RADIATION PROTECTION GUIDE

Veterans Administration

VA Medical Center
Boise, Idaho

RADIATION PROTECTION GUIDE

VETERANS ADMINISTRATION MEDICAL CENTER
500 WEST FORT STREET
BOISE, IDAHO 83702-4598

RADIATION CONTROL OFFICE
SEPTEMBER 1, 1984

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

VETERANS ADMINISTRATION MEDICAL CENTER

BOISE, IDAHO

RADIATION PROTECTION GUIDE

Veterans Administration Medical Center, Boise, Idaho, is authorized to procure and use radioactive materials under a license issued by the Division of Materials Licensing of the Nuclear Regulatory Commission (NRC). This license is contingent upon the existence of a Radiation Control and Radioactive Drug Research Committee (RCRDRC) and a Radiation Safety organization which, among other requirements, must:

1. Assure that any person using radioactive materials is qualified by training and experience, has the facilities to handle the materials safely, and proposes a use which is safe to all concerned.

2. Assure observance of all safety standards established by the NRC, and other Federal and local regulatory agencies.

3. Keep records of the receipt, storage, use, transfer, and ultimate disposal of all radioisotopes used at the Boise VA Medical Center.

4. Keep records of the monitoring of personnel and areas involved in the use of radionuclides and other sources of ionizing radiation.

The Boise VA Medical Center is subject to periodic inspection by the Division of Regulatory Operations of the NRC to insure that all requirements of the license are being met. These inspections are very thorough and include surveys of laboratory areas, inspection of records of procurement, use and disposition of radioactive materials, and qualifications of individual users. Violations of license requirements can result in a loss of the license, and/or imposition of civil unit penalties, including fines.

All sources of ionizing radiation are not covered by the NRC license. They are, however, controlled by regulations issued by the Radiation Control and Radioactive Drug Research Committee. Non-license sources include x-ray machines, and radioactive materials from sources other than reactor byproducts.

This Guide describes the rules and procedures required at the Boise VA Medical Center for the use of radioactive materials under the terms of the licensure, and for the use of non-licensed ionizing radiation sources.

Lawrence L. Knight, M.D.,
Chairman, Committee on
Radiation Control and
Radioactive Drug Research

1. RADIATION CONTROL AND RADIOACTIVE DRUG RESEARCH COMMITTEE

1.1 Chairman and Members.

The Chairman and members of the Committee on Radiation Control and Radioactive Drug Research are appointed by the Medical Center Director from the hospital staff. Members are selected on the basis of experience in clinical, research, and administrative areas, especially as they relate to the use of sources of ionizing radiation. In making appointments to this committee consideration is given to the need for experts in nuclear medicine, diagnostic radiology, internal medicine, endocrinology, radiopharmaceutics, medical research, pharmacology, nursing and hospital administration.

A list of current members and their areas of expertise follows:

Chairman:

Lawrence L. Knight, M.D.
Diplomate, American Board of Pathology
(Anatomic, Clinical and Radioisotopic)
Director of Radiation Control
Chief, Laboratory Service

Members:

John B. Tweeten, M.D.
Diplomate, American Board of Radiology
Chief, Nuclear Medicine Service

David A. Hindson, M.D.
Diplomate, American Board of Internal Medicine and
American Board of Endocrinology and Metabolism
Assistant Chief, Medical Service

Sandra G. Jue, Pharm. D.
Certified Nuclear Pharmacist
Clinical Pharmacist, Pharmacy Service

Robert E. Vestal, M.D.
Diplomate, American Board of Internal Medicine
Chief, Clinical Pharmacology and Gerontology Units, and
Chief, Research & Development Service

Roger G. Stano, M.S.
Radiation Safety Officer and
Consulting Medical Physicist

Bryon K. Meador, C.N.M.T.
Nuclear Medicine Technologist and
Assistant Radiation Safety Officer

I. Jo Scantling, R.N.
Staff Nurse and Ward Coordinator,
Surgery Service

Heidi L. Parke
Safety & Occupational Health Specialist

Robert F. Tipton
Associate Medical Center Director

1.2 Attendance.

Members who fail to attend two-thirds of scheduled meetings of the Committee in one year will be replaced.

1.3 Meetings.

The Chairman shall prepare the agenda. The committee will meet at the call of the Chairman, but no less frequently than every three months. Permanent records of all meetings and actions will be kept on file in the office of the Director of Radiation Control. Minutes shall include time of beginning and ending, attendance of members, and the signature of the Committee Chairman. Results of all votes shall be indicated as yes, no, or abstain. Copies of minutes shall be forwarded to the Medical Center Director for his information.

1.4 Quorum.

Quorum shall consist of at least two-thirds of the membership of the Committee. The Director of Radiation Control must be present. Action of the Committee must be ratified by a two-thirds majority of the members present at the meeting, and in no case by less than five members of the Committee. When considering research uses in humans the designated experts in nuclear medicine, radiopharmacy and radiation safety/dosimetry must be present. Members who have a protocol before the Committee may be included in the number present for purposes of quorum requirements but shall absent themselves during voting on their proposal.

1.5 Authority.

This Committee is established by authority of the Medical Center Director.

1.6 Responsibility.

This Committee is responsible for the safe use of all sources of ionizing radiation within the Medical Center. This includes but is not restricted to artificially produced radionuclides, naturally occurring radionuclides in excess of the concentrations found in nature, and apparatus capable of producing ionizing radiation, whether particulate or electromagnetic. Specifically the Committee controls the use of x-rays, byproduct materials, radionuclides produced in particle accelerators, naturally occurring radioactive elements such as Radium and Radon and isotopically enriched sources of naturally occurring radioactive isotopes of the elements. The Committee shall ensure that all research involving administration of internally as well as externally applied sources of radiation to human subjects shall take into consideration a risk benefit analysis of the consequences of his participation in the research protocol. In this regard

the Radiation Control and Radioactive Drug Research Committee will function in an advisory capacity to the Institutional Review Board (Human Subjects Research Committee) of the University of Washington in Seattle, which perfonms the review of research involving human subjects at the VA Medical Center in Boise. The Boise VA Medical Center is affiliated with the University of Washington School of Medicine under the oversight of a Dean's Committee. The Committee shall be fully aware of its responsibilities and of the conditions under which radioactive materials may be considered safe and effective for the purpose for which intended as mandated in 20CFR36 and which are further enumerated in the section of this Radiation Protection Gudie entitled Authorization to Use Radioactive Materials (Part 4).

To fulfill its responsibilities the Committee shall formulate a radiation control program. This program shall be submitted to the Medical Center Director. Upon acceptance of the program by the Medical Center Director, the Committee shall be responsible for its implementation.

The Committee shall review the entire Radiation Control Program at least annually and may amend or modify it as circumstances dictate, in accordance with applicable federal, city, county, and State regulations. Any changes which tend to liberalize these Radiation Protection Guidelines shall be first submitted to the Nuclear Regulatory Commission for license amendment.

2. RESPONSIBILITIES OF DIRECTOR OF RADIATION CONTROL

The Director of Radiation Control shall be responsible for:

a. General surveillance of all health physics activities, including both personal and environmental monitoring.

b. Furnishing consultative services to personnel at all levels of responsibility on all aspects of radiation protection.

c. Receiving, delivering, and shipping all radioactive materials coming to or leaving the Boise VA Medical Center.

d. Assaying and performing isotopic purity checks on all radioactive materials to be used in humans.

e. Monitoring of all machines capable of producing penetrating radiations. Calibrating the output of these machines as required.

f. Distribution and processing of personnel monitoring equipment including the keeping of personnel exposure records, and recommending appropriate remedial action, to minimize personnel exposure, where necessary.

g. Instruction of personnel in the safe and efficacious use of radioactive materials.

h. Supervision and coordination of the waste disposal program, including the keeping of waste disposal records.

i. Supervision of storage of all radioactive materials not in current use.

j. Performing quarterly leak tests on all sealed radioactive sources.

k. Maintaining an inventory of all radioactive materials on hand at the Medical Center.

l. Supervising and providing instruction in methods of decontamination in cases of spillage of radioactive materials.

m. Maintaining a continuous program of personnel and environmental radiation hazard evaluation and positive programs to eliminate or minimize the consequences of accidents involving radioactive materials.

3. RESPONSIBILITIES OF RADIATION SAFETY OFFICER

The Radiation Safety Officer (RSO), under the direction of the Director of Radiation Control, is responsible for the following:

a. General surveillance of health physics activities including personnel and environmental monitoring.

b. Furnishing consultant services to personnel on various aspects of radiation protection.

c. Receiving, delivering, and shipping radioactive materials coming to or leaving the Boise VA Medical Center.

d. Assaying and performing radionuclide purity checks on radioactive materials.

e. Monitoring and calibration of output of apparatus capable of producing ionizing radiations according to established schedules.

f. Distribution and processing of personnel monitoring equipment including the keeping of records of internal and external personnel exposure, and notifying individuals and their supervisors of exposure levels and recommending appropriate remedial action.

g. Instructing personnel in proper procedures for the use of radioactive materials.

h. Coordination of the waste disposal program, including maintenance of waste storage and disposal records.

i. Storage of radioactive materials not in current use.

j. Performing leak tests on sealed sources.

k. Maintaining inventories of radioactive materials at the Boise VA Medical Center.

l. Supervising decontamination in cases of contaminating accidents.

m. Maintaining a continuous program of environmental radiation hazard evaluation and hazard elimination.

n. Some or all of these responsibilities may be delegated to the Assistant Radiation Safety Officer.

4. AUTHORIZATION TO USE RADIOACTIVE MATERIALS

The use of radioactive materials by personnel of the Boise VA Medical Center is authorized by a license issued by the NRC. A copy of this license is on file in the Radiation Control Office. All applications for such use shall be submitted to the Committee on Radiation Control and Radioactive Drug Research through the Director of Radiation Control. Radioactive materials, including what are sometimes called exempt quantities, shall not be used within the Medical Center without prior approval of the Committee. The Committee is to be informed of the use of radioactive materials by transmittal of a copy of each Purchase Requisition to the Radiation Control Office.

4.1 All Applications.

As the recipient of an NRC License for use of radioactive material, the Boise VA Medical Center is charged with the responsibility of insuring that such materials procured under the license to be used in a manner that is completely safe and without hazard to personnel or to property. The Radiation Control and Radioactive Drug Research Committee has been delegated this responsibility and has the authority to issue or withdraw authorization for the use of radioisotopes. Before any radioactive material can be used, an application must be approved by the Committee and an appropriate authorization for such use must be issued in the name of the Committee by the Director of Radiation Control. An application for authorization to use radioactive materials (Form RC 10) should be completed by the user. Before an application can be approved for an individual user, the Committee must determine that the training and experience of the applicant is adequate to conduct the proposed investigation in a safe manner. Such a determination is critically dependent upon the proposed use, since the kind and quantity of radioactive material coupled with the way the material is to be used specifies the degree of the hazard. Each application for an authorization to use radioactive material (Form RC 10), which contains a statement of the kind, quantity and proposed use of the material, and must contain a complete statement of the applicant's training and experience (Form RC 20). The Committee in its review of the application determines whether or not the statement of training and experience is consistent with the kind, quantity, and proposed used of radioactive material that the applicant has specified.

Training sufficient for the proposed use may be obtained by the applicant from a formal training course, or by collaboration with an experienced person. As a prerequisite for approval, the applicant shall provide safisfactory evidence of his knowledge of:

a. Principles and practices of radiation safety

b. Radioactivity measurements, standardization, and monitoring techniques and instruments

c. Mathematics and calculations basic to the use and measurement of radioactivity

d. Biological effects of radiation

In addition to the training requirements, the applicant must show that sufficient experience has been acquired in the safe handling of the material for which application is made or that equivalent experience has been acquired. Where on-the-job training has been received at a place other than the Boise VA Medical Center, the Committee may ask for documentation of the nature and extent of that training or instruct the Director of Radiation Control to administer a practical examination to assess the competence of the applicant in the uses requested.

If the applicant has had training and experience suitable for a large variety of problems but not enough for the use which is proposed, this investigator should make his application in his own name and in the name of a collaborator (joint application). Such an application will be approved in the name of the experienced person but with the understanding that the work will be performed by the inexperienced person under the supervision of the other. Responsibility for safe use of this material will be vested in the experienced user who will remain responsible throughout the life of the authorization. At such times as the supervising investigator is willing to recommend that the inexperienced person is ready to undertake the work without supervision, a new application may be submitted in the name of the new experienced person with his recently acquired experience listed in the application.

For the situation in which a medical graduate student will utilize radioactive material in his research project, the application shall be submitted in the name of the faculty advisor of the work; and the authorization will be issued to the faculty advisor. Of course, the faculty advisor must be qualified by training and experience as outlined above. Thus, the responsibility for safe handling of radioactive material to be used in student research will be vested in the faculty advisor of the project; or if the faculty advisor is not qualified by training and experience, the responsibility will be vested in a third party named in the application who has agreed to supervise this portion of the research.

Applications for possession and use of radioactive material are to be made on Forms RC 10 and 20. Copies of these forms are available from the Radiation Control Office. Both forms are to be completed for the initial application of a prospective user, and both forms are required if the user wishes to report changes in equipment, facilities, or procedures. Ordinarily, the application from an investigator already authorized to use one or more radioisotopes and who wishes to extend his coverage will require completion of only Form RC 10. A current file of approved users is maintained by the Director of Radiation Control which indicated the nuclides, activities and types of studies performed by approved users within the Boise VA Medical Center.

4.2 Application for Human Use.

Applications for the administration of radiation (x-rays or radioisotopes) to human subjects in research projects must be made on Form RC 30. When only minor exposure is involved/e.g., routine chest x-ray, Form RC 31 may be substituted. The completed form and a copy of the Human Subject Review Committee Application should be sent to the Radiation Control Office.

The application is reviewed by the Radiation Control and Radioactive Drug Research Committee. The following guidelines have been imposed for research projects involving a non-FDA approved radiopharmaceutical.

4.2.1 Radiation Dose to Subjects.

To assure that the radiation dose to research subjects is as low as practicable to perform the study the Radiation Control and Radioactive Drug Research Committee shall require that:

a. The investigator provide absorbed dose calculations based on biologic distribution data available from published literature or from other valid studies.

b. The investigator provide an acceptable method of radioassay of the radioactive drug prior to its use to assure that the dose calculations actually reflect the administered dose.

c. The radioactive drug chosen for the study has that combination of half-life, types of radiation, radiation energy, metabolism, chemical properties, etc., which results in the lowest dose to the whole body or specific organs with which it is possible to obtain the necessary information.

d. The investigator utilizes adequate and appropriate instrumentation for the detection and measurements of the specific radionuclides.

4.2.2 Limit on Radiation Dose.

a. The amount of radioactive material to be administered shall be such that the subject receives the smallest radiation dose with which it is practical to perform the study without jeopardizing the benefits to be obtained from the study.

b. Under no circumstances may the radiation dose to an adult research subject from a single study or cumulatively from a number of studies conducted within 1 year be generally recognized as safe if such dose exceeds the following:

(1) Whole body, active blood forming organs, lens of the eye, and gonads:

	Rems
Single dose	3
Annual and total dose commitment	5

(2) Other organs:

Single dose	5
Annual and total dose commitment	15

c. For a research subject under 18 years of age at his last birthday, the radiation dose shall not exceed 10 percent of the above limits.

d. All radioactive material included in the drug either as essential materials or as a significant contaminant or impurity shall be included when determining the total radiation doses and dose commitments. Radiation doses from x-ray procedures that are part of the research study (i.e., would not have occured but for the study) shall also be included. The possibility of follow-up studies shall be considered for inclusion in the dose calculations.

e. Numerical definitions of dose shall be based on an absorbed fraction method of radiation absorbed calculation, such as the system set forth by the Medical Internal Radiation Dose Committee of the Society of Nuclear Medicine, or the System set forth by the International Commission on Radiological Protection.

4.2.3 Limit on Pharmacological Dose.

(Only applicable for those radioactive drugs which are not subject of an approved IND): The amount of active ingredients to be administered shall be known not to cause any clinically detectable pharmacological effect in human beings. To determine that the amount of active ingredients to be administered does not exceed the limitation, the Committee shall require that the investigator provide pharmacological dose calculations based on data available from published literature or from other valid human studies. If the same active ingredients (exclusive of the radionuclide) are to be administered simultaneously, e.g., under a "Notice of Claimed Investigational Exemption for a New Drug" or for a therapeutic use in accordance with labeling for a drug approved under Part 314 of 21 CRF, the total amount of active ingredients including the radionuclide shall be known not to exceed the dose limitations applicable to the separate administration of the active ingredients excluding the radionuclide.

4.2.4 Quality of Radioactive Drug.

The radioactive drug used in the research study shall meet appropriate chemical, pharmaceutical, radiochemical, and radionuclide standards of identity, quality, and purity as needed for safety and be of such uniform and reproducible quality as to give significance to the research study conducted. The Radiation Control and Radioactive Drug Research Committee shall determine that radioactive materials for parenteral use are prepared in sterile and pryogen-free form.

4.2.5 Qualification of Investigator.

Any individual wishing to use radioactive materials in human subjects must be a physician licensed to dispense drugs in the practice of medicine by a state or territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico. Outlined below are training and experience criteria which the Committee will accept for physicians who use radiopharmaceuticals. Each physician's training and experience are examined on a case-by-case basis. If a physician wishes to use radiopharmaceuticals but does not have the training and experience described, he may submit an

application listing his specific qualifications and this will be reviewed by the Committee. Training may be obtained in a residency, formal training course, or collaboration in a program using radioactive material. A physician's background should include the basic radioisotope training in Section 4.1 plus, Clinical Radioisotope Training Consisting of:

a. Supervised examination of patients to determine the suitability for radioisotope diagnosis and/or treatment and recommendation on dosage to be prescribed.

b. Collaboration in calibration of the dose and the actual administration of the dose to the patient, including calculation of the radiation dose, related measurements and plotting data.

c. Adequate period of training to enable the physician to manage radioactive patients and to follow patients through diagnosis and/or the course of treatment.

d. Study and discussion with preceptor of case histories to establish most appropriate diagnostic and/or therapeutic procedures, limitations, contraindication, etc.

4.2.6 Human Research Subjects.

Each investigator shall select appropriate human subjects and shall obtain the consent of such human beings or their representatives. The research subjects shall be at least 18 years of age and legally competent. Exceptions are permitted only in those special situations when it can be demonstrated to the Committee that the study presents unique opportunity to gain information not prescribed available and requires the use of research subjects less than 18 years of age and is without significant risk to the subject. Studies involving minors shall be supported with review by qualified pediatric consultants to the Radiation Control and Radioactive Drug Research Committee. Each female research subject of child bearing potential shall state in writing that she is not pregnant, or, on the basis of a pregnancy test, be confirmed as not pregnant before she may participate in any study.

4.2.7 Clinical Research Protocol.

A formal protocol of the proposed study shall be submitted to the Committee for approval and be so approved prior to initiation of such a project. The protocol shall contain at least the follwoing information:

a. Title of study.

b. Purpose for conducting the study. The plan of investigation should be presented in sufficient detail to permit a critical evaluation of the methods and controls used.

c. The types, numbers and age levels of patients to be studied. A statement as to the necessity of serial studies on any individual.

d. Calculations of the radiation dosage to the critical organ and to the whole body. Rationale for using the dose selected.

e. A statement as to the experience of the individuals that are directly involved in the handling of the study.

f. Reference to previous literature or animal research that is directly related to the proposed study.

g. Facilities and equipment to be used for the study.

h. Consent of the subjects or their representatives.

i. A schedule for reporting results of the study and an outline of the type of information to be included in the report.

No matter how small the amount of radioactivity, no study involving administration of a radioactive drug, to research subjects shall be permitted unless the Radiation Control and Radioactive Drug Research Committee concludes, in its judgement, that scientific knowledge and benefit is likely to result from that study. Therefore, the protocol shall be based upon a sound rationale derived from appropriate animal studies or published literature and shall be of sound design such that information of scientific value may result. The radiation dose shall be both sufficient and no greater than necessary to obtain valid measurement. The projected number of subjects shall be sufficient but no greater than necessary for the purpose of the study. The number of subjects shall also reflect the fact that the study is intended to obtain basic research information and not intended for immediate therapeutic, diagnostic or similar purposes or to determine the safety and effectiveness of the drug in humans for such purposes, (i.e., to carry out a clinical trial).

4.2.8 Annual Report.

Some research projects may require an annual report to be submitted to the Food and Drug Administration. Such reports must be made on Form FD 2915 and submitted to the Committee before January 31. The following information must be presented:

a. Title of the research project.

b. Brief description of the purpose of the research project.

c. Name of the investigator responsible.

d. Pharmacological dose:

(1) Active ingredients.

(2) Maximum amount administered per subject.

e. Name of the radionuclide(s) used, including any present, as significant contaminants or impurities.

f. Radiation absorbed dose. Give the methods by which radiation dose commitment was estimated, such as by calculation, by in vivo measurements, by uptake excretion, or by other methods. For each subject, provide:

(1) Age, sex

(2) Amount of each radionuclide administered

(3) Estimated absorbed dose per single administered of radioactive drug, expressed as whole body active blood-forming organs, lens of the eye, gonads, and other organ dose.

(4) If more than one administration of a radioactive drug per subject, cumulative radiation dose and dose commitment, expressed as whole body, and actvie blood-forming organs, lens of the eye, gonads, and other organ doses from the administered radionuclides.

g. A claim of confidentiality, if any.

4.2.9 Informed Consent.

Research subjects should be informed in writing that their participation in the study will involve radiation exposure. The magnitude of the radiation exposure and the associated risks should be presented in meaningful terms. Inclusion of a statement such as the following is suggested:

> "The Food and Drug Administration has listed the conditions under which the use of radioactive drugs for research are considered as safe and effective. The amount of radiation you will receive as a result of the radioactive substance to be injected for this study is less than that considered the annual yearly allowable exposure for radiation workers."

4.3 Authorization.

When the submitted application is approved by the Committee, the investigator is notified by receipt of a copy of Form RC 10 and in the case of human studies Form RC 30 (or 31) indicating the response of the Committee to the application. Most commonly, the investigator is authorized to possess and use the radioactive materials in the quantities and forms that he requested. Occasionally, in the interest of radiation safety, the Committee will add certain restrictions on the use of the radioactive material to insure compliance with current Federal and State regulations.

Each authorization will be marked with an expiration date which will usually be the last day of the month, one year after the month of the approval. Authorized investigators should anticipate the expiration of their approvals by at least one month and apply for renewal of authorization. For this purpose, in the case of research involving human subjects it is necessary to submit Form RC 32. The Committee may require the investigator to submit inventory, use and/or survey records before renewal is granted.

If an investigator has no positive plans for the use of a given authorization during the coming year, he should consider its retirement in order to save on bookkeeping in the Radiation Control Office. Such a retired

authorization can usually be reactivated in one day should need for it develop. Whenever an authorization for a user is inactivated or terminated, the Radiation Safety Office must insure that:

a. The area is free of all radioactive materials and contaminants.

b. All radiation caution signs and labels are removed.

c. All radioactive material that is still in the possession of the user is stored in the Radiation Control Area or that disposal of such material has been properly carried out.

d. Film badge services are discontinued.

5. RESPONSIBILITIES OF RADIATION USER

A "Radiation User" is any individual who personally utilizes or manipulates a source of ionizing radiation (greater than an exempt quantity or concentration) in his duties at the Boise VA Medical Center.

5.1 Radiation Exposure.

Each radiation user must keep radiaton exposure to himself and to others in the vicinity to as low a level as is reasonably achievable and specifically below the maximum permissible exposure as listed below:

TABLE

Organ or Tissue	Millirem per week
Whole body; blood-forming organ; lens of eye; gonads.	100
Skin of whole body	600
Hands; forearms; feet; ankles	1500

5.2 Radioactive Materials.

All radioactive materials shall be used in such a way that their concentrations in air of the laboratory and environs and water released from the laboratory shall not exceed the limits specified in Appendix B of the Code of Federal Regulations, Title 10, Part 20 (10 CFR 20) "Standards for Protection Against Radiation." (Copies of this document have been supplied to all approved users at the Boise VA Medical Center. The specific conditions imposed on each approved use of radioactive material by the Radiation Control and Radioactive Drug Research Committee at the Boise VA Medical Center are designed to ensure that these levels are not exceeded).

5.3 Personnel Monitoring Equipment.

Wearing prescribed personnel monitoring equipment such as film badges, pocket dosimeters, thermoluminescent dosimeters. Film badges may not be required if you are working only with H-3, C-14 or S-35.

5.4 Protective Measures.

Utilizing all appropriate protective measures indicated in his approval notification, which may include:

a. Wearing protective clothing if personal contamination is possible, and not wearing such clothing outside of the laboratory area.

b. Wearing gloves when indicated.

c. Using protective barriers and other shields whenever possible.

d. Using mechanical devices whenever their aid will aissit in reducing exposure.

e. Using pipette filling devices. Never pipette radioactive solutions by mouth.

f. Performing work with volatile radioactive materials in an approved hood or glove box unless the safety of working in the open has been demonstrated.

5.5 Smoking or Eating in Radioisotope Laboratories.

Refrain from smoking or eating in radioisotope laboratories. Smoking or eating may be permitted in an office area of a laboratory that has been demonstrated to be free of removable radioactive contamination. Refrigerators shall not be used jointly for radioactive materials and food or drinks intended for human consumption.

5.6 Maintaining Good Personal Hygiene.

a. Keep fingernails short and clean.

b. Do not work with radioactive materials if there is a break in the skin distal to the wrist.

c. Wash hands thoroughly after working with radioactive materials before handling any object which goes to the mouth, nose, or eyes.

5.7 Laboratory Hygiene.

Checking the immediate areas, e.g., table tops, on which radioactive materials are being used, at least once daily for contamination. A log record shall be maintained of these surveys including results which are entirely negative. Any removable radioactive contaminant should be cleaned up.

5.8 Trasporting Radioactive Materials.

Keeping the laboratory neat and clean. Keep or transport materials in such a manner as to prevent breakage or spillage (double container), and to insure adequate shielding. Whenever practical, keep work surfaces covered with absorbent material, preferably in a stainless steel tray or pan, to limit and collect spillage in case of accident.

5.9 Labeling Isolated Radioactive Waste and Equipment.

Labeling and isolating radioactive waste and equipment, such as glassware, used in laboratories for radioactive materials. Laboratory equipment shall not be sent from the area to central cleaning facilities, repair shops, or to surplus, until demonstrated to be free of contamination.

5.10 Emergency Repair of Contaminated Equipment.

Requesting from the Radiation Safety Officer or the Assistant Radiation Safety Officer supervision of any emergency repair of contaminated

equipment in the laboratory. At no time shall servicing personnel be permitted to work on equipment in a radiation area without the presence of a member of the laboratory staff to provide specific information.

5.11 Reporting Accidents.

Reporting accidental inhalation ingestion, or injury involving radioactive materials to his supervisor and the Radiation Safety Officer, and carrying out recommended corrective measures. The individual shall cooperate in attempts to evaluate his exposure.

5.12 Decontamination Procedures.

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

5.13 Submission of Samples.

Complying with requests from the Radiation Safety Officer for routine body burden measurements and submission of samples of breath and urine for radioassay. Requests for these tests may be made in the case of workers using significant quantities of beta emitters such as H-3, C-14, alpha emitters such as radium and/or radon, and isotopes of iodine and technetium.

6. RESPONSIBILITIES OF APPROVED USERS

An "Approved User" is a person who has submitted information to the Radiation Control and Radioactive Drug Research Committee substantiating his competence to use a particular source or sources of ionizing radiation in a particular study without the necessity for immediate supervision. A list of approved users is maintained by the Radiation Control and Radioactive Drug Research Committee and is on file in the office of the Director of Radiation Control. Individuals not sufficiently qualified to use radioactive materials without supervision may gain experience by working with an approved user (See Section 4.1).

Approved users are responsible for insuring that the preceding individual responsibilities are dischared by those under their control, and are further responsible for:

a. Adequate Planning. Before an experiment is performed, the approved user should determine the types and amount of radiation or radioactive material used.

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. Contacting the Radiation Safety Officer or his Assistant whenever major changes in operational procedures, new techniques, alterations in physical plant, or when new operations which might lead to personnel exposure are anticipated.

d. Complying with the regulations governing the use of radioactive materials, as established by the State of Idaho and the Federal Government as well as the Boise VA Medical Center Radiation Control and Radioactive Drug Use Committee .

    (1) Correct procedure for the procurement of radioactive materials by purchase or transfer.

    (2) Posting areas where radioisotopes are kept or used, or where radiation fields may exist.

    (3) Insuring that each sign carries the name of the person currently responsible for the associated area.

    (4) Recording the receipt, use, transfer, and disposal of radioactive materials in his custody. This includes sealed sources such as ion sources in gas chromatographs and static eliminators. The authorized user must be prepared to submit current inventory data upon request.

    (5) Assuring that all radioactive waste materials are disposed of in accordance with instructions received from the Radiation Safety Officer or his Assistant.

(6) Taking steps to prevent the transfer of radioactive materials to unauthorized individuals.

e. Keeping stocks of stored radioactive materials (including wastes) to a minimum within laboratory areas. Authorized users may employ the storage facilities of the Radiation Control Office for radioactive material not needed currently.

f. Complying with proper procedure for termination of employment or termination of any experiment using radioactive materials. The authorized user must return to the Radiation Control Office all radioactive materials, including waste, assigned to him under the license. Under certain circumstances, the Radiation Control and Radioactive Drug Research Committee may approve transfer of radioactive materials to the job successor if he is an approved user. Care should be exercised to see that specialized equipment such as personnel monitoring devices (e.g., film badges), survey instruments, and shielding materials are returned to the Radiation Control Office. A final radiation survey should also be requested from the Radiation Safety Officer or his Assistant.

7. EXPLANATION OF TERMS

ABSORBED DOSE: The amount of energy imparted to matter by ionizing radiation per unit mass of irradiated material. (See Rad)

ACTIVITY: The number of nuclear disintegrations occurring in a given quantity of material per unit time. (See Curie)

CONTAMINATION, RADIOACTIVE: Deposition of radioactive material in any place where it is not desired, and particularly in any place where its presence may be harmful. The harm may be in vitiating the validity of an experiment or a procedure, or in actually being a source of excessive exposure to personnel.

CURIE: The quantity of any radioactive material in which the number of disintegrations is 3.700×10^{10} per second. Abreviated Ci.

Millicurie: One-thousandth of a curie 3.7×10^{7} disintegrations per second). Abbreviated mCi.

Microcurie: One millionth of a curie (3.7×10^{4} disintegrations per second). Abreviated uCi.

Picocurie: One millionth of a microcurie (3.7×10^{-2} disintegrations per second or 2.22 disintegrations per minute). Abreviated pCi.

DOSE: A general term denoting the quantity of radiation or energy absorbed in a specified mass. For special purposes it must be appropriately qualified, e.g., absorbed dose.

DOSE, ABSORBED: The energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest. The unit of absorbed dose is the rad, which is 100 ergs/gram.

EXPOSURE: A measure of the ionization produced in air by X or gamma radiation. It is the sum of the electrical charges on all ions of one sign produced in air when all electrons liberated by photons in a volume element of air are completely stopped in air, divided by the mass of air in the volume element. The special unit of exposure is the roentgen.

GENERAL PUBLIC: For the purpose of this manual, individuals not occupationally exposed to ionizing radiation shall be considered members of the genreal public.

HIGH RADIATION AREA: Any area accessible to personnel in which there exist ionizing radiation at such levels that a major portion of the body, head and trunk, active blood-forming organs, gonads, or the lens of the eye could receive in any one hour a dose in excess of 100 mrem.

IONIZING RADIATION: The electromagnetic or particulate emanations produced by radiation sources. These emanations can cause ionizations, i.e., the ejection of electrons from atoms.

MAXIMUM PERMISSIBLE DOSE (MPD): Maximum dose of radiation which may be received by persons working with ionizing radiation, which will produce no detectable damage over the normal life span.

MILLIROENTGEN (mR): A submultiple of the roentgen equal to one on-thousandth (1/1000th) of a roentgen. (See Roentgen)

MONITORING, RADIOLOGICAL: Periodic or continuous determination of the amount of ionizing radiation or radioactive contamination present in an occupied region as a safety measure for purposes of health protection.

Area Monitoring: Routine monitoring of the level or radiation or of radioactive contamination of any particular area, building, room or equipment.

Personnel Monitoring: Monitoring any part of an individual, his breath, excretions, or any part of his clothing. (See Radiological Survey).

RAD: The unit of absorbed dose which is equal to the absorption of energy in the amount of 100 ergs/gram of any material. For the purpose of these regulations, one Rad is considered to be the dose delivered by one Roentgen of X or gamma radiation.

RADIATION AREA: Any area to which access shall be limited as deemed necessary by cognizant authority and in which appropriate precautionary measures are taken to protect personnel from exposure to radiation or radioactive materials. A radiation area includes any area accessible to personnel in which there exists:

a. Ionizing radiation at such dose-rate levels that a major portion of the body, head and trunk, active blood-forming organs, gonads, or lens of the eye could receive in any one hour a dose of five mrem, or in any five consecutive days a dose in excess of 100 mrem.

b. Airborne radioactivity levels in excess of the amounts specified for a 40-hour week in Table 1. Column I of Appendix B in Title 10, Part 20 of the Code of Federal Regulations.

RADIOACTIVE CONTAMINATION: A radioactive substance dispersed in materials or places where it is undesirable.

RADIOACTIVE MATERIALS: For purposes of these regulations include all materials which contain atoms that emit ionizing radiation spontaneously, and are artificially produced or natural but found in concentrations and/or isotopic abundance greater than that in nature. Practically all materials found on earth contain traces of radionuclides. We do not consider human, animals, or plants to be radioactive, even though they contain small amounts of Radium, K-42, C-14 and H-3. The ability to identify a material as radioactive is based on the sensitivity of detection apparatus, the length of country time and the background of the instrument. For practical purposes we are limited to detection of radioactive materials where activity is equivalent to greater than the square root of background.

RADIOLOGICAL SURVEY: Evaluation of the radiation hazards incident to the production, use or existence of radioactive materials or other sources of radiation under a specific set of conditions. Such evaluation customarily includes a physical survey of the disposition of materials and equipment, measurements or estimates of the levels of radiation that may be invovled, and a sufficient knowledge of processes using or affecting these materials to predict hazards resulting from expected or possible changes in materials or equipment.

ROENTGEN (R): That amount of x-ray or gamma radiation which will produce in air 2.58×10^{-4} Coulombs per kilogram of air.

REM: The special unit of dose equivalent. The dose equivalent in rems is numerically equal to the absorbed dose in rads multiplied by the quality factor, distribution factor, and any other necessary modifying factors.

SMEAR (Smear or Wipe Test): A procedure in which a circle of filter paper is rubbed on a surface and its activity measured to determine if the surface is contaminated with loose radioactive material.

THERMOLUMINESCENT DOSIMETER: A dosimeter made of certain crystalline material which is capable of both storing a fraction of absorbed ionizing radiation and releasing this energy in the form of visible photons when heated. The amount of light released can be used a a measure of radiation exposure to these crystals.

UNRESTRICTED AREA: Unrestricted area means any area access which is not controlled by the activity for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

8. RADIATION PROTECTION PROGRAM

8.1 Materials Covered.

All radium, radon, and other artificially produced or isotopically enriched radioactive materials used in the Boise VA Medical Center are included in the provisions of this Radiation Protection Program.

8.2 Governmental Regulation.

All applicable and federal regulation shall be enforced.

8.3 Procurement.

All by-product materials shall be procured under the By-product material license issued to the Boise VA Medical Center by the NRC. No individuals will be permitted to obtain by-product material under individual license.

8.4 Inventory.

The Committee on Radiation Control and Radioactive Drug Research shall ascertain that proper written records of receipts, transfer and disposal of radioactive materials in the Medical Center are maintained, as well as current inventories of the total quantity of each radionuclide possessed by the Boise VA Medical Center.

8.5 Education.

The Committee on Radiation Control and Radioactive Drug Research shall be responsible for supervision of the preparation and dissemination of information pertaining to federal and state rules and regulations pertaining to radiation safety.

8.6 Violations.

Violations of established safety practices may result in the loss of Committee approval to use sources of ionizing radiation until corrective measures have been effected. Violations which are not corrected after reasonable notice and negotiation will be reported to the Chief of Staff and the Medical Center Director.

8.7 Withdrawal of Approval.

The Committee may withdraw approval from a user for a specific use and/or a specific radionuclide if circumstances dictate. It may withdraw approval for all uses from a user if repeated violations of established radiation safety procedures indicate that continued approval would likely result in overexposure to personnel, or release into the environment of quantities of radioactive materials in excess of those permitted under our license.

9. POLICIES AND PROCEDURES FOR RESTRICTED AREAS

"Restricted Area" means any area, access to which is controlled by the licensee for the purposes of protection of individuals from exposure to radiation and radioactive materials. 10 CFR 20.3 (14)

In addition to the Code of Federal Regulations Title 10, Part 20, "Standards for Protection Against Radiation," appended to the Guide, the following policies and procedures will apply to the Boise VA Medical Center license.

9.1 Proper Marking of Laboratories, Areas, and Equipment.

9.1.1 Signage for Radioactive Materials.

A "CAUTION RADIOACTIVE MATERIALS" sign must be conspicuously posted on the door or entrance to areas where radioactive materials are being used or stored. The name and phone number(s) of the individual 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 approved user is responsible for insuring that posted information is current.

9.1.2 Storage Areas.

Storage areas for radioactive materials shall be conspicuously marked with a "CAUTION RADIOACTIVE MATERIALS" 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 MATERIALS." This label shall state the activity and identity of radioactive materials in the container and the date of assay.

9.1.3 Radiation Exposure.

Areas where radiation exposure to an individual could exceed 5 millirem in any one hour; or a dose in excess of 100 mrem in any 5 consecutive days, shall be posted with the sign "CAUTION RADIATION AREA."

9.1.4 Contaminated Equipment Signage.

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.

9.1.5 Availability of Signage.

All signs referred to in this part are available from the Radiation Safety Officer.

9.2 Shielding of Sources.

Radioactive sources shall be shielded in such a manner that the radiation levels in any

a. restricted area will not expose radiation workers in the area to more than 100 mrem in any five consecutive days from all sources of radiation;

b. unrestricted area will not lead to exposure of personnel to more than

(1) 0.5 Rem in any one year

(2) 2 Rem in any one hour

(3) 100 mrem in any seven consecutive days.

9.2.1 Availability of Shielding Materials.

Shielding materials are available on loan from the Radiation Safety Officer.

9.3 Aerosols, Dusts, and Gaseous Products.

Procedures involving aerosols, dusts or gaseous products or procedures which might produce airborne contamination in excess of the limits specified in Appendix B of 10 CFR 20 shall be conducted in a hood, dry box, or other suitable closed system.

9.3.1 Maximum Permissible Concentration Release.

All radioactive materials released from such systems shall not exceed the maximum permissible concentration in air for the nuclide in question. See Appendix B, Table II of 10 CFR 20 for appropriate values.

9.3.2 Storage of Radioactive Gases.

Radioactive gases must be stored in gas-tight containers and must be kept in areas having ventilation approved by the Director of Radiation Control.

9.3.3 Hood Testing.

Hoods to be used for work with radioactive materials will be tested by the Radiation Safety Officer to insure that they have adequate air flow at the face of the hood, depending on their use.

9.4 Work Surfaces.

All work surfaces (bench tops, hood floors, etc.) as well as storage areas and areas adjacent to permanent set-ups and sinks should be covered at all times with stainless steel or plastic trays, uncracked glass plates, or other impervious materials. For some purposes a plastic-backed absorbent paper (e.g., "Kimpak") may be satisfactory. If such paper is used, it should be changed frequently.

9.5 Periodic Surveys of Radiation Areas.

The immediate areas (e.g., hoods, bench tops) in which radioactive materials are being used should be chected for contamination at least once on any day of use for radioactive materials (at the end of the procedure) by the radiation workers in that laboratory. These areas should be inspected oftener if there is reason to suspect a contamination incident. Records shall be kept on both positive and negative survey results in the approved user's laboratory logs. The detection method shall be capable of detecting 0.005 μCi of the radionuclide used, per 100 cm^2 surface area.

9.6 Laboratory Monitors.

Each laboratory or area where radioactive materials are used (other than those where H-3 is used exclusively) shall be equipped with a portable or semiportable monitoring device to be used for personnel and area monitoring. Laboratory monitors of this type are available on loan from the Radiation Control Office.

9.7 Removal of Equipment from the Laboratory.

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

9.8 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 the Radiation Safety Officer who will assure that the necessary safeguards are taken. It is the responsibility of the approved user to request this supervision from the Radiation Safety Officer.

9.9 House Vacuum Lines.

House vacuum lines are vulnerable to contamination and must not be used for suction of solutions containing radioactive materials. It is advisable to use a separate vacuum system whenever possible, such as a separate vacuum pump exhausting into a hood.

9.10 Radioactive Contamination.

In general, no removable radioactive contamination can be tolerated. Exceptions to this will include, of necessity, the interiors of hoods and dry boxes. Stainless steel trays, Kimpak covered surfaces, or other equipment which is used specifically to confine or contain radioactive materials shall be clearly marked with standard radiation caution signs or stickers.

Areas, individuals, or equipment will be considered contaminated if any of the following conditions exist:

a. Alpha activity detectable at the surface in excess of 0.0005 microcuries;

b. Removable beta or gamma activity in excess of 0.005 microcuries per 100 cm^2 by wipe sample techniques;

c. Beta and/or gamma radiation in excess of 0.2 millirads per hour at the surface.

9.11 Exposure of Individuals to Radiation in Restricted Areas.

No approved user shall possess, use, receive, or transfer sources of radiation in such a manner as to cause any radiation worker in a restricted area to receive from all sources of ionizing radiation a dose in excess of the following:

	Type of Exposure	Rem per calendar quarter	Rem per year
a)	Whole body, head & trunk, active blood-forming organs, gonads, or lens of the eye	1.25	5*
b)	Skin of whole body	7.5	30
c)	Hands & forearms, feet & ankles	18.75	75
d)	Bone-Body burden	0.1 micrograms of radium-226	

*Accumulated Dose = 5 (N-18)
N = the individual's age in years at his last birthday. Individuals under age 18 shall not be permitted to remain in restricted areas, except by special permission of the Committee under 10 CFR 20.104.

9.12 Exposure of Individuals to Radiation in Unrestricted Areas.

No user shall possess, use or transfer sources of radiation in such a manner as to create in any unrestricted area:

a. radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of two millirems in any one hour; or

b. radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of 100 millirems in any seven consecutive days; or

c. radiation levels which could result in any individual receiving a dose in excess of 500 millirems in any calendar year.

10. REPORTS OF OVEREXPOSURE

10.1 Immediate Notification.

Immediately notify the Director of Region, Division of Compliance, U.S. NRC* and telegram of any incident involving licensed material which may have caused or threatens to cause:

a. Any exposure to the whole body of 25 rems or more; an exposure to the skin of the whole body of 150 rems or more; an exposure of the feet, ankles, hands, or forearms of 375 rems or more.

b. Release of radioactive materials in concentrations which if averaged over 24 hours would have exceeded 5000 times the limits for an unrestricted area (See Appendix B, Table II, 10 CFR 20).

c. A loss of one working week or more of the operation of any facilities affected.

d. Damage to property in excess of $200,000.00.

10.2 Twenty-four Hour Notification.

Within 24 hours of any incident involving licensed material, the Director, Region Division of Compliance* will be notified by phone and telegram if the incident causes or threatens to cause:

a. Exposure of the whole body of an individual to 5 rems or more of radiation; exposure of the skin of the whole body to 30 rems or more; or exposure of the feet, ankles, hands and forearms to 75 rems or more of radiation.

b. The release of radioactive materials in concentrations which if averaged over a period of 24 hours would exceed 500 times the limits for an unrestricted area (See Appendix B, Table II, 10 CFR 20).

c. The loss of one day or more of the operation of any facility affected.

d. Damage to property in excess of $2,000.00.

*Region IV, Office of Inspection and Enforcement, USNRC
611 Ryan Plaza Drive, Suite 1000, Arlington, Texas 76012
Phone: (817) 334-2841 (days); (817) 334-2841 (nights/holidays)

10.3 Thirty Day Notification.

In addition to the above requirements, a report in writing shall be made to the Director, Division of Compliance, U.S. Nuclear Regulatory Commission, Washington, D.C., 20545, with a copy to the Director, Region Division of Compliance, U.S. NRC.

a. Each exposure of an individual to radiation or concentrations in excess of any limits in this instruction.

b. Any incident for which immediate or 24-hour notification is required.

c. Levels of radiation or concentration or radioactive materials in an unrestricted area in excess of 10 times any applicable limit in this instruction.

The 30-day written report shall include but not be limited to a description of the extent of exposure of persons to radiation or the radioactive materials; levels of radiation and concentrations of concentrations; and corrective steps taken or planned to assure against such a recurrence.

Any individual so exposed shall be notified in writing of the nature and extent of exposure and the notice shall include this statement:

> "This report is furnished to you under the provisions of the U.S. NRC regulations entitled "Standards for Protection Against Radiation" (10 CFR, Part 20). You should preserve this report for future reference."

Any such written report to the NRC shall be prepared so that names of individuals who have received exposure to radiation will be stated in a separate part of the report. It is the duty of the Director of Radiation Control to prepare these reports for transmittal.

11. GENERAL INSTRUCTIONS AND REGULATIONS FOR USE OF RADIOACTIVE MATERIALS

The following general rules and regulations cover the use of radionuclides at the Boise VA Medical Center.

11.1 Qualifications:

Individual staff members of the Boise VA Medical Center who satisfy one or more of below listed qualifications may be authorized to possess and use radioactive materials upon application to the Radiation Control and Radioactive Drug Research Committee. Approved users are directly responsible for the actions and handling of radioisotopes by technical personnel under their direction. General requirements which must be met to qualify for use of radioactive materials include, but are not limited to the following:

a. Successful completion of formal courses totaling 30 or more hours in radioisotope methodology including health physics, radiation physics, radiation biology, math and statistics.

b. Those working with radioactive materials for not less than one year under the supervision of approved users on the staff, or with authorized or approved users at other institutions. In this case, the sponsor under whom the "on-the-job" training was obtained is required to furnish a written statement attesting to the competence of the applicant to handle radioactive materials safely.

c. Individuals who demonstrate their proficiency and competence in the areas of radioisotope techniques and radiation safety to the Radiation Control and Radioactive Drug Use Committee . This may be by oral, written or practical examination as determined by the Committee.

11.2 Procurement and Storage of Radioactive Materials:

a. All radioactive materials covered by the Byproduct Material License issued by the NRC and used at the Boise VA Medical Center shall be obtained by ordering from licensed suppliers only through the Radiation Control Office. All radioactive materials, even those received without cost, must be received via or with immediate notification of the Radiation Control Office. The Radiation Control Office will maintain records on all incoming radioisotopes which include the following information:

(1) Radionuclide/Compound, Source, Date of Receipt, Assay of Receipt, Name of Approved User. Written purchase orders may be transmitted directly to the purchasing department for prompt service. The approval control number obtained from the DRC must be noted on the order form. The purchasing department will provide the Radiation Control Office with a xerox copy of the purchase order form each time radioactive materials are ordered.

b. No radioactive materials may be transferred from one user's laboratory to another in the Medical Center without notification and approval of the Director of Radiation Control, to ensure adequate control of licensed material.

c. All radioactive materials must be stored in appropriately shielded containers in secure locked areas (including refrigerators) accessible only to and under direct control of the approved user or his technical staff. These areas should be appropriately labeled with radiation area signs.

11.3 Use and Application of Radionuclides:

a. No radioactive materials may be used for any purpose unless prior approval is received from the Radiation Control and Radioactive Drug Research Committee. Any significant change in use, e.g., activity levels, method of disposal, physical form or laboratory alteration requires consultation with the Director of Radiation Control or his deputy and in certain circumstances may require approval of the Radiation Control and Radioactive Drug Research Committee.

b. Application of radiation from byproduct materials or administration of byproduct materials to humans for investigational purposes must be first approved by the Radiation Control and Radioactive Drug Research Committee. Any radionuclide and/or labeled compound obtained from sources other than a radiopharmaceutical supplier with an unrevoked (HHS) license to market that material must be assayed as to quality and activity by counting against appropriate standards for gamma or beta activity. Radiochemical purity may be established by assay in multichannel or pulse height analyzers or other radiochemical analysis. Sterility must be established by appropriate culture techniques if the radioactive material is administered parenterally. A protocol outlining the details of these precedures for each compound or radioisotope must be submitted to the Radiation Control and Radioactive Drug Research Committee for approval prior to use.

11.4 Disposal of Radioactive Waste:

All radioactive waste, including liquids, solids, and unused stock materials, must be disposed of by the methods and procedures outlined in the Boise VA Medical Center Radiation Protection Guide. Specific directions are ordinarily indicated in the form indicating approval for use of radioactive materials.

11.5 Notices, Instructions and Information:

The approved users of radioactive materials at the Boise VA Medical Center will receive copies of all current Administrative instructions. Instructions relating to Radiation Protection, and other pertinent notices, including those received from the U.S. Nuclear Regulatory Commission and the Food and Drug Administration. All users will be notified in writing of any additions, deletions or modifications to these notices.

12. PROCEDURES FOR OPENING PACKAGE CONTAINING RADIOACTIVE MATERIALS IN EXCESS OF TYPE A QUANTITIES*

Procedures for opening packages containing radioactive materials in excess of Type A quantities are as follows:

a. Wipe test package for removable contamination.

b. Note radiation units stated on package, verify and record in receipt log. (Hard beta and gamma only)

c. Place package in vented hood.

d. Open outer package and remove packing slip. Open inner package and verify that the contents agree in name and quantity with the packing slip.

e. Measure radiation field of unshielded container--if necessary place container behind shielding to reduce field to allowable limits and proceed with remote handling devices. (Hard beta and gamma only)

f. Check for possible breakage of seals or containers, loss of liquid or change in color of absorbing material.

g. Wipe test inner contents and document any pertinent findings no packing slip.

h. Record type of activity, quantity present and location of delivery in receiving log.

i. Notify recipient of its arrival and clearance.

j. If material has been packaged in dry ice, refrigerate or freese as required.

k. If contamination, leakage or shortages are observed, notify the user.

*Special requirements will be followed for packages containing quantities of radioactive material in excess of the Type A quantity limits as specified in paragraphs 20.205(a)(1) and (c)(1) of 10 CFR Part 20 (more than 20 Ci for Mo-99 and Tc-99m). They will be monitored for surface contamination and external radiation levels within 3 hours after receipt if received during working hours or within 18 hours if received after working hours, in accordance with the requirements of paragraphs 20.205(a) through (c). All shipments of liquids greater than exempt quantities will be tested for leakage. The NRC Regional Office will be notified in accordance with the regulations if removable contamination exceeds 0.01 μCi/100 cm^2 or if external radiation levels exceed 200 mR/hr at the package surface or 10 mR/hr at 3 feet (or 1 m).

13. CALIBRATION OF RADIATION MONITORING EQUIPMENT

13.1 Frequency.

All portable survey instruments in routine use for monitoring ionizing radiation must be recalibrated at least every three months. This must be done by the Radiation Safety Officer or an agency or person approved by the Radiation Safety Officer. Records of these calibration values and calculations are to be kept by the Radiation Safety Officer.

13.2 Standards.

Calibrated or standard sources from the National Bureau of Standards or a firm licensed by the National Bureau of Standards, such as encapsulated radium-226, cesium-137, cobalt-60 and C-14 are acceptable.

13.3 Gamma-ray Calibration Procedures for Portable Survey Meter.

Using a calibrated gamma reference source in an open area free from scattering objects closer than 1 Meter, plot the actual meter reading versus the dose rate calculated at various distances (using the inverse square law) on 2-cycle log-log graph paper and determine the appropriate correction factor for all meter readings. Correction factors greater than ±20% from expected reading are indications for removal from use and repair if necessary.

13.3.1 Pocket Dosimeters.

For pocket dosimeters, we use a calibrated source at one meter and measure approxiamte 1/4, 1/2, and 3/4 of full scale deflections, recording the time required for each excursion, recharging the dosimeter between readings. Record the calculated dose in milliroentgens and determine the correction factor (the number by which all readings must be multiplied in order to give true readings) for each exposure. A plot of the correction factor may be made as a function of dose on linear graph paper which then represents the calibration curve for a given pocket dosimeter. Remove from service those pocket dosimeters whose correction factor lies outside the range of 0.8 to 1.2.

14 POLICY ON EMPLOYMENT OF PREGNANT RADIATION WORKERS

When a radiation worker is discovered to be pregnant, she should no longer be considered as a radiation worker for the purposes of allowable radiation exposure. The extent of her continued radiation exposure is determined by a limitation of exposure during the entire gestation period of only 0.5 rem.

a. The Director of Radiation Control (DRC) is directed to institute whatever controls are necessary to limit a pregnant worker's occupational total body radiation exposure to no more than 500 millirem for the period of the pregnancy. This is in agreement with NCRP Report No. 39, issued January 15, 1971 ("Basic Radiation Protection Criteria").

   (1) The DRC shall review that person's occupational exposure history and shall use this as a guide in predicting the likely exposure during the remaining portion of the pregnancy.

   (2) The DRC shall discuss the matter with the person and/or her supervisor indicating methods of maintaining strict radiation exposure control. The pregnant worker will be asked to sign a statement to the effect that this interview has taken place and that she understands any additional radiation safety instructions which she has been asked to observe.

c. Pregnant workers, as well as students, house staff, faculty, will be removed from fluoroscopy duties and from all work with therapeutic quantities of radioactive materials including radium, radon, cesium-137, iodine-131.

d. Instruction of all new female radiation workers, and current employees on an annual continuing basis in accordance with 10 CFR 19 and Regulatory Guide 8.13 are a part of our continuing education program. Copies of these documents are available in the office of the DRC and RSO.

15. CLINICAL USE OF RADIOACTIVE MATERIALS

Exposure to ionizing radiation of all individuals should be limited to an amount considered necessary to accomplish the desired therapeutic or diagnostic result.

a. Every person who receives radioactive materials in any amount for diagnosis, therapy or research shall have this fact recorded in a permanent record of the Boise VA Medical Center. In the Medical Center, this notation will ordinarily be recorded in the patient's medical history record in addition to the permanent records maintained by the department concerned. These notations shall be made by the physician responsible for administering the radioactive material.

b. If a patient dies within the hospital or requires emergency surgery within two weeks after receiving a therapeutic dose of any radionuclide, the Director of Radiation Control (Ext.7404) shall be called to determine if a radiation hazard exists. Under no circumstances shall an autopsy be performed, nor the body released from the Medical Center, until certification has been obtained from the Director of Radiation Control or his designate. For purposes of this section, "therapeutic amounts" is defined as five millicuries or more of any radionuclide with a half-life greater than 1 day.

c. Patients who receive amounts of radioactive materials which may make them a hazard to others, shall be isolated in a designated area or areas of the Medical Center. Arrangements for radiation isolation shall be made by the responsible physician before such amounts are administered.

d. When therapeutic amounts of gamma emitting radioactive materials are being used in patient treatment, pregnant Medical Center personnel shall be transferred from the immediate area of radiation exposure. Adult visitors may be permitted under guidelines established for each type therapy case.

e. Tissue specimens, blood, ascitic fluid, urine, feces, emesis, etc., from patients undergoing therapy orally or parenterally administered radionuclides shall not be sent to the clinical laboratories without permission of the Director of Radiation Control.

16. INSTRUCTIONS FOR TECHNOLOGISTS WHERE PATIENT RECEIVES TREATMENT DOSE OF RADIONUCLIDE.

a. Arrange for a single bedded room with a private bath.

b. Notify Radiation Control Office (Ext. 7478).

c. Review orders.

d. If a patient receiving 131-I for treatment of cancer, ascertain if TSH is to be given.

e. As soon as treatment dose arrives from Radiation Control, place in storage area until needed.

f. Take the following equipment to the patient's room:

(1) Plastic bottle for urine (131-I).

(2) Plastic bags for radioactive trash.

(3) Lavendar topped tubes for blood samples (131-I).

(4) Vacutainer holder and needles (131-I).

(5) Plastic gloves.

(6) Plastic bottle with water (131-I).

(7) Straws (131-I).

g. Bring lead cart with radionuclide (131-I) into the patient's room.

h. Take blood samples at times determined by attending physician.

i. Measure and record 131-I activity in urine.

j. Disposal: Transfer urine to Radiation Control Office for storage prior to disposal.

k. When the patient is dischared, check everything in the room to see if there is any contamination in excess of 0.005 μCi removable (telephone, bedding, floor, bathroom, etc.). Decontaminate if necessary.

17. RADIATION SAFETY OFFICER'S DUTIES WHERE MEDICAL CENTER PATIENTS RECEIVE TREATMENT DOSES OF RADIONUCLIDES

a. Provide signs for door, tags for patient's bed.

b. Provide radiation monitoring service in area where the patient is to reside.

(1) Film badge or pocket dosimeters.

(2) Ionization chamber and/or G-M counter.

c. Provide specific instructions for nurse.

d. Provide specific instructions to Medical Officer and Technologist as indicated for radiation safety purposes.

e. Measure radiation levels in patient's room after administration of dose.

f. Establish boundaries for visitors.

g. Tag patient's bed, indicating exposure at 1 meter, time and date.

h. Specify the date when radiation safety precautions concerning visitor's privileges terminate.

18. INSTRUCTIONS FOR NURSES AND WARD PERSONNEL WHERE PATIENTS HAVE RECEIVED TREATMENT DOSES OF RADIOACTIVE 131-I (_____ mCi)

(Given Orally)

Patient Name _____ Room # _____ Date _____

18.1 Patient.

a. Patient is to be in a single bedded room with the door suitably marked to indicate the recent administration of therapeutic radionuclide (over 30 mCi). Room is to have a bath used by patient only.

b. Patient must wear a hospital gown for first 48 hours.

c. When patient vacates the room, notify the Section of Nuclear Medicine so that monitoring may be performed. Do not remove ANYTHING from the room except the patient's personal articles.

d. Patients may purchase articles from the cart, newspapers, etc. They may have flowers.

18.2 Nursing Staff.

a. Attendants caring for the patient must be 18 years of age or older.

b. Pocket dosimeters will be provided for nurses and aides attending this patient.

c. If you are pregnant, do not attend this patient.

d. Necessary patient care (not to include back rubs, vital signs unless specifically requested) is the only justification for entry into the room by nurses and ward personnel.

e. If the patient should vomit or be incontinent, personnel attending the patient should don scrub gowns, disposable gloves and shoe coverings. The soiled area should be covered with incontinent pads. The Chief of Nuclear Medicine and the R.S.O. or his assistant should be notified immediately.

f. Provision should be made for vomiting by providing a waterproof cardboard container during the first 24 hours after administration of the radionuclide. If this is used by the patient, handle only with plastic or rubber gloves. Remove it to a corner of the room and notify the Radiation Safety Officer (RSO) or his assistant.

g. A plastic or rubber covering should be placed on the mattress and pillowcase.

h. If patient perspires profusely, bedding, towels, etc. are to be handled with rubber gloves and placed in a laundry bag in the patient's room to be checked by the RSO or his assistant before they are sent to the laundry. These precautions should also apply if the patient is incontinent of urine. This bag should be identified with the patient's name, room number, date and contents.

i. Scrub gowns and disposable gloves or rubber gloves should be used when attending to the patient. Wash gloves before removing from hands, remove gloves and place used disposable gloves in separate plastic bag and reusable gloves and linen in another. Wash hands paying particular attention to fingernails. Attach a card to the bag noting the patient's name, room, date and contents. A separate container will be placed near the door for rubber gloves and gowns. This must be checked by the RSO or his assistant before release to the laundry.

j. If the patient should die during this period of isolation, the Chief of Nuclear Medicine and the RSO or his assistant should be notified immediately.

k. All food trays and dishes may be handled in a routine manner being removed from the room as used. Plastic utensils shall be retained in a plastic bag for monitoring by personnel from the Section of Nuclear Medicine.

l. The urine (may) (may not) be flushed down the toilet. BE CAREFUL NOT TO SPLASH. Follow with 6 flushings.

m. Bedpans and urinals used should be kept for individual use and precautions against radiation contamination maintained for 5 days. Disposable gloves must be used in handling bedpans and urinals, and must be disposed of after use.

18.3 Visitors.

Visitors are restricted to not more than 1 hour unless otherwise specifically permitted. They must be instructed to sit at a distance from the patient, beyond the line placed by the RSO or his assistant. Persons under the age 18 will not be permitted to visit the patient.

18.4 General.

NOTE: THIS PATIENT WILL CONTINUE TO CONTAIN RADIOACTIVE MATERIAL FOR SEVERAL WEEKS AND YOUR PROLONGED PRESENCE IN HIS/HER IMMEDIATE VICINITY IS TO BE AVOIDED. DO NOT ENTER THE ROOM UNLESS NECESSARY, MAKE YOU STAY AS BRIEF AS POSSIBLE AND REMEMBER THE GREATER THE DISTANCE BETWEEN YOU AND THE PATIENT, THE SAFER YOU ARE.

Please observe these directions carefully. If there are any questions call:

Radiation Safety Officer,
Roger G. Stano, M.S. Telephone 7478

Chief, Nuclear Medicine Service,
John B. Tweeten, M.D. Telephone 7275

Director of Radiation Control,
Lawrence L. Knight, M.D. Telephone 7240

19. INSTRUCTION SHEET FOR PATIENTS RECEIVING RADIOACTIVE IODINE

The rules of the Boise VA Medical Center requires that all patients receiving more than 30 millicurie of 131-I be kept in a single bedded room with the door suitably marked. You will be asked to remain in this room until the levels of raioactivity have decreased to the point where you may travel outside of the room without restrictions. It is required that you wear a hospital gown for most of this period of time. It is preferable that visitors should be adults who would stay in your room for only short periods of time and sit at a distance from you. No visitors under 18 years of age will be permitted.

When you are discharged you will be informed of any further restrictions which should be obsered. For example, the ages of visitors at home who could see you without restrictions or with restrictions if appropriate. In general, it is the policy of the hospital to keep you in the hospital until any risk to family or friends has passed.

As you will recall from your discussions with the physician, the radioactive material which you have received is for the purpose of treating you. It is not necessary or even wise that other people should be exposed to the treatment that will be beneficial to you.

JOHN B. TWEETEN, M.D.
Telephone: 336-5100 (Ext. 7275)

20. POST-MORTEM CARE OF THE PATIENT CONTAINING THERAPEUTIC QUANTITIES OF A RADIONUCLIDE

20.1 General Procedure.

In most hospitals deceased patients containing large amounts of radionuclides will be encountered only rarely since, in priciple, radionuclide therapy is not given to moribund patients. If several days intervene between treatment and subsequent surgery or death, the radiation hazard is usually considerably reduced.

If a patient containing a therapeutic quantity of a radionuclide* dies in the hospital, the physician who pronounces death shall be responsible for attaching a radioactivity precautions tag to the body. The physician in charge of the case and the Radiation Safety Officer or his assistant shall be notified at once. If permission has been granted to perform an autopsy, this shall be carried out only after consultation with the Radiation Safety Officer or his assistant. If no autopsy is to be performed, the radioactivity report shall be attached to the death certificate and, with the approval of the Radiation Safety Officer or his assistant, the body may be released to the funeral director.

20.2 Special Procedures.

The following special handling procedures are required for post-mortem handling of patients having received a therapeutic quantity of radioactive material, orally or parenterally, within the previous six weeks.

a. Any person handling the body shall wear rubber or plastic gloves and a gown.

20.2.1 Duties of Ward Nurses.

a. Tie one radiation hazard tag on the right great toe and secure a second tag to the shroud; write on each the specific isotope administered, amount, method of administration, time, and date. These tags may be removed from the patient's bed and are also available on request from the Radiation Safety Officer.

b. Notify the Radiation Safety Officer or his assistant (ext. 7478) and the Chief of Nuclear Medicine (ext. 7478) of the patient's death.

c. Notify the morgue that the corpse contains administered radioactive material.

*A therapeutic quantity for purpose of this instruction is defined as 5 millicuries or more of any radionuclide with a half-life greater than 1 day.

20.2.2 Duties of the Radiation Safety Office or His Assistant.

a. The Radiation Safety Officer or his assistant shall, if remaining activity warrants, monitor the body, indicate if the radiation level

is sufficiently low that a post-mortem examination may be performed, and monitor the post-mortem examination, if indicated.

b. Approval for release of the body shall be obtained from the Radiation Safety Officer or the Director of Radiation Control. Any pertinent instructions regarding radiation safety precautions that should be known by the embalmer shall accompany the approval for the release.

21. INSTRUCTIONS FOR MORGUE PERSONNEL CONCERNING SAFE HANDLING OF CADAVERS CONTAINING RADIOACTIVE MATERIALS

21.1 Requirement for Notification.

When a corpse suspected to contain more than 5 millicuries of radioactive material with $T_{\frac{1}{2}}$ greater than 1 day is to be examined at autopsy, the Radiation Control Office (Ext. 7478) shall be notified. The amount of activity remaining in the body should be estimated by reference to the time elapsed since the administration of the radionuclide. If the amount remaining is less than 5 millicuries, no special precautions are necessary other than the usual wearing of gloves, except in cases of I-131 therapy, where the handling of the thyroid gland should be minimized.

21.2 Special Precautions.

Where the residual activity exceeds 5 millicuries, the following precautions shall be observed.

21.3 Duties of the Radiation Safety Officer (or his Assistant).

a. Survey the body before it is opened to allow estimation of maximum working times for the pathologist(s).

b. After the body is opened, a second survey shall be made to estimate levels of beta-ray dose, particularly in intra-cavitary therapy.

c. The working time inside the body will usually be limited by exposure of the hands. Determine whether use of double gloves is indicated and determine working time based on current exposures to the hands, and previous exposure of the pathologist.

d. The pathologist should be informed of the likely exposure that he will receive to his eyes, torso, hands and he should agree to agree to function in the capacity of a radiation worker during this time. His finger exposure should be determined by TLD ring badge and body and wrist pocket dosimeters. It is highly likely that the pathologist and his assistant will be exposed to more than the maximum permissible dose for the general public, viz. 2 mrem in any one hour and 100 mrem in any 1 week.

22. EMERGENCIES

22.1 Emergency Handling of Patients Accidentally Exposed to High Levels of Ionizing Radiation or Contaminated with Radioactive Materials.

a. DUTIES OF SENIOR EMERGENCY ROOM PERSON:

(1) When prior notice is received or when a patient suspected of contamination is received, NOTIFY IMMEDIATELY:

(a) Dr. John Tweeten, Chief, Nuclear Medicine, VA Medical Center, Ext. 7275 -- Home telephone: 345-5463
OR
(b) Dr. Lawrence L. Knight, Director of Radiation Control, VA Medical Center, Ext. 7240 -- Home telephone: 375-0945
OR
(c) Mr. Roger G. Stano, Radiation Safety Officer, VA Medical Center, Ext. 7478 -- Home telephone: 345-7490
OR
(d) Mr. Byron Meador, Assistant Radiation Safety Officer, VA Medical Center, Ext. 7478 -- Home telephone: 384-0042
OR
(e) Hospital Administrator: VA Medical Center, Ext. 7202 or pager #148.

b. If contamination with radioactive materials is suspected, drape examination table to mimimize possible contamination. Mark and close off area to non-essential personnel. Surgical isolation procedure should be used, i.e., gowns, gloves, caps, masks, etc. in handling patient and wounds.

c. Upon arrival, give emergency lifesaving measures immediately, as indicated.

d. Check the patient in the ambulance for contamination by use of the survey meter stored in the instrument locker of the emergency room.

e. When there is external contamination of the patient, save all clothing and bedding, blood, urine, stool, vomitus, and all metal oojects (e.g., jewelry, dental plates). Label with patient's name, body location, time and date, and place in appropriate container and mark "Radioactive."

f. Decontamination should start when medical status permits, with cleansing and flushing areas of greatest contamination first. Initial cleansing should be done with mild soap and water. Pay special attention to hairy parts, orifices and body fold areas. If a wound is involved, prepare and cover the wound with self-adhering surgical drapes. Measure and record radioactivity present after each washing. Use disposable items for swabbing whenever possible. When wound has been covered, cleanse neighboring areas of skin, being careful not to wash the contamination into the wound. Seal off previously cleansed areas with self-adhering surgical drapes.

Remove wound covering and irrigate wound with sterile saline, catching the irrigating fluid in a container to be marked and handled as described in Step 5. Each step in decontamination should be preceded and followed by monitoring and recording of the location and extent of the contamination.

g. Save physicians', nurses', and assistants' scrub or protective clothing, as described for patients in Step 5. All staff must be monitored and decontaminated afterwards if indicated.

h. Note to E.R. Staff: Although the patient may be contaminated and a source of ionizing radiation exposure to you, the chances that you personally will receive a significant dose of radiation is very remote, considering the nature of the conceivable accidents involving radiation. Accidents involving truck or air transport of liquid sources of radiative materials are the most likely source in the Boise area.

22.2 Accidents Involving Radioactive Dusts, Mists, Fumes, Organic Vapors and gases.

a. INDIVIDUAL USER'S DUTIES.

(1) Notify all other persons to vacate the room immediately.

(2) Hold breath and close escape valves, switch off air conditioning devices, etc., if time permits.

(3) Vacate the room.

(4) Close all access doors and post guard or lock room to prevent re-entry to the room.

(5) Notify the Radiation Control Office at once (either Mr. Roger Stano or Mr. Byron Meador, Ext. 7478).

(6) Report at once all known or suspected inhalation of radioactive material cases to the Radiation Safety Officer or his assistant.

b. RADIATION SAFETY OFFICER'S DUTIES.

(1) Monitor all personnel involved.

(2) Evaluate the hazard and the necessary safety procedures for safe re-entry.

(3) Determine the cause of contamination and rectify the condition.

(4) Decontaminate the area.

(5) Perform air and monitoring surveys of the area before permitting work to be resumed.

(6) Prepare a complete history of the accident for record purposes.

22.3 Injuries to Personnel Involving Radiological Contamination.

a. INDIVIDUAL USER'S DUTIES

(1) Wash minor wounds immediately under running water.

(2) Report all radiological accidents of personnel (wounds, overexposure, ingestion, inhalation) to the Radiation Safety Office as soon as possible (Mr. Roger Stano or Byron Meador, Ext. 7478).

b. RADIATION SAFETY OFFICER'S DUTIES.

(1) Call Dr. Tweeten or Dr. Knight (Ext. 7275 or 7240) to administer treatment if indicated.

(2) Permit no person involved in a radiation injury to return to work without the approval of the attending physician.

(3) Prepare a complete history of the accident to determine means of prevention of future incidents and for incident reporting to the RCRDRC and possibly U.S.NRC Region IV if required.

22.4 Fire or other Major Emergencies.

a. INDIVIDUAL USER'S DUTIES

(1) Remove patients from immediate danger.

(2) Pull nearest alarm box.

(3) Call Switch Board by dialing operator. Give: 1) name; 2) location of fire; 3) type of fire. DO NOT CALL FIRE DEPARTMENT.

(4) Close all windows and doors. Turn off oxygen, gas outlets and electrical equipment.

(5) Fight fire with proper extinguisher.

(6) Attempt to put out fire if radiation hazard is not immediately present.

(7) Notify the Radiation Control Office (Mr. Roger Stano or Mr. Byron Meador, Ext. 7478).

b. RADIATION SAFETY OFFICER'S DUTIES.

(1) Advise fire fighting or other emergency personnel of any radiation hazard, and recommend appropriate action.

(2) Following the emergency, monitor area and determine the decontamination measures needed.

(3) Monitor all personnel involved in the emergency.

(4) Decontaminate as required.

(5) Monitor area before work is resumed.

(6) Prepare a complete history of the emergency, indicating steps taken to prevent recurrence, report to RCRDRC Committee and U.S.NRC Region IV if required.

23. DECONTAMINATION

23.1 Responsibility.

a. Individuals who cause contamination of an area, floor, equipment, etc., are responsible for decontamination procedures and for taking steps to prevent the spread of the contamination to other areas.

b. The Radiation Safety Officer or his Assistant shall assess the extent and seriousness of such contamination and may supervise decontamination. If a serious radiation problem develops or is likely, the Radiation Safety Officer or his Assistant may assist in carrying out the decontamination procedures necessary to reduce hazards to personnel.

23.2 Equipment and Area Decontamination.

a. Spills of radioactive material may be managed by blotting with absorbent paper, wet mopping, or scrubbing. Rubber or plastic gloves shall be worn during such decontamination procedures.

b. After the area has dried, it shall be monitored and a wipe test taken to ensure the permissible level of contamination is not exceeded:

23.3 Decontamination of Personnel Contaminated with Radioactivity.

a. Notify supervisor immediately after contaminating accident.

b. Wash body area involved thoroughly for 2 or 3 minutes, repeatedly "soaping" and rinsing. Consideration should be given to the chemistry of the contaminant and an attempt made to find a suitable agent for dissolving 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. They may make the skin more permeable to radioactive contaminants. Avoid scrubbing and abrasives.

c. If this procedure is not immediately and completely effective, notify the Radiation Safety Officer or his Assistant. Special decontaminating agents such as "Versene", "Radiacwash", etc., may be used under the direction of a physician.

Limits for Removable Surface Contamination
$\mu Ci/m^2$

Type Surface	Beta/Gamma Ray Emitters	*Low Risk Beta/Gamma Emitters
Unrestricted Area	10^{-4}	10^{-3}
Skin	10^{-4}	10^{-3}
Personal Clothing Worn Outside Restricted Area	10^{-4}	10^{-3}
Protective Clothing Worn Only in Restricted Areas	10^{-3}	10^{-2}
Restricted Area	10^{-3}	10^{-2}

*^{14}C, ^{3}H, ^{35}S, ^{99m}Tc
Adapted from Table 2, Regulatory Guide 8.23, February 1979

24. SPILLED RADIOACTIVE MATERIALS

a. Procedures.

(1) If you are first aware of it: Notify all other persons in the room at once and vacate all persons not involved in emergency procedures.

(2) Notify the laboratory supervisor.

(3) Allow to remain only persons dealing with the spill.

(4) Confine spill immediately:

(a) Don plastic or rubber gloves.

(b) Drop paper towels or absorbent pads on spilled liquid.

(c) If spill is on skin, flush thoroughly with running water in sink, wash gently with soap and water.

(d) If spill is on clothing, discard contaminated outer or protective clothing at once.

(5) Monitor all persons with Geiger-Mueller counter as they leave area to insure that contamination is not spread.

(6) Notify the Radiation Control Office (Mr. Roger Stano or Mr. Byron Meador, Ext. 7478).

(7) Decontaminate the area according to instructions received from the Radiation Safety Officer or his Assistant.

(8) Monitor all persons invovled in spill and cleaning with Geiger-Mueller counter to determine adequacy of decontamination.

(9) No person is to resume work in the area until permission has been granted by the Radiation Safety Officer or his Assistant.

(10) Place all contaminated articles in plastic bags and remove to radioactive material waste storage area.

(11) Prepare a summary of the accident and indicate corrective measures taken to prevent recurrence and send to the Radiation Safety Officer. RSO will notify RCRDRC and NRC if required.

This sign is posted in rooms and labs where radioactive materials are used in liquid form.

---

25. RADIOACTIVE WASTE

25.1 General.

No radioactive waste shall be released from a laboratory area for pickup and disposal prior to autoclaving or otherwise suitable deactivation of infectious agent(s). Radioactive waste disposal procedures involve crushing and compacting of dry waste and pooling of liquids in approved shipping containers for disposal by a licensed contractor. These procedures are not compatible with the proper handling of infectious agents. Similar considerations shall also be given to other highly toxic or hazardous substances.

25.2 Waste Containers.

To insure that solid and liquid wastes are kept separate, each laboratory having radioactive waste must be equipped with at least one container for solid dry waste and one for liquid waste. Due to the methods of ultimate disposal, short half-life (less than 30-days) waste must be kept separate from long half-life waste. Additional waste containers shall be requested for this purpose and marked as to the radionuclides being disposed of.

25.2.1 Solid Dry Waste Containers.

These may be obtained from the Radiation Control Office. They must be kept fitted with a disposable waterproof polyethylene liner.

25.2.2 Liquid Waste Containers.

Plastic carboys, jars, or bottles are suitable for storage of liquid wastes. The use of glass or fragile containers is prohibited. Liquid containers must possess securely fitting covers or corks, and must be kept closed. In addition, they shall be conspicuously marked with appropriate radiation signs.

25.2.3 Animal Carcasses.

Small radioactive animals should be placed in polyethylene bags. Larger animals (e.g., dogs, sheep) should be placed in large labeled polyethylene bags which will in turn be placed in a designated area. Each unit must be conspicuously marked with a "CAUTION RADIOACTIVE MATERIAL" sign and in addition, the nuclide(s) and amount remaining in the carcass shall be posted on the bag or label. If pickup cannot be arranged within 48 hours of sacrifice of animals, such animal carcasses must be refrigerated or preferably frozen.

25.2.4 Liquid Scintillation Media.

Used liquid scintillation media must be disposed of as radioactive waste, if they contain any radionuclides other than ^{3}H or ^{14}C, or if they contain in excess of 5 nanocuries ^{3}H per milliliter or greater than 5 nanocuries ^{14}C per milliliter. Prior to removal to the Radiation Control

Office, all liquid scintillation vials must be tightly capped and returned to the original shipping trays.

25.3 Waste Pickup.
Request for removal of liquid and dry waste may be made by telephone to the Radiation Control Office.

25.4 Unusual Waste Disposal Problems.
Plans for proper disposal of infectious agents or highly toxic or hazardous substances shall be made early in the design stage of the experiment.

26. INSTRUCTIONS AND PROCEDURES FOR USE AND HANDLING OF RADIONUCLIDES IN THE ANIMAL RESEARCH FACILITY AND FOR INCINERATION

26.1 Animal Research Facility.

a. All animals which are to be held for more than 8 hours that contain more than 1 microcurie of any radionuclide shall be kept in a separate cage(s) labeled with the warning "CAUTION -- RADIOACTIVE MATERIALS."

b. Excreta from such animals is disposed of via the sanitary [illegible] incineration of solid waste, or by disposal via commercial [illegible] firm, as determined by the DRC as the most appropriate method. Specific disposal method and reporting requirements are a part of each approved user's conditions for use.

c. Animal house personnel shall wear film badges when handling radioactive waste or animals containing administered radioactive materials.

26.2 Incineration.

a. No more than a total of 100 microcuires of any kind will be incinerated at any one time.

b. Dust masks shall be worn when ashes are handled.

c. Plastic or rubber surgical gloves shall be worn by all personnel handling carcasses and ashes.

d. All containers, gloves, clothing, surface of incinerator and surrounding area shall be checked monthly on a routine basis by the Radiaion Safety Officer or his Assistant who shall keep records of survey results and recommendations.

e. Coveralls, hats, and shoe covers shall be worn to avoid personal contamination when handling radioactive ash.

f. Ashes are to be shoveled into the containers provided and then covered and taped closed until disposed of via commercial service or transfer to storage for decay.

27. BIOASSAY

a. Bioassay involves estimation of the body's content of a radionuclide by:

(1) Direct counting of the individual in a low background area such as a whole body counter; or

(2) By placing the person under a scintillation detector probe such as is used in the Nuclear Medical Division for thyroid uptake studies; or

(3) By assaying biologic samples such as expired air, feces, blood, or urine for their content of radioactive materials in an attempt to estimate the body burden of specific radionuclides.

The naturally occurring radionuclides such as C-14, K-40, radium and its daughter products, and artificially produced radionuclides such as Sr-90 and Cs-137 all contribute to a greater or lesser degree to our body burden of radioactive materials. These radionuclides vary in content among people, dependent on body build, sex, age, diet, and geographic location. For those people who may be required to submit themselves or biological samples for determination of body burden of radionuclides, it is important to establish in some cases, baseline levels, in order to determine the body burden acquired as a result of occupational exposures.

b. Any person whos work requires procedures invovling handling more than:

(1) 10 millicuries of H-3 in any form (other than sealed sources) at any one time where the possiblity of ingestion or inhalation of H-3 exists, shall be required to submit a 10 ml urine specimen no later than the morning following a single exposure and at weekly intervals for sustained operations. (No preservatives are to be added to the urine.)

c. Any person whos work requires procedures involving handling more than:

(1) 5 millicuries of I-125 or I-131 in any combination, in any form (other than sealed sources) at any one time where the possibility of inhalation or ingestion of I-125 or I-131 exists, shall be required to:

(a) Submit a 10 ml urine specimen no later than the morning following a single exposure and at weekly intervals for sustained operations. (No preservatives are to be added to the urine. Specimens bottles for I-125 or I-131 containing NaOH are to be obtained from the Radiation Safety Officer.)

(b) Submit to having the I-125 or I-131 activity in his thyroid gland determined by standard in-vivo counting procedure with a scintillation probe within one day following each single event, or at weekly intervals for sustained operations.

APPENDIX

Radiation Control Forms and Instructions

Form RC 7.....Radiation Workers Record Card

Form RC 10.....Application for Authorization to Use Radioactive Material

Instruction Sheet for Form RC 10

Summary of Requirements for Personnel Dosimetry for Work with Radioactive Material

Area Survey Procedures

Form RC 20.....Statement of Training and Experience in Radiation Work

Form RC 30.....Application for Authorization to Use Radiation with Human Subjects

Risk Statement for Radiation Dose to Human Subjects (Model Format)

Form RC 31.....Application for Authorization to Use Radiation with Human Subjects - Short Form

Form RC 32.....Application for Authorization to Use Radiation with Human Subjects - Renewel

Form RC 50.....Radioactive Material Laboratory Registration (RAM Lab)

RADIATION WORKER RECORD CARD

Form RC 7(9/84)

☐ New Application

☐ Amend ☐ Review

☐ Neutron badge ☐ H-3 Bioassay
☐ Ring Badge ☐ Right ☐ Left
☐ Other bioassay

Social Security No. _____

Birthdate ___/___/___ ☐ Male ☐ Female

Date _____ Service _____

Laboratory and Mail Stop _____ Telephone No. _____

Job Title _____ Supervisor _____

Have you had previous occupational radiation exposure? ☐ Yes ☐ No ☐ At VAMC
If yes, complete work history report on reverse side.

DESCRIPTION OF RADIATION WORK

☐ X-ray: Medical ☐ Dental ☐ Analytical ☐ Other ☐

☐ Isotopes: List isotopes used and approximate amount per month _____

I hereby certify that all information provided on this form is correct and complete to the best of my ability.

_____ _____
Signature Date

RADIATION SAFETY OFFICE USE ONLY

Film Badge No. _____ Bioassay Records _____

VA MEDICAL CENTER RADIATION SAFETY OFFICE 500 W. FORT ST., BOISE, ID 83702

RADIATION WORK HISTORY

From	To	Employer	Address

AUTHORIZATION
I hereby authorize the Boise VA Medical Center Radiation Safety Officer to receive a summation of all pertinent previous occupational radiation exposure data from all the above listed previous employers.

_____ _____
Signature Date

APPLICATION FOR AUTHORIZATION TO USE RADIOACTIVE MATERIAL

Form RC 10 (9/84)

Docket Number

1. ☐ New application
   ☐ Amend ☐ Renew

2. Applicant's Name:

   Title:

   Service:

   Telephone: Mail Stop:

3. Alternate person who is knowledgeable about this application:

   Telephone:

4. Laboratory or room where radioactive material will be used.

   a)_____
   b)_____
   c)_____
   d)_____
   e)_____
   f)_____
   g)_____

5. Type of space and general use in each room or laboratory

   a) _____
   b) _____
   c) _____
   d) _____
   e) _____
   f) _____
   g) _____

Form 50
a)____
b)____
c)____
d)____
e)____
f)____
g)____

Each space mentioned above must be accompanied by a description of the space on Form RC 50 (9/84) Radioactive Material Laboratory Registration.

6. Individual(s) who will handle licensed material. A current RSC 20 form must be attached for each person listed below.

Full Name	Title/Position	Form 20
a)_____	a)_____	a)____
b)_____	b)_____	b)____
c)_____	c)_____	c)____
d)_____	d)_____	d)____
e)_____	e)_____	e)____
f)_____	f)_____	f)____

7. Local Radiation Safety Agent: Emergency Phone No:

8. Radioactive Material to be Used

a) Element & Mass Number	b) Chemical and/or physical form	c) Maximum no. of millicuries which will be possessed
(1)		
(2)		
(3)		
(4)		
(5)		

VA MEDICAL CENTER RADIATION SAFETY OFFICE 500 W. FORT ST., BOISE, ID 83702

APPLICATION TO USE RADIOACTIVE MATERIAL Docket Number
Form RC 10 (9/84)

8. Materials to be Used (continued). Briefly describe the proposed use of each item.

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

15 G's Attached

1. _____

2. _____

3. _____

4. _____

5. _____

9. Radiation detection of instruments: one line for each instrument

	a) Type	b) Manufacturer	c) Model & vintage	d) Radiation detected	e) Range mr/hr-c/m	f) Location Rm. No.
1)						
2)						
3)						
4)						

Indicate normal location of instrument.

10. Calibration of instruments listed in Item 9

a) Calibration of Service Group

☐ Name or ☐ RS Office

Address

Frequency

b) Calibration by Applicant

☐ Attach separate sheet describing method, frequency and standards used for calibrating each instrument.

11. Personnel Monitoring Devices ☐ R.S. Landauer ☐ Other

Name of Individual	Type	Name of Individual	Type
(1)	a b c	(7)	a b c
(2)	a b c	(8)	a b c
(3)	a b c	(9)	a b c
(4)	a b c	(10)	a b c
(5)	a b c		
(6)	a b c		

Refer to Boise VAMC Radiation Protection Guide for other requirements.
Apply on Form RSO 7.

RSO 7 completed ____

A MEDICAL CENTER RADIATION SAFETY OFFICE 500 W. FORT ST., BOISE, ID 83702

APPLICATION TO USE RADIOACTIVE MATERIAL Docket Number
Form RC 10 (9/84)

12. Sealed Sources: (Not dispersible in normal use)

a) Manufacturer _____ b) Model Number _____

c) Container/device in which source(s) will be stored or used

_____

d) Location of use _____ e) Location of storage _____

13. Facilities and Equipment
Check where appropriate and attach annotated sketch(es) and descriptions if not on Form RC 50.

a) ☐ Special laboratory facilities, plant facilities, fume hood, etc.

b) ☐ Storage facilities, containers, special shielding, etc.

c) ☐ Special handling tools or equipment

d) ☐ Respiratory protective equipment, etc.

14. Waste Disposal

a) ☐ Applicant agrees to follow current waste disposal practices of the Boise VAMC Radiation Safety Office.

b) ☐ Applicant has developed internal procedures for waste disposal (attach copy).

c) ☐ Applicant agrees to charges associated with disposal.

d) ☐ Applicant agrees to maintain record of all waste disposal by categories: 1) Dry; 2) Absorbed liquid; 3) Liquid scintillation vials; 4) Animal carcasses; 5) Lab sink; 6) Exhaust hood; 7) Decay to normal waste.

15. Radiation Protection Program

a) ☐ Applicant agrees to urine bioassay for H-3 for staff if:
1) > 100 mCi used 2) > 100 mCi through lab/3 mo.

b) ☐ Applicant agrees to thyroid in vivo test for I-125 and I-131 for staff of any lab if > 0.1 mCi through lab in 3 months. These tests shall be every quarter if > 0.1 mCi in use and within one week if > 1.0 mCi in use.

c) ☐ Applicant agrees to establish survey/monitoring program of laboratories in accordance with Radiation Protection Guide and attached copy of Area Survey Procedures.

d) ☐ Applicant agrees to establish a record of inventory and receipt of all packages including contamination survey.

e) ☐ Attach copy of procedures for opening and surveying packages.

APPLICATION TO USE RADIOACTIVE MATERIAL
Form RSC 10(81) Page 4

Docket Number

5. Radiation Protection Program (continued)

f) ☐ Attach copy of emergency procedures ____

g) ☐ Attach brief procedures of laboratory practices for use of materials in Item 8. ____

h) ☐ Attach day-to-day general safety instructions for laboratory practices. ____

i) ☐ Attach description of security for stored material including waste. ____

6. Formal Training in Radiation Safety: Each person in Item 6 & 7 must provide statement of training in the following areas:

a) Principles and practices of radiation protection
b) Radioactivity measurement standardization and monitoring techniques and instruments
c) Mathematics and calculations of radioactivity
d) Biological effects of radiation

Include name of person or institution providing the training, duration and date of training (use Form RC 20).

17. Experience

Attach a resume for each person named in Item 6 & 7. Describe individual's work experience with radiation, including where experience was obtained. Work experience or on-the-job training should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.

18. Certificate

The applicant accepts full responsibility for the safe use of radioactive material described in this application. The applicant further agrees to conform to Radiation Protection Guide, conditions of the NRC's license to use these materials and Boise VAMC Radiation Safety policies. The applicant has reviewed this application with his/her Service Chief.

Applicant Signature _____

Type _____

Date _____

19. REVIEW BY RADIATION SAFETY OFFICE STAFF:

Is _____

Recommendation: ☐ Approve ☐ Disapprove date _____

Radiation Safety Officer Date

INSTRUCTION SHEET FOR FORM RC 10 (9/84)

APPLICATION FOR AUTHORIZATION TO USE RADIOACTIVE MATERIAL

1. Check "New" if not currently authorized for Boise VAMC work with radioactive material.
   Check "Amend" if currently authorized and change in need to increase limits or add other materials.
   Check "Renew" if projects continue unchanged from previous authorization.

2. Complete all parts.

3. Name person who can answer questions if applicant is not available.

4. List each laboratory where applicant will use, store or count radioactive material. Each lab must be supported by an attached Form 50, RAM Lab Registration, that has been reviewed by Radiation Safety Office staff. Use will be restricted to the labs listed.

ATTACH

5. Briefly describe lab type consistent with Form 50, i.e., standard lab, cold room, etc.

6. List each person who will be working with radioactive material. Each person listed must provide a completed Form RC 20, Statement of Training and Experience. Persons not listed and approved may not work with radioactive material. New people can be added later by submitting a Form RC 20 with an indorsement from the Authorized User.

7. An individual who is familiar with the lab should be designated as the Local Radiation Safety Agent. This can be the applicant. Provide a number where the agent can be reached in off hours.

IMPORTANT

8. List each radionuclide, general chemical and/or physical form and maximum activity that will be possessed. Separate lines should be provided for the same radionuclide used in substantially different forms, e.g. I^{125} as NaI, I^{125} as labeled amino acids, I^{125} as labeled fatty acids, I^{125} RIA Kits. Suggest use of categories from supply catalogues. If reagents are used to label material, list the reagent on one line and the labeled categories that result from the labeling on another line.

On the second page, provide briefly the use of each item, e.g., I^{125} Bolton Hunter Reagent used to label hTSH and hGH. A second line should describe use of labeled hTSH and hGH.

ATTACH

Each use must also be supported with a more detailed description of handling procedures which describe what, where and how these these materials are handled safely. Note use of hood, transfers from one area to another and final waste disposal. About a half page for each item should be adequate. The emphasis here

should be on the safe handling, not on the chemistry. List activity present at each step.

9. Radiation Instruments. Provide the information requested for each instrument. End window GM probe or pancake GM probe are acceptable for use of all radionuclides except H^3, C^{14} and I^{125}. Work with I^{125} must show that a thin NaI crystal detector is readily available. Work with H^3 and C^{14} must show that a liquid scintillation counter is used for counting wipe tests.

ATTACH

10. Instruments must be calibrated semi-annually. At the present time Radiation Safety Office will be responsible for maintaining calibration. An appropriate check source should be available for each instrument and used each time the instrument is used.

ATTACH

11. Personnel dosimetry is required for certain uses, dependent on the energy of the radiation emitted and the activity in use. Consult insert entitled "Summary of Requirement for Personnel Dosimetry for Work with Radioactive Material." Application for dosimeters must be on RC Form 7.

12. Sealed sources should be described here. Much of the detail in other parts of the form is not applicable for sealed source use. Complete as is applicable.

ATTACH

13. Special Facilities and Equipment.
Special facilities and equipment must be described. Attach a separate sheet if applicable.

ATTACH

14. Waste Disposal.
The general waste disposal practices should be reviewed by the applicant. A method for recording waste disposal must be established in each lab and the procedures used in each lab. Attach copy of these procedures.

15. Animal Use Information (if appropriate). If radioactive material is to be used in animals, the following information should be submitted with the application:

(1) Specifications of the facilities to be used to house the animals.
(2) Instructions to be provided to animal caretakers for handling animals, animal wastes, and carcasses.
(3) Instructions to appropriate personnel for cleaning and decontaminating animal cages.
(4) Methods to be used to ensure that animal rooms will be locked or otherwise secured unless attended by authorized users of radioactive materials.

ATTACH

16. Applicant must agree to establish various radiation protection programs. Sample material is included in the application packet. These items must be developed as appropriate for each lab and copies attached.

17. Statements of training and experience must be provided for each person using radioactive material. Use Form RC 20.

18. The applicant must sign and date the application. This statement implies that the applicant's Service Chief has reviewed the proposed use and the application.

19. The Radiation Safety Office staff will review the application and recommend action by the Radiation Control and Radioactive Drug Research Committee.

SUMMARY OF REQUIREMENT FOR PERSONNEL DOSIMETRY

FOR WORK WITH RADIOACTIVE MATERIAL

a) Whole body badge G1
REQUIRED: > 10 mCi/wk Average Use of:
F-18, Na-24, K-42, Ca-47, Mn-54, Co-58,
Fe-59, Co-60, Cu-64, Zn-65, Se-75, Sr-85,
Sr-87m, Y-87, Mo-99, Ag-110m, Sn-113,
In-113m, I-123, I-131, I-132, Cs-137,
Hg-197, Au-198, Ir-192, Hg-203, Bi-206,
Others with $\Gamma > 1.0 R\text{-}Cm^2/hr\text{-}mCi$

b) Ring Dosimeter U3 or U4
REQUIRED: > 1 mCