the USNRC.

4. The RSO will maintain surveillance of all activities involving ionizing radiation.

5. He shall develop a Quality Assurance Program in written form for the Committee's assessment and acceptance. He shall review this program annually and provide the Committee with reports on it's activities and it's continual improvement.

6. He shall enforce the Hospital's Radiation Health Policies.

7. He has the authority to terminate misuse of ionizing radiation without referral to the Radiation Safety Committee by direct delegation of the authority from the USNRC and the Hospital Director.

8. He shall develop educational programs in good practices and mechanisms to maintain compliance with the radiation control agencies rules and regulations with particular reference to the ALARA Program.

9. He shall insure that a radiation safety education program is maintained and held annually at least two weeks prior to meeting of the Committee, during November and of each year.

10. He is responsible for the maintenance of records of acquisition, storage, use, and disposal of radioactivity at this hospital and shall produce summaries at the meetings in November and May of each year of the Committee. He will follow appropriate regulations.

11. He is responsible for the submission to the Radiation Safety Committee of inventory of all radioactivity twice yearly the Committee's Meetings during May and November and shall present a summary of inflow and outflow of radiation to and from the hospital.

12. He is responsible for determining compliance with the Rules and

Regulations and the standards of compliance including the mechanisms to obtain and foster improved compliance. He will insure that the license conditions specified by the Radiation Safety Committee are carried out fully.

13. He reports semiannually to the Committee, this is in November and May of each year, on the following: (These items shall constitute the major headings of the Radiation Safety Officer's report to the Committee.)

13.1. The status of personnel monitoring devices and the compliance with the ALARA Program including inventory summaries.

13.2. The results of leak tests on sealed sources by or under the direction of the Radiation Safety Officer.

13.3. Actions that were taken to correct misuse of ionizing radiation.

13.4. The status of changes in user authorization.

13.5. The status of regulatory compliance including results of surveys.

14. He will furnish consulting services on all aspects of radiation health and protection of personnel at all levels of responsibility as required by USNRC.

15. He is responsible for the determination of the need for recording of inspection and reporting of all bioassay procedures to the Committee and relevant supervisors, and any exposure exceeding ALARA limits together with the recommendation for insuring adequacy of remedial action.

16. He will post notices and control access to restricted areas, radiation areas, and high radiation areas as required.

17. He will supply emergency procedures and instructions concerning spills and accidental contamination to personnel including decontamination procedures. Unacceptable and acceptable levels of contamination shall be listed in the instructions to users of radioactivity.

18. He is in charge of distributing and processing of personnel monitoring equipment, determining the need for and the evaluation of bioassays in keeping with personnel exposure and bioassay records, and notifying individuals and their supervisors of exposures approaching the maximum permissable amounts and recommend appropriate remedial action.

19. He shall monitor compliance with the action level set by the Committee for radiation exposure of hospital personnel, investigate any exposure in excess of action levels and maintain an account of the investigation including the cause of exposure, corrective action, and the followup action as required.

ARTICLE VI

MEETINGS AND ORDER OF BUSINESS

1. The meetings of the Radiation Safety Committee will occur on calender quarters of the year.

2. Additional meetings of the Radiation Safety Committee may be held at the call of the Chairman.

3. The order of business of the Committee will contain standard items: Robert's Rules of Order will be used and all contributors will address the Chair. (See Appendix III.)

4. Each member of the Committee or it's subcommittees shall receive written notice of all statutory meetings at least 15 days prior to the scheduled meeting.

5. All members of the Committee are required to be present at statutory meetings.

6. A quorum of the Committee shall be present if all permanent members (or their alternates) are present. It is to be noted additionally that an administrative representative is required to be present at all meetings of the Committee.

7. No business shall be transacted in the absence of a quorum.

8. The Rules and Regulations of the Committee may be amended by the USNRC or by three-fourths majority of the Committee with prior approval of the USNRC.

CHAPTER II

POLICIES GOVERNING ACQUISITION, UTILIZATION AND DISPOSAL OF RADIOACTIVITY

POLICIES RULES AND REGULATIONS FOR INVESTIGATOR AUTHORIZATION FOR USE OF RADIOACTIVITY

A separate application is required for each project in which it is planned to use radionuclides. Four basic categories of use have been identified: 1) in-vitro laboratory, 2) lower animal research, 3) routine diagnostic human use, and 4) nonroutine human use. Each use category requires appropriate training and experience.

2.1. POLICIES, RULES AND REGULATIONS GOVERNING INVESTIGATOR AUTHORIZATION - GENERAL

The principal investigator will call on the Radiation Safety Officer (RSO) whenever he is considering a project involving ionizing radiation. The RSO will discuss the project and application with the investigator to assess potential problems before the protocol is submitted, and to point out those areas that may require specific attention.

Upon completion, the application should be forwarded to the Chairman of the Radiation Safety Committee. Action of the Committee will be returned to the applicant. If the application is approved, one copy will be sent to the Radiation Safety Officer and the signed original will be returned to the investigator for submission to the Research and Development Committee.

Any significant changes in the project must be brought to the attention of

the RSO as soon as possible.

Each authorization will be marked with an expiration date, which will usually be two years after the month of approval. The investigators should anticipate the expiration of their projects by at least one month in order to apply for renewal of the authorization. For this purpose, it is necessary to submit a memorandum requesting renewal of the application without modification. If modifications are proposed, these shall be clearly described.

Resubmission of the changes for approval by the Radiation Safety Committee may be necessary.

If questions regarding details of an application should arise in the course of the Committee's consideration, the investigator may be invited to meet with the Committee and discuss the details of his proposal.

2.2. IN-VITRO LABORATORY APPLICATIONS

a. Investigators applying for this type of use must have the following qualifications:

1. A working knowledge of the principles and practices of radiological health safety, radioactivity measurements, standardization and monitoring techniques, instrument use, biological effects of radiation, and mathematics and calculations basic to the use and measurement of radioactivity.

2. Experience in the use of the radioactive materials for the types and quantities for which the application is being made, or an equiva-

lent experience.

b. The application must contain the following:

1. A copy of the protocol submitted to the Research and Education Committee.

2. "Request to Use Radioactive Materials" (Appendix IV).

2.3. LOWER ANIMAL RESEARCH APPLICATIONS

a. Investigators applying for this type of use must satisfy the preceding requirements and must also have experience or training in the handling of radioactive animals.

b. Applications must include the following, in addition to the information listed under in-vitro applications:

1. The type of animal to be used, and the maximum and the average number to be used in the study.

2. The isotope and amount to be given to each animal, the frequency that the dose is given, and the effective half-life of the isotope in the animal.

3. The estimates of the exposure rates at one meter from the animal cages.

4. A list of the safety precautions that will be given to the Animal Research Facilities personnel.

2.4. ROUTINE DIAGNOSTIC HUMAN USE APPLICATIONS

a. Diagnostic human use applications fall into the same category as "routine use" as defined by the Nuclear Regulatory Commission. A listing of acceptable routine uses is listed in the NRC Licensing Guide for Medical Programs.

b. Investigators applying for this type of use must satisfy the NRC requirements for physicians as stated in the Licensing Guide for Medical Programs (Appendix VI).

c. The Radiation Safety Committee will accept the same format and forms that are submitted to the Human Use Committee and Research and Development Committee (Appendix IVB). Expansion of Section VI.C.1. Methods of Procedure to include the following is necessary:

a. General

b. Procedures containing radiation risk

d. Applications must also include the following:

1. A description of the laboratory facilities.

2. A description of the methods used to insure radioisotopic purity, sterility and nonpyrogenicity, if the radioisotopic compound is not obtained in sterile pyrogen free form from the manufacturer.

3. A statement of the method to be used to monitor for radioactive contamination.

4. "Request to Use Radioactive Materials" (Appendix IV)

2.5. PROCUREMENT OF RADIONUCLIDES

a. The person ordering radioactive materials must assure compliance with the terms of the license issued by the Nuclear Regulatory Commission and the regulations imposed by this hospital. Before ordering, it must be assured that:

1. The department has an approved protocol for the radionuclide compound on file with the Radiation Safety Office.

2. The millicurie units ordered will not exceed the department's limits or the hospital's license limits.

3. The department's radionuclide inventory cards on file with the Radiation Safety Officer are up-to-date.

4. The purchase order is properly completed.

b. After receipt of notice of approval from the Radiation Safety Committee, the radionuclide may be requisitioned in the usual manner by filling out a VA Form 07-2237. The purchase order with eight attached copies is to be completed in accordance with the enclosed sample (Appendix IV) and must be properly signed. Purchase orders for radioactive materials

should not contain requests for nonradioactive materials or other laboratory supplies and shall be clearly labeled with the words "RADIONUCLIDE ORDER".

c. After the purchase order is completed, it shall be routed through Radiation Safety Officer for approval. Once approved, the Nuclear Medicine Service will place the order.

d. Any purchase orders placed by outside agencies, such as hospitals or universities, for radiactive materials that are to be delivered to this hospital must also be approved by the Radiation Safety Officer.

e. All orders for radionuclides that are not approved will be returned to the requesting department along with a memorandum stating the reasons for disapproval.

f. The Radiation Safety Officer receives all radioactive materials delivered to the hospital. He will notify the investigator by telephone upon delivery of a radionuclide. The retained copy of the purchase order will serve as a reference for the proper disposition of the material.

g. The shipper must notify the Radiation Safety Officer when radioactive material is to be shipped from the h

2.6. RULES AND REGULATIONS FOR RECEIVING AND THE INITIAL MONITORING OF PACKAGES

a. All shipments of radioactive materials received by the VA Hospital shall be delivered immediately to the appropriate users or locked in Rooms C-03 or C-04 for temporary storage. If package appears stained or damaged in any way, notify Radiation Safety Officer immediately.

b. All radioactive shipments received are logged in the Radioisotope Receipt Log in the Nuclear Medicine Service. Each item is given a separate log and the following data is listed: (1) date of receipt, (2) P.O. Number, (3) shipper, (4) compound, (5) nuclide, (6) lot number, (7) quantity in ml., (8) activity in mCi, (9) monitoring data, and (10) user, if other than Nuclear Medicine. A record of disposal date is also kept here.

c. Wearing gloves, the following will be carried out on all packages containing radioactive materials.

1. A visual inspection of the package for external damage or leakage stains.

2. Determine if exempt from required inspection.

(a) if exempt - continue when practical

(b) if not exempt - continue within 3 hours if received during normal working hours or 12 hours if received after normal working hours.

3. Measure the external exposure rate of the package. If exposure rate exceeds 10mR/hr at 3 ft. or 200mR/hr at the surface, proceed with caution and expedite notification of the NRC Regional Office of Inspection and Enforcement by phone (404-526-4503) and telegraph.

4. If outer package shows signs of damage or leaks, or if required by CFR Title 10, Part 20.205 wipe 100 sq. cm. of package surface and count with appropriate system. If wipe test indicates contamination in excess of 0.01uCi (22,000 DPM), proceed with caution and expedite notification of the NRC.

5. Open package and inspect for signs of internal damage (i.e. discoloration of packing material, breakage of seals, loss of liquid, etc.). Verify vial contents against packing slip.

6. Monitor the packing material and packages before discarding:

(a) if contaminated, treat as radioactive waste

(b) if not, obliterate radiation labels before discarding in regular trash

2.7. RULES AND REGULATION GOVERNING UTILIZATION AND INVENTORY OF RADIONUCLIDES

a. Under the provisions of the license issued to this hospital by the

Nuclear Regulatory Commission, we are limited to certain millicurie amounts of radioactive materials that can be in our possession at any one time. The NRC also requires that detailed records be maintained of the receipt, use, and disposal of all radioisotopes in this hospital.

b. Each department is limited as to the types of radionuclides, and to the millicurie units of activity that it may have in its possession at any one time. These limits are determined by the current radioisotope inventory and by the needs of each department as indicated by the radioisotope project protocols on file with the Radiation Safety Officer. The limits will be set by the Radiation Safety Committee and will be reviewed periodically. Temporary increases in the permitted limits may be obtained through the Radiation Safety Officer.

c. Radioisotope inventory cards (Appendix IV) are completed on all radioactive material received. These cards are to be maintained by the user as an inventory with an accurate record of use and mode of disposal. Upon disposal of the isotope, the card is to be returned to Nuclear Medicine as part of the permanent facility records.

d. All inventory cards and records shall be made available to the Radiation Safety Officer upon request.

e. See also Chapter I, Article V, paragraph 13 for additional inventory requirements.

2.8. INTERDEPARTMENTAL TRANSFER OF RADIOACTIVE MATERIALS

a. No radioactive materials shall be transferred between Institutions or Departments without the prior knowledge and approval of the Radiation Safety Officer.

b. Inventory cards will be issued to the receiving department for each vial picked up. The cards from the shipping department can be closed out by indicating that the activity was transferred to another department.

2.9. RADIOACTIVE WASTE DISPOSAL

a. Radioactive wastes may not be placed in the normal waste containers to be collected by housekeeping personnel, except as noted below. Liquid wastes may not be discharged into the sewer except as noted below. Animals that have received radioisotopes shall not be incinerated, except as noted below.

b. Each laboratory having radioactive wastes must be equipped with at least one container for solid dry waste and one for liquid waste.

c. Solid dry waste containers must be fitted with a disposable polyethylene liner. The container must be fitted with a securely fitting cover so that the waste will not spill out of the container were it to be tipped over. The container shall be labeled with the radioactive caution sign (Appendix VI). Plastic bags with "sharps", i.e., pipet tips, broken glass, etc., shall be placed in a cardboard box and sealed.

d. High density, high quality polyethylene jugs or bottles are suitable for temporary storage of liquid wastes. Caution should be used when

organic liquids are stored in certain plastic containers. If the liquid waste container is glass or ceramic, then it must be kept in such a manner that if accidentally broken, the contents will be retained in a small restricted area, e.g., having it sit in a large pan. Securely fitting covers or impervious stoppers must be used. Containers shall be conspicuously labeled with a radioactive caution sign along with the type of radioisotope contained in them (See Appendix VII).

e. All radioactive animal carcasses shall be placed in a polyethylene bag and labeled. These bags are then placed in the freezer marked for radioactive material in Building 2, Room 18 (See Appendix VII for satisfactory label).

f. Proposed procedures involving unusual waste disposal problems will be considered individually by the Radioisotope Committee or by the Radiation Safety Office.

g. Solid, liquid, and animal carcass waste will be collected outside of Room 18 on the first and third Mondays of each month. Each item must be labeled with the following information: isotope, amount, date, and investigator's name.

h. Dilute solutions of radioactive material which are readily soluble may be discharged into the sewer provided that the concentration in water is not greater than the maximum permissible concentrations stated in 10 CFR, Chapter I, Part 20. (See Appendix VIII) and that it is cleared with the Radiation Safety Officer.

i. Liquid scintillation vials, specifically C-14 and H-3, should be prepared for incineration on the first and third Mondays of each month by placing the vials in a cardboard box of less than two cubic feet volume.

The box should be secured from opening by sealing with strapping tape.

2.10. RULES AND REGULATIONS GOVERNING RADIOACTIVE WASTE DISPOSAL

1. The RSO shall ensure that all radioactive waste is disposed of in a proper manner.

2. All radioactive waste containing potentially infectious biohazardous or other biohazardous material shall be properly labelled and placed in the appropriate containers when the contents are not only radioactive.

3. The RSO shall ensure that sharp materials ("sharps") e.g. pipette tips, needles, broken glass are placed in proper containers which will not permit penetration.

4. The RSO shall ensure that Principal Investigators (PI's) are aware of, actively participate in, and educate their personnel in proper waste disposal practices.

B. PRINCIPAL INVESTIGATORS (PI) are required to maintain accurate and up-to-date disposal logs of all radioactrivity used in their areas. They are also required to ensure that waste is properly labelled with the nature and amounts of radionuclides contained in each package to be disposed of.

1. When radioactive waste contains potentially biohazardous material such containers shall be so labelled as instructed by the RSO.

2. PI shall ensure that their colleagues, associates and subordinates are conversant with the proper procedures, their responsibilities and are educated in the prevailing and proper practices of radioactive biohazardous and chemical waste disposal techniques as these apply to their areas of activ-

ity.

C. CHIEF NUCLEAR MEDICINE SERVICE is responsible for the proper disposal of radioactive biohazardous, infectious and chemical waste. The Nuclear Medicine Service will therefore:

1. Ensure that all radioactivity is disposed of in a proper manner. Since this is mostly short physical half life material, the most effective disposal procedure is storage until complete decay (eg. 10 physical t1/2.). Dependent on the resultant compound disposal will be either as clean waste via the sewer or in the normal waste.

2. Should radioactivity be associated with biohazardous waste the waste shall be so labelled and disposed of via proper channels.

3. The material to be treated as hazardous shall be disposed of by and under the supervision of the Hazardous Material Officer.

4. The co-ordination of this process within the service shall be assigned to a given individual.

In this Institution, this individual is designated as the Chief Technologist, Nuclear Medicine Service.

a. Radioactive wastes may not be placed in the normal waste containers to be collected by housekeeping personnel, except as noted below. Liquid wastes may not be discharged into the sewer except as noted below. Animals that have received radioactivity shall not be incinerated, except as noted below.

b. Each laboratory having radioactive wastes must be equipped with at least one container for solid dry waste and one for liquid waste.

c. Solid dry waste containers must be fitted with a disposable polyethylene liner. The container must be fitted with a securely fitting cover so that the waste will not spill out of the container were it to be tipped over. The container shall be labelled with the radioactive caution sign (Appendix VII). "Sharps" i.e., pipette tips, broken glass, etc., shall be placed in a box and sealed, and labelled.

d. High density, high quality polyethylene jugs or bottles are suitable for temporary storage of liquid wastes. Caution should be used when organic liquids are stored in certain plastic containers. If the liquid waste container is glass or ceramic, then it must be kept in such a manner that if accidentally broken, the contents will be retained in a small restricted area, e.g., having it sit in a large pan. Securely fitting covers or impervious stoppers must be used. Container shall be conspicuously labeled with a radioactive caution sign along with the type of radioisotope of radioisotope contained in them (Appendix VII).

e. All radioactive animal carcasses shall be placed in a polyethylene bag and labeled. These bags are then placed in the freezer marked for radioactive material in Building 2, Room 18 (See Appendix VII).

f. Proposed procedures involving unusual waste disposal problems will be considered individually by the Radioisotope Committee or by the Radiation Safety Office.

g. Solid, liquid, and animal carcass waste will be collected outside of wasteroom on the designated days of each month. Each item must be labeled with the following information: isotope amount, date and investigator's name.

h. Dilute solutions of radioactive material which are readily soluble

may be discharged into the sewer provided that the concentration in water is not greater than the maximum permissible concentrations stated in 10 CFR, Chapter I, Part 20. (See Appendix VII.)

i. Liquid scintillation vials, specifically C-14 and H-3, should be prepared for incineration on the designated days of each month by placing the vials in a cardboard box of less than two cubic feet volume. The box should be secured from opening by sealing with strapping tape.

A. PROPER MARKING OF LABORATORIES, AREAS, AND EQUIPMENT

a. All laboratory areas where radioactive biohazardous materials are being used shall have the appropriate sign conspicuously posted on the doors. The name and phone number of the individuals responsible for the posted area shall be shown in the designated place on the sign in order to facilitate contact in case of emergency. The supervisor shall be responsible for seeing that the posted information is current. The signs shall not be removed from any room except by radiation safety personnel following an inspection survey.

b. All storage areas shall be conspicuously marked with the appropriate sign. In addition, containers in which materials are transported or stored shall bear a durable, clearly visible label bearing the radiation caution symbol and the words "CAUTION RADIOACTIVE MATERIAL" in addition to other appropriate signs.

c. The type of warning sign necessary depends on the amount of activity present. Signs should be placed accordingly (See Appendix VI Radiation Safety Officers Guide to the safe handling of radioisotopes revised 1985).

d. All equipment contaminated with rdioactive material shall be marked

with signs, decals or other conspicuous means. Labeling shall not be required for laboratory containers such as beakers, flasks, and test tubes used transiently in laboratory procedures during the presence of the user.

B. SHIELDING AND SECURITY OF SOURCES.

a. Radioactive sources or stock solutions in the laboratory shall be shielded in such a manner that the radiation levels in any occupied area will not expose individuals in that area to more than 50 mR/week (1.1 mR/hr for 40 hr. week).

b. Various shielding materials should be readily available. Radiation Safety Officers Guide to the safe handling of radioisotopes revised 1985.

c. Laboratories containing radioactive materials in amounts greater than 10uCi will be locked when unattended.

C. AEROSOLS, DUSTS, AND GASEOUS PRODUCTS.

a. Procedures involving aerosols, dusts, or gaseous products, or procedures which might produce airborne contamination shall be conducted in a properly filtered hood, dry box, or other suitable closed system.

b. Radioactive gases shall be stored in gas tight containers and must be kept in areas having appropriate ventilation as in "C.a." above.

c. Suitable air monitoring equipment shall be kept available.

D. LABORATORY WORK SURFACES.

All work areas (bench tops, hoods, etc.) as well as storage areas and areas adjacent to permanent setups and sinks should be covered at all times with stainless or plastic trays, uncracked glass plates, or other impervi-

ous materials. For some purposes, absorbent paper with plastic backing will be satisfactory. However, if such paper is used, it should be discarded frequently to prevent radioactive materials from dusting off the surface.

E. REMOVAL OF EQUIPMENT FROM THE LABORATORY.

Equipment once used for radioactive substances shall not be used for other work or sent from the laboratory to cleaning facilities, repair shops, surplus, or returned to the source of supply, until demonstrated to be free from contamination.

F. REPAIR AND MAINTENANCE OF EQUIPMENT IN THE LABORATORY.

Equipment to be repaired by shop and maintenance personnel or by commercial service contractors shall be demonstrated to be free of contamination prior to servicing. If it becomes necessary to make emergency repairs on contaminated equipment, the work will be supervised by radiation safety personnel who will assure that the necessary safeguards are taken. It is the responsibility of the laboratory personnel to request this supervision from the radiation safety officer.

G. HOSPITAL VACUUM LINES.

Hospital vacuum lines are vulnerable to contamination. If hospital vacuum lines are to be used, precautions must be taken to ensure that the withdrawn gas is free of radioactivity and biohazardous material. It is most advisable to use a separate vacuum system whenever possible, or to use a separate vacuum pump exhausting into a hood.

H. CONTAMINATION IN RADIATION AREAS.

No uncontrolled radioactive or biohazardous contamination will be tolerated. Certain hood trays, dry boxes, stainless steel trays, or other equipment which is used frequently for radioactive or biohazardous work may become temporarily contaminated. All of these must be clearly marked with the standard radiation caution signs or stickers. Any contamination that is not confined to protected surfaces should be reported immediately to the radiation safety officer, and decontamination procedures should be started. After decontamination, the area or equipment will be considered contaminated until proven otherwise by the radiation safety officer and/or the Infection Control Nurse.

I. This appropriate labelling use of forms and covering for hazardous non-radioactive material will be coordinated through the Radiation Safety and the Hazardous Materials Officer. These May be reached at extensions:

Hazardous Materials Office: Ext. 7077

Radiation Safety Office: Ext. 6673

J. Using required copies of Materials Safety Data Sheets, VA Form 90-2237 Request for Supplies (both delivery and turn in), Uniform Hazardous Waste Manifest, disposal certification and other supporting documents. All such records shall be maintained in an orderly and current manner indefinitely.

CHAPTER III

POLICIES GOVERNING USE OF RADIOACTIVITY IN AREAS OF USE

3.1. Proper marking of Laboratories, Areas, and Equipment

a. All laboratory areas where radioactive materials are being used shall have the appropriate sign conspicuously posted on the doors. The name and phone number of the individuals responsible for the posted area shall be shown in the designated place on the sign in order to facilitate contact in case of an emergency. The supervisor shall be responsible for seeing that the posted information is current. The signs shall not be removed from any room except by radiation safety personnel following an inspection survey.

b. All storage areas shall be conspicuously marked with the appropriate sign. In addition, containers in which materials are transported or stored shall bear a durable, clearly visible label bearing the radiation caution symbol and the words "CAUTION RADIOACTIVE MATERIAL".

c. The type of warning sign necessary depends on the amount of activity present. Signs should be placed accordingly (See Appendix VI).

d. All equipment contaminated with radioactive material shall be marked with signs, decals, or other conspicuous means. Labeling shall not be required for laboratory containers such as beakers, flasks, and test tubes used transiently in laboratory procedures during the presence of the user.

3.1A. Shielding and Security of Sources

a. Radioactive sources or stock solutions in the laboratory shall be shielded in such a manner that the radiation levels in any occupied area will not expose individuals in that area to more than 50 mR/week (1.1 mR/hr for 40 hr. week).

b. Various shielding materials should be readily available.

c. Laboratories containing radioactive materials in amounts of 10uCi will be locked when unattended.

3.1B. Aerosols, Dusts, and Gaseous Products.

a. Procedures involving aerosols, dusts, or gaseous products, or procedures which might produce airborne contamination shall be conducted in a hood, dry box, or other suitable closed system.

b. Radioactive gases shall be stored in gas tight containers and must be kept in areas having approved ventilation.

c. Suitable air monitoring equipment shall be kept available.

3.1C. Laboratory Work Surfaces.

All work areas (bench tops, hoods, etc.) as well as storage areas and areas adjacent to permanent setups and sinks should be covered at all times with stainless steel or plastic trays, uncracked glass plates, or other impervi-

ous materials. For some purposes, absorbent paper with plastic backing will be satisfactory. However, if such paper is used, it should be discarded frequently to prevent radioactive materials from dusting off the surface.

3.1D. Removal of Equipment from the Laboratory.

Equipment once used for radioactive substances shall not be used for other work or sent from the laboratory to cleaning facilities, repair shops, surplus, or returned to the source of supply, until demonstrated to be free from contamination.

3.1E. Repair and Maintenance of Equipment in the Laboratory.

Equipment to be repaired by shop and maintenance personnel or by commercial service contractors shall be demonstrated to be FREE OF CONTAMINATION PRIOR to servicing. If it becomes necessary to make emergency repairs on contaminated equipment, the work will be supervised by radiation safety personnel who will assure that the necessary safeguards are taken. It is the responsibility of the laboratory personnel to request this supervision from the radiation safety officer.

3.1F. Hospital Vacuum Lines.

Hospital vacuum lines are vulnerable to contamination. If hospital vacuum lines are to be used, precautions must be taken to ensure that the with-

drawn gas is free of radioactivity. It is most advisable to use a separate vacuum system whenever possible, or to use a separate vacuum pump exhausting into a hood. A volume trap must be used to prevent vacuum line contamination.

3.1G. Contamination in Radiation Areas.

No uncontrolled radioactive contamination will be tolerated. Certain hood trays, dry boxes, stainless steel trays, or other equipment which is used frequently for radioactive work may become temporarily contaminated. All of these must be clearly marked with the standard radiation caution signs or stickers. Any contamination that is not confined to protected surfaces should be reported immediately to the radiation safety officer, and decontamination procedures should be started. After decontamination, the area or equipment will be considered contaminated until proven otherwise by the radiation safety officer.

3.2 REGULATIONS FOR THE USE OF RADIOINUCLIDES

a. Do not smoke, eat, or drink in radioisotope laboratories. It is recommended that eating be done in the cafeteria or other designated areas.

b. Do not bring food or food containers into radioisotope labs. Refrigerators shall not be used jointly for foods and radioactive materials.

c. Wash hands and arms thoroughly before handling any object which goes to the mouth, nose, or eyes (e.g., food, cigarettes, cosmetics).

d. Use pipette filling devices. NEVER PIPETTE RADIOACTIVE SOLU-

TIONS BY MOUTH.

e. Wear disposable gloves whenever there is a possibility of contamination when handling radioisotopes.

f. Keep fingernails short and clean.

g. Label radioactive solutions and materials appropriately as radiation hazards. Keep or tranport materials in such a manner as to prevent breakage or spillage (use double container).

h. Do not perform radioactive work outside exhaust hoods or glove boxes until serious consideration has indicated that it would be radiologically safe to do so.

i. Keep the laboratory neat and clean. The work area should be free from equipment and materials not required for the immediate procedure.

j. Notify the supervisor and radiation safety officer immediately in the event of any radiological emergency. (See CHAPTER IV Radiological Health Emergencies.)

k. After each procedure involving radioactive materials, the user should monitor the work area to assure that there has been no contamination.

l. The individual responsible for radioactive contamination will be required to perform the major portion of any decontamination, under the supervision of the radiation safety officer.

m. Use one or more of the following items to prevent permanent contamination of working surfaces: plastic or stainless steel trays, plate glass, absorbent paper, or stripable paint.

n. Dispose of radioactive waste carefully and in conformance with these regulations.

o. Before allowing any physician to treat you with radiation for a disease, be certain that he knows you are a radiation worker. This does not apply to X rays used for diagnostic purposes as an NRC regulation.

p. Pregnant women must exercise special precautions against exposure to radiation, since present knowledge of radiation effects on the unborn child is incomplete.

3.3 PRINCIPAL INVESTIGATOR RESPONSIBILITY

Investigators who use radioisotopes are responsible for insuring that the individual responsiblities previously listed are discharged by those under their control. They are further responsible for:

a. Planning adequately for the experiments. Before an experiment is performed, the supervisor should determine the types and amounts of radiation or radioactive materials to be used. This will generally give a good indication of the protection required. The procedure must be well outlined. In many cases, before the procedure is actually performed with radioactive materials, it should be rehearsed. In any situation where there is appreciable radiation hazard, the radiation safety officer should be consulted before proceeding.

b. Instructing those employees, for whom they are responsible, in the use of safe techniques and in the application of approved radiation safety practices.

c. Furnishing the radiation safety officer with information concerning individuals and activities in their areas, particularly pertinent changes in their personnel rosters.

d. Contacting the radiation safety officer whenever changes in

operational procedures, new techniques, alteration in physical plant, or new operations leading to personnel exposure are anticipated.

e. Complying with the regulations governing the use of radioactive materials as established by the Nuclear Regulatory Commission and the hospital's Radiation Safety Committee for:

1. Procuring of radioactive materials by purchase or transfer by the correct procedure.

2. Posting radiation areas. (See Appendix VI).

3. Seeing that each sign carries the name of the personnel currently responsible for the radiation area.

4. Accounting of the amounts and disposition of radioactive materials in his area.

5. Assuring that all radioactive waste materials are properly disposed of.

6. Preventing transfer of radioactive materials to unauthorized individuals.

7. Assuring adherence to the applicable portions of Sections 2.1, 2.3, 2.4, 2.5, 2.6, 2.7 and 2.8.

3.4 INDIVIDUAL RESPONSIBILITIES

Each person who uses radioactive materials is responsible for:

a. Keeping his exposure to radiation as low as possible and specifically below the maximum permissible exposure (Appendix V).

b. Wearing the prescribed monitoring equipment such as film badges or pocket dosimeters in radiation areas. Personnel who work only with pure alpha emitters or only with pure beta emitters having a maximum energy of

less than 0.2 Mev will not be required to wear film badges.

c. Surveying his hands, shoes, and body for radioactivity and removing all loose contamination before leaving the laboratory to eat, smoke, etc.

d. Utilizing all appropriate protective measures such as:

1. Wearing protective clothing whenever contamination is possible. Disposable gloves should also be used in handling radioactive material and should be check for contamination after use.

2. Using protective barriers and other shields whenever feasible to significantly reduce exposure.

3. Using mechanical devices such as remote pipettors, handling equipment, etc. whenever their aid will assist in reducing exposure.

4. Using pipette filling devices. NEVER PIPETTE RADIOACTIVE SOLUTIONS BY MOUTH.

5. Use disposable bench covering (absorbent paper with plastic back) in areas where radioactive materials are used.

6. Performing radioactive work within the confines of an approved hood or glove box unless serious consideration has indicated that working in the open would be safe.

7. Restricting the potential spread of radioactive materials outside radiation areas.

e. Not Smoking, eating or drinking in radiation laboratories. Smoking, eating and drinking in radiation areas are prohibited.

f. Not Congregating in areas designated as radiation areas. CROWDING OF RADIATION AREAS IS DANGEROUS.

g. Maintaining good personal hygiene:

1. Keep fingernails short and clean.

2. Do not work with radioactive materials if there is a break in the skin below the wrist that is not covered with a waterproof bandage or other suitable covering. The box(es) should be placed in the first floor fallout of Building 2 and labeled with the investigator's name, isotope, and amount. No radioactive labels shall be placed on the box. Other LSC materials will be considered as ligand waste.

3. Washing hands and arms thoroughly before handling any object which goes into or near the mouth, nose or eyes.

h. Checking for contamination in the immediate areas in which radioactive materials are being used and keeping records of these surveys. Any contamination observed should be removed immediately. If such removal is not possible, the area should be clearly marked with the Radiation Safety Officer notified.

i. Keeping the laboratory neat and clean:

1. Work areas should be free from equipment and from materials not required for the procedure.

2. Keep or transport materials in such a manner as to prevent spillage (double container) or to prevent breakage and to insure adequate shielding.

3. Keep work surfaces covered with absorbent material, and work in plastic or stainless steel trays or pans to limit and to collect spillage in case of an accident.

j. Labeling and isolating radioactive waste and equipment, such as glassware, used in laboratories for radioactive materials. Once used for

radioactive substances, equipment should not be used for other work or removed from the area until demonstrated to be free of contamination. Glassware and equipment items decontamination is the responsibility of the user.

k. Reporting accidental inhalation, ingestion or injury involving radioactive materials to his supervisor and the Radiation Safety Officer, carrying out their recommended corrective measures, and assisting with evaluation of exposure.

l. Carrying out decontamination procedures when necessary and taking necessary steps to prevent the spread of contamination to other areas.

m. Keeping accurate records of his use and of his disposal of radioactive material.

3.5 SURVEYS AND MONITORING

a. PERSONNEL MONITORING:

All hospital personnel who utilize radioactivity in their work shall be monitored for radiation exposure.

1. TLD badges will be issued to all personnel that come in contact with gamma-ray emitting isotopes and/or isotopes that emit beta particles of energies greater than 0.2 Mev, or are irradiated by other sources of ionizing radiation as determined by the Radiation Safety Officer. (For maximum permissible dose see Appendix VB).

2. Persons working with radioactive isotopes in amounts of 1.0mCi or greater as an unsealed source shall submit urine bioassays results to the Radiation Safety Officer on the appropriate form at weekly intervals. Thyroid uptake measurements may be required, if indicated.

3. Following iodination, a urine sample shall be taken between two and twenty-four hours after the procedure for bioassay. Thyroid uptake measurements will be required if urine bioassay results indicate they are needed.

4. IF THERE IS A SUSPECTED ACCIDENTAL INHALATION, INGESTION, OR SKIN PUNCTURE INVOLVING RADIOACTIVE MATERIAL, THE RADIATION SAFETY OFFICER SHOULD BE CONTACTED IMMEDIATELY. IF ACCIDENT IS SUSPECTED TO RESULT IN A HEALTH HAZARD, IT SHOULD BE REPORTED TO THE RADIATION SAFETY OFFICER.

5. The Radiation Safety Officer maintains permanent records of all personnel exposures. All users are EXPECTED to be aware of their exposure.

b. PERIODIC SURVEYS OF RADIOISOTOPE LABORATORIES:

1. All laboratories where radioactive materials are used shall be checked for contamination after each day that radioactivity is used.

2. All laboratories shall perform wipe tests on a weekly basis to ascertain if contamination exists. These wipe tests will consist of wiping an area of 100 cm2 with a 2" dry square of filter paper and counting the paper in a well counter or liquid scintillation counter as is appropriate for the isotopes handled in the tested area. A copy of the results of the test shall be sent to the Radiation Safety Officer. This copy shall indicate the areas wiped and the disintegration per minute level of removable contamination and the radioisotope involved.

3. All laboratory areas shall initiate decontamination when a wipe test reveals more than 200 DPM above background for each 100 square centimeters wiped. If contamination exceeds 1000 DPM, a contamination zone will be established until contamination is removed.

4. The Radiation Safety Officer will perform peoriodic wipe tests and meter surveys of the laboratories as a further check against isotopic contamination.

c. SURVEYS AND OTHER CONSIDERATIONS FOR THERAPY PATIENTS:

1. All hospitalized therapy patients with an exposure rate at 1 meter of 2 mR/hr will be placed in a private room with toilet. Hospitalization and patient care will be carried out in accordance with the recommendations of NCRP Report 37.

2. Adjacent rooms and floors will be surveyed when appropriate to assure 2mR/hr or 100mR/admission for patients and visitors in these areas.

3. Surveys will be taken at bedside, 1 meter and 3 meters from the

patient. Calculated times for nursing care at these distances will be recorded on the nursing care forms (See Chapter VI).

CHAPTER IV

POLICIES GOVERNING EMERGENCIES AND DECONTAMINATION

4.1 RADIOLOGICAL HEALTH EMERGENCIES

As used here, the term "Radiological Health Emergency" shall apply to any incident pursuant to the uncontrolled release of radioactive substances which might irradiate or contaminate personnel or laboratory areas.

a. If the contamination is airborne, hold breath, if possible, leave the room and close the doors. Do not turn off the ventilating equipment. The air in the Tampa VA Hospital laboratories is vented directly to the roof of the hospital.

b. If the contamination is in a solid or in a liquid form, try to contain the spill.

1. Permit no one to leave the area without clean footwear. Exception must be made in case rapid departure is necessary in order to avoid overexposure to radiation.

2. Do not allow any personnel to enter the contaminated area without proper protective clothing.

3. If personnel are contaminated, proceed with safe decontamination procedures immediately.

4. If there is no continuing personnel risk, decontamination procedures should be deferred until competent advice has been obtained. Major spill issued report.

5.0 mR/hr @ 1 ft.

500uCi hard (>100 KeV)

1000uCi soft (< 100KeV)

Exceptions

100uCi Ca-45 or Rb-86

150uCi I-125

4.2 DECONTAMINATION PROCEDURES

Removal of radioactive contaminants falls into two general categories; decontamination of "PEOPLE" and decontamination of "THINGS". Every effort shall be made to control and limit the spread of contamination.

I. PERSONNEL DECONTAMINATION

People are decontaminated for three reasons:
1) to prevent possible transfer to internal organs by ingestion or through cuts and abrasions,
2) to prevent external exposure or possible radiation burns, and 3) to prevent spread of contamination. In each case, prompt removal of radionuclides will reduce the potential hazard, but methods used to effect decontamination must not spread material that was initially localized or assist the contaminant to enter the body (e.g., excessive scrubbing which abrades the skin).

a. Notify supervisor immediately after a contaminating accident. The supervisor is responsible for contacting the Radiation Safety Officer.

b. Wash the area thoroughly for two to three minutes repeatedly soaping and rinsing. Consideration should be given to the chemistry of the contaminant and an attempt should be made to find a suitable agent for removing it. Any cleansing agent may be used, but synthetic detergents are preferred to soaps. Avoid prolonged use of any one decontamination procedure. Irritation of the skin may impede the success of more suitable procedures. Avoid the use of organic solvents on the skin. These may make the skin more permeable to contamination.

c. Flush well under running tap water contaminated open cuts or wounds.

d. Remove any contaminated clothing.

e. Seek medical aid to induce vomiting if radioactive material has been ingested. Vomiting should be induced repeatedly, with ingestion of 2 to 4 glasses of lukewarm water between times.

f. Notify the Radiation Safety Officer and proceed at once to the Medical Officer in charge of the Employee Health Unit, if these procedures are not immediately and completely effective. Special decontaminating agents such as Versene, Radiacwash, etc., may be used under the direction of the Medical Officer.

g. Following satisfactory decontamination, there should be no detectable radiation.

II. DECONTAMINATION OF LABORATORY AREAS

In case an area becomes contaminated, preparations for decontamination should be started promptly.

a. Cover clean ares in the vicinity with absorbent paper.

b. Prevent flow of liquid radioisotopes: apply absorbers, raise barriers (putty, etc.), seal cracks in floors, desk tops, etc.

c. Remember that all run-off solutions, mops, rags and brushes used are potentially contaminated.

d. Notify the Radiation Safety Officer, who will assist in determining the extent and hazard of contamination.

e. Methods of decontamination:

1. Smooth nonporous surfaces - Solutions of detergents, EDTA,

Radiacwash, etc., may be used to decontaminate many smooth, nonporous surfaces.

2. Metals - only surfaces may have to be removed first. High normality acids, concentrated acids, or aqua regia may be used, if needed and if the surfaces will withstand this treatment.

3. Concrete or brick - solutions of HCL used with commercial scrubbers.

4. Glassware - ordinary chromic acid cleaning solution, or discard.

5. Linoleum - if well waxed before contamination. Removal of wax with solvents or scouring powder and steel wool to decontaminate. It may be replaced.

6. Wood 1- sand, plane, or discard.

7. Painted surface - paint removers.

f. An area is considered free from radioactive contamination when a wipe test shows no detectable radiation.

CHAPTER V

POLICY GOVERNING THE USE OF RADIOACTIVITY IN ANIMALS

RADIOINUCLIDES IN EXPERIMENTAL ANIMALS

The use of radioisotopes in experimental animals must be approved by the Veterinary Medical Officer, the Radioisotope Committee, and the Research and Education Committee.

a. RESPONSIBILITY: The investigator is responsible for the care of the animals for the duration of the experiment, and is responsible for the safe use of the radioisotopes involved.

b. FACILITIES: All experiments involving radioisotopes will require prior arrangements with the animal facilitiy personnel. The animals will be isolated from other animals and the door will be locked at all times. Keys will be possessed by the research animal personnel. All cages containing radioactive animals must bear a radiation caution sign, indicating the isotope, activity, and date of administration (Appendix IID).

c. REPORTING OF SUSPECTED CONTAMINATION: Investigators using the radioisotopes in the animal room shall immediately notify the Radiation Safety Officer if a major spill is suspected. Minor spills are the responsibility of the investigator.

d. TERMINATION OF EXPERIMENT: Upon termination of the experiment, all animals that are sacrificed must be placed in a plastic bag and put in the freezer in disposal area. All cages, equipment used, and the room shall be considered to be contaminated. The investigator is re-

sponsible for decontamination of the area and equipment. The investigator is responsible for decontamination of the area and equipment periodically.

e. EMERGENCIES: Each unit using the facility shall provide names and telephone numbers for notification if an emergency situation develops involving their animals during off duty hours. Physical emergencies in off duty hours will be reported by the Hospital Guard to the Radiation Safety Officer who will notify the individuals involved.

f. GENERAL REGULATIONS:

1. During all procedures involving radioactive animals, disposable gloves and laboratory coats must be worn.

2. All fecal waste will be monitored and when found radioactive placed in plastic bags and taken to the Radiation Safety unit for proper disposal.

3. All animals will remain in their cages until their excreta contain only background amounts of radioisotopes, or until they are sacrificed.

CHAPTER VI

RULES AND REGULATIONS GOVERNING THE ACTIONS AND PROCEDURES CARRIED OUT IN WHOLE OR PART BY NURSES AND THEIR SUBORDINATES

6.1 RADIATION SAFETY FOR NURSING PERSONNEL

1. It is the responsibilitiy of any person involved in radiation procedures to minimize his or her own exposure as far as possible. This may be accomplished by keeping as much distance and shielding between radioactive source and operator as possible and by spending the minimum time in the vicinity of the radioactive material. This applies whether the material is contained within a patient or within a storage container. Contamination with radioactive fluids should always be avoided by wearing rubber gloves and other suitable protective clothing when necessary.

2. Dosimeters: A dosimeter estimates radiation exposure. On occasion, ward personnel may be asked to wear dosimeters when a patient receiving radioisotope therapy is on the ward. The estimate of radiation exposure made from the dosimeter will only be correct if these common sense rules regarding its wearing are observed:

a. Wear on hip or chest all the time while on duty.

b. Leave in a safe place in your work area when not on duty. Do not take it out of the hospital.

c. Never wear a dosimeter issued to another person.

d. Take care not to send to laundry with the uniform.

e. Report loss immediately to your supervisor.

f. Report any other incident relative to the wearing of the dosimeter (such as possible accidental exposure during diagnostic x-ray studies

performed on you) to your supervisor.

3. Not all radioactive procedures involve the same hazard. At low levels (diagnostic isotope procedures) and with some isotopes like phosphorus-32, the hazard may be very small, whereas in others, it may be considerable. Detailed instructions for the greater potential hazards are listed on subsequent pages.

4. Amounts of radioactive material less than certain prescribed levels ae to be regarded as requiring no special precautions. Patients receiving therapy doses requiring no special precaution will have a note placed in their charts indicating that no special precautions are required.

5. Nuclear Medicine Diagostic Studies:

Patients receiving radioactive isotopes for diagnostic studies present no radiation hazard and no unusual precautions are needed.

a. Because many of the clinical radioisotope procedures used in this hospital are based on the time after the administration of the radioactive material, it becomes necessary to collect specimens (such as stools, urine, and blood) at a definite predetermined hour. It should be pointed out that the successful use of radioisotope procedures, therefore, requires the full cooperation of the Nursing and Nuclear Medicine Services. Some tests are not done daily and others require the patient to be available for several hours or on subsequent days. Cancellation of a study may cost the patient a long delay.

b. All specimens will be collected in properly marked containers with specific instrutions attached. Please return all specimens to the Nuclear Medicine Laboratory. DO NOT RETURN TO THE CLINICAL LABORATORY.

c. Special patient preparation is required for some procedures.

These preparations are thoroughly explained in the nuclear medicine card file distributed to each ward.

d. If there are any questions, call Ext. 6673, or the nuclear medicine physician on call.

NURSING INSTRUCTIONS FOR PATIENTS RECEIVING LARGE THERAPEUTIC DOSES OF RADIOACTIVE IODINE 131 I

(Greater than 30 mCi)

Patient's Name _____Ward_____

This patient received a large therapeutic dose (____mCi) of radioactive iodine on _____(date) at _____AM/PM.

Physician:_____Pager:_____Phone:_____

Precautions must be exercised to assure that no other person receives radiation in excess of that permitted by federal regulations.

These radiation precautions apply:

Starting ___AM/PM_____(date) and ending ___AM/PM_____
(date)

1. A SIGN bearing the words "CAUTION RADIATION AREA" and this instruction sheet shall be placed on the patient's door. Signs noting that patient contains radioactive material will be placed on the patient's chart and on his door.

2. PERSONNEL shall limit their time in proximity of the patient as shown in the chart below, and shall not enter the patient's room without wearing a dosimeter.

TIME LIMITS

Maximum permissible time of occupancy in area of patient per day.

PATIENT TO WORKER DISTANCE

Date	Bedside	1 Meter	3 Meters
_____	____hr,____min.	____hr,____min.	____hr,____min
_____	____hr,____min.	____hr,____min.	____hr,____min
_____	____hr,____min.	____hr,____min.	____hr,____min
_____	____hr,____min.	____hr,____min.	____hr,____min

3. VISITORS shall be restricted to the above times and they will be asked to remain at least three feet (1 meter) from the patient's bed. Pregnant women or persons under 18 years of age will not be allowed to visit.

4. PATIENTS shall be restricted to their room and no personnel other than those involved directly in patient care, or visitors, shall enter the room.

5. Patients shall use toilet facilities normally except that a few drops of SSKI solution shall be added to the toilet bowl before that patient urinates. If the patient is incontinent, an indwelling catheter should be used during the first 48 hours and the urine receptacle emptied frequently into the toilet.

6. Personnel shall wear gowns and rubber gloves while handling the patient or contaminated objects such as bed pans, urinals, dressings, and bed linen.

7. Urinal, bed pan, thermometer, and other items used by the patient shall be kept in the room for the patient's personel use.

8. If there is contamination of bed, floor, etc., with urine, vomitus, or other contaminated material, notify the Radiation Safety Officer immediately so that proper cleanup procedures can be employed.

9. Gowns and gloves worn by personnel and linens used by the patients

shall be kept in a container in the patient's room and shall not be discarded until permission for discarding is obtained subsequent to completion of a radiation survey by Nuclear Medicine Service personnel.

10. If death occurs, notify Pathology and Nuclear Medicine Services as soon as possible and observe the following precautions:

a. Wear gown and gloves to manage body and equipment.

b. Remove "Radioactive" label from patient's chart and attach it to the outside of his record folder.

c. Remove red and yellow tag from patient's chart and tie to his wrist.

d. Save all articles used by the patient, such as linen, catheters, urinal, and dressings until they are surveyed by Nuclear Medicine Service personnel. Do not remove them from the room. Do not use the room for another patient until it has been surveyed by Nuclear Medicine Service personnel and permission granted to use for other patients.

11. QUESTIONS concerning radiation safety procedures shall be directed to Chief, Nuclear Medicine Service, Ext. 6673, or Radiation Safety Officer, ext. 6673, home phone 689-2778, or physician on call for nuclear medicine.

NURSING INSTRUCTIONS FOR PATIENTS RECEIVING

THERAPEUTIC DOSES OF PHOSPHORUS-32

Patient's Name:_____Ward:_____

This patient received a therapeutic dose (____Mc) of radioactive phosphorus on _____(date) at _____am/pm.

Route of Administration_____

Physician:_____Pager:____Phone:___

1. Report any evidence of leakage of any material at injection site immediately to charge nurse and as specified in instruction 7.
2. There is normally no danger in carrying out normal nursing care, and no restriction on time spent with the patient.
3. Patients are allowed visitors in accordance with the usual hospital rules.
4. No special precautions are necessary for dishes, utensils, or instruments, sputa, or exreta.
5. The P-32 was given I.V. or intracavitary, no special precautions are necessary for vomitus.
6. Soiled surgical dressings at site of puncture wound for intracavitary instillation of P32 should be isolated and retained in plastic bags until monitored by Nuclear Medicine Service personnel. Disposal instructions will be given by Nuclear Medicine Service personnel at the time of monitoring.
7. QUESTIONS concerning radiation safety procedures shall be directed to Chief, Nuclear Medicine Service or Radiation Safety Officer, ext. 6673.

INSTRUCTIONS FOR NURSES

MANAGEMENT OF PATIENTS STATUS POST MORTEM WHO CONTAIN RADIOACTIVE MATERIALS.

1. The probability of a patient dying in the hospital who has received high doses of radioactive isotopes is slight. However, the following should be understood in case such an instance would occur.

2. Patients receiving tracer doses of radioactive materials for diagnostic study require no special precaution. This includes radioactive iodine uptake studies, radioactive chromium blood volume and red cell survival studies, radioactive iron, hemoglobin production studies, radioactive cobalt, vitamin B12 absorption studies, and radioactive iodine fat absorption studies and all imaging procedures.

3. For all patients who have received therapeutic doses of radioactive iodine, or phosphorus, just prior to death, the following procedure should be followed:

a. Ward personnel handling the body of the deceased in preparing it for the mortician should wear gloves.

b. All articles used by the patient such as linen, pajamas, urinal, catheter, dressings, etc., must be surveyed by the Radiation Safety Officer.

c. The Chiefs of Nuclear Medicine and Pathology Services will be notified of the patient's death.

d. The Pathology personnel at the morgue must be notified that the

patient received radioactive therapy and the date administered.

e. Radiation tags must remain on the patient's charts and body indicating recent therapy dosage. The Nuclear Medicine Service will indicate precautions necessary regarding autopsy and mortician handling procedures.

4. Reference "Safe Handling of Cadavers Containing Radioactive Isotopes", Handbook No. 65, National Bureau of Standards, is available in the Nuclear Medicine Service.

CHAPTER VII

RULES AND REGULATIONS GOVERNING THE ACTIONS OF OTHER PERSONNEL

7.1 INSTRUCTIONS FOR SUPPLY PERSONNEL

a. No packages are to be opened by supply personnel.

b. It is important that all shipments of radioisotopes be delivered to the Radiation Safety Officer promptly where they can be monitored for degree of activity, and opened and inspected for leaks or damage so that proper action can be taken to avoid contamination.

c. Shipments of radioisotopes are shielded in accordance with NRC regulations and pose a minimal hazard. The necessary handling instructions are usually listed on the package.

d. If supply personnel have reason to believe they have become contaminated, e.g., by a package that appears to be leaking, they should notify their supervisor who will notify the RSO.

7.2 INSTRUCTIONS FOR HOUSEKEEPING PERSONNEL

a. Radiation precaution signs apply to all personnel. This does not mean, however, that housekeeping personnel cannot enter the laboratories for ordinary cleaning duties. The sign primarily indicates that shielded radioactive materials are present and that all personnel should be aware of this fact. It further indicates that radioactive labeled bottles, reagents, etc. should not be touched or moved. In all working areas of the laboratories, the level of radiation is frequently checked so that these areas occupied by the laboratory workers during the day are safe areas in which to clean.

b. Housekeeping personnel shall not enter rooms occupied by

patients undergoing radioisotope therapy unless authorized to do so by the nurse in charge, who will in turn be guided by the precautions listed in the patient's chart. The room door of any patient on therapy will be marked with a radiation caution sign. See example of sign in Appendix IID.

c. If housekeeping personnel have reason to believe they have become contaminated, e.g., through inadvertent contact with radioactive material, they should notify their supervisor who will notify the RSO.

APPENDIX I

The composition of the Committee as it presently stands is as follows:

Chairman: *Chief, Nuclear Medicine Service

Vice Chairman: *Nuclear Medicine Representative

Secretary: *Radiation Safety Officer

Members: *Research Representative

*Radiology Representative

*Nursing Representative

*Management Representative

Medical Center Hospital Safety Officer

Radiaton Safety Officer, USF Medical Center

Physicist, USF Medical Center

Hematology Physician

AFGE Representative

EX OFFICIO: Chief of Staff

*Denotes permanent members. Other members (term) will serve for three calendar years.

APPENDIX II

I. Call to Order 0-1 minute

II. Minutes: a. Review 1-2 minutes

b. Motion and Discussion to accept 10-12 minutes

III. Radiation Safety Officer's Report 13-20 minutes

Inventory summaries to be available and distributed with agenda and minutes

IV. Old Business 21-30 minutes

V. New Business 31-40 minutes

VI. Any Other Business 41-47 minutes

VII. Chairman's Summary and Adjourn 45-50 minutes

APPENDIX III

PROCEDURE FOR TELEPHONE POLL

CRITERIA

1. At the Chairman's discretion and with the Vice Chairman's support.

2. And/or on the advice of the Radiation Safety Officer with the Chairman's approval.

PROCEDURE

1. The action is requested with supportive material to the:

   1.1. Radiation Safety Officer

   1.2. Vice Chairman of the Radiation Safety Committee

   1.3. Committee Chairman

2. The material, on approval according to the criteria above, is distributed to members of the Radiation Safety Committee with a notice of a polling date.

3. On the polling date, members will be requested to make their vote

known to the Chairman of the Committee. The vote will be recorded by an appointed teller at the time of the voting.

4. If a member cannot be available at the time of the poll, the vote may be registered by memo before the polling date.

5. The polling date shall not be more than two weeks from the initial submission time.

6. The results of the poll shall be made known to the members of the Committee and the applicant within two working days.

APPENDIX IV

VETERANS ADMINISTRATION HOSPITAL

Request to Use Radioactive Materials

1. Name of applicant:

2. Other persons directly involved in the study:

3. Place where radioactive materials will be used and stored:

4. Radioactive material:

a) Element and Mass number:

b) Chemical and/or physical form:

c) Maximum quantity which will be used and possessed at one time:

5. a) Describe purpose for which radioactive material will be used (for in vitro or animal research. If for human use, omit this item and complete p. 4 for routine use in humans).

b) Give quantity of isotope used in each study and method and quantity of disposal.

VETERANS ADMINISTRATION HOSPITAL

Request to Use Radioactive Materials

Applicant:

6. Training in use of radioisotopes:

Type of Training	Where trained	duration	on-job course
Principles & practice of radiation protection			
Radioactivity measurement standardization and monitoring techniques & instruments			
Mathematics and calculations basic to the use and measurement of radioactivity			
Biological effects of radiation			

7. Experience with radioactive materials:

Isotope	Maximum	Where experience	Duration	Type of Use

. 8. Addition information about training and experience:

VETERANS ADMINISTRATION HOSPITAL

Request to Use Radioactive Materials

Applicant:

9. Radiation detection instruments available:

10. The applicant and other persons directly involved in study:

a) Are familiar with the contents of Part 20-Standards for protection against radiation of the USAEC Rules and Regulations.

b) Are familiar with the contents of National Bureau of Standards Handbook 92.

c) Are familiar with the Radiation Protection Procedures of this institution.

d) Have arranged for appropriate disposal of radioactive wastes.

e) Agree that ordering of any radioactive materials will be made through the Nuclear Medicine Service.

f) Agree to keep an accurate, current record of the use and disposal of radioactive materials. This will include a record of each animal study.

g) Agree to cooperate with the Radiation Protection Officer in maintaining radiation safety and to follow the procedure outlined in Part II.

Date:_____ Signature of Applicant:_____

VETERANS ADMINISTRATION HOSPITAL

Request to Use Radioactive Materials

Routine Use in Humans

Applicant:

11. Is the applicant licensed to practice medicine?

12. Describe purpose for which radioactive material will be used, including disorders to be diagnosed or treated.

13. Chemical form administered.

14. Proposed dosage schedule.

15. If material will not be obtained in precalibrated form for oral use or in precalibrated and sterilized form for parenteral use, describe identification, processing and standardization procedures:

APPENDIX V

1. BIOLOGICAL EFFECTS OF EXPOSURE

A. ACUTE (Single Dose)

Whole body - 100,000 Rads - "Molecular Death"

10,000 Rads - Death in 1-2 Days

250-450 Rads - LD

100 Rads - <15% show symptoms of "Radiation Sickness"

Gonads - 500-600 Rads - Permanent sterility

20 Rads - Doubling dose for spontaneous mutations

Skin - 1,500-2,000 Rads - Blistering

500-600 Rads - Dryness and dull tanning, erythema threshold

B. CHRONIC (Multiple Dosing)

1 in 50,000/1 Rad Exposure - Risk of cancer production

1000 Rads at 300 Rads/day - Erythema threshold

2. NRC REGULATIONS FOR PERMISSIBLE EXPOSURE

Radiation Worker

Whole Body - 1250 mR/qtr

Skin - 7,500 mR/qtr

Extremities - 18,750 mR/qtr

Whole Body MPD - (N-18) 5 rems

General Public

Whole Body - 2 mR/hr, but not to exceed 100 mR/wk and 500 mR/yr

MPD = 14 rems for first 30 yrs.

0.5 rems/yr thereafter

APPENDIX VI - SOME ABSORBED DOSES

TOTAL MEAN DOSE (Mr/uCi) TO STANDARD MAN FROM ORAL ADMINISTRATION*

Nuclide	Pharmaceutical	Whole Body	Organ
3H	H2O	0.1-0.2	-
24Na	NaCl	2	-
51Cr	Na2CrO5(i.v.)	0.3-0.5	Spleen 15-25
59Fe	FeCl3	3.5	Spleen 15
57Co	Vit. B12	2-5	Liver 130-160
125I	NaI	0.4-4	Thyroid 1200-2000
131I	NaI	1-4	Thyroid 1500-2000
133Xe	gas(inhaled)	-	Lungs 20-35

*Taken From:

Hine, G.J. (Ed.) Instrumentation in Nuclear Medicine. New York Academic Press. Vol. 2, pp 556-559.

APPENDIX VII - SIGNS AND LABELS

SYMBOL MUST BE MAGENTA OR PURPLE AND MUST BE ON A YELLOW BACKGROUND. NO OTHER SIGNS OR LABELS ARE ACCEPTABLE.

SIGNS -

"CAUTION HIGH RADIATION AREA" -

A sign bearing the symbol and these words must be clearly visible at any access to a room or area in which a major portion of an individual's body could receive a dose in excess of 100mR in any one hour.

"CAUTION RADIATION AREA" -

---A dose in excess of 5mR in any one hour or 100mR in any 5 consecutive days.

"CAUTION RADIOACTIVE MATERIAL" -

---Room or area which contains radioactive materials in lesser quantities than the above areas.

"CAUTION AIRBORNE RADIOACTIVITIY AREA" -

---Clearly visible on any room, enclosure, or operating area in which airborne radioactive materials exist in concentrations in excess of the amounts specified in NRC Title 10, Part 20, Appendix B, Table I, Column I. (See Radiation Safety Officer.)

LABELS -

All containers of radioactive materials will conspiciously bear a label with the symbol and the words "CAUTION RADIOACTIVE MATERIAL". Further, the following information will appear on the label to permit individuals handling or using the containers, or working in the vicinity thereof, to take precautions to avoid or minimize exposures.

1. Isotope
2. Quantity
3. Date

When a biohazard is involved, e.g., toxic chemicals (HPM 138-1) the material will require additional proper labels.

APPENDIX VIII

MAXIMUM CONCENTRATIONS OF RADIOISOTOPES WHICH MAY BE DISCHARGED TO SEWER

Radioisotopes may be discharged to a sanitary sewage system only if they are readily soluble. All such discharges must have prior approval of the Radiation Safety Officer.

The quantity to be discharged to sewage shall not exceed in any one day the concentrations listed in the following table.

The concentrations listed are those which are maximum levels after the radioisotope has been diluted in the hospoital sewage system. Basis for calculations should include a discharge rate of approximately 760,000 liters per day for this hospital.

This is a partial list of isotopes excerpted from Nuclear Regulatory Commission regulations, TITLE 20, Chapter I, Part 20. For isotopes other than those listed, see this reference.

ISOTOPE	CONCENTRATION	ISOTOPE	CONCENTRATION
H3	1 x 10-1 uC/cc	Zn65	3 x 10-3 uC/CC
C14	2 x 10-2	Zn69	2 x 10-3
Na22	1 x 10-3	Se75	9 x 10-3
Na24	6 x 10-3	Sr85	3 x 10-3
P32	5 x 10-4	Tc99	2 x 10-1

S35	2 x 10-3	In113	4 x 10-2
K42	9 x 10-3	I125	4 x 10-5
Ca45	3 x 10-4	I131	6 x 10-5
Ca45	1 x 10-3	Au198	2 x 10-3
Cr57	5 x 10-2	Hg197	9 x 10-3
Co57	2 x 10-2	Hg203	5 x 10-4
Fe59	2 x 10-3		

APPENDIX IX

REFERENCES

1. Radiation Safety Officers Guide to the safe handling of radioisotopes revised 1985.

2. HPM No. 138 - March, 1988.

3. OSHA Instruction CPL 2-2.44A.

4. EPA Guide for Infectious Waste Management EPA/530-SW-86-014.

5. Nuclear Medicine Service Procedure Manual 1984-1988 Revision 1988.

6. Shapiro, J., Radiation Protection - A Guide for Physicians and Scientists, Harvard University Press, Cambridge, MA 1972.

7. Brodsky, A. & Bradley, FJ., Radiation Protection and Regulations in CRC Handbook of Radioactive Nuclides, Chapter VIII, Ed. Wang CRC, Cleveland, Ohio, Current Edition.

8. Hendee, WR., Medical Radiation Physics, Chapters 7 - 9 and 24, 25, Yearbook Medical Publ., Chicago, 2nd Ed., 1979.

RULES AND REGULATIONS GOVERNING THE PRACTICE AND MANAGEMENT OF RADIATION AT THE JAMES A. HALEY V.A. MEDICAL CENTER TAMPA FLORIDA 33612

REVISED 1988

PURSUANT TO U.S. NUCLEAR REGULATORY COMMISSION REGULATIONS
V.A. REGULATIONS
NCRP REPORTS NOS. 37,91,93
OSHA INSTRUCTION CPL 2-2, 44A
EPA GUIDE FOR INFECTIOUS WASTE MANAGEMENT
EPA/530-SW-86-14
JOINT EPA/NRC GUIDANCE ON THE DEFINITION AND IDENTIFICATIONS OF COMMERCIAL MIXED LOW-LEVEL RADIOACTIVE AND HAZARDOUS WASTE
DIRECTOR 6432.00-2 JANUARY 1987
NUCLEAR MEDICINE PROCEDURE MANUAL 1984-1988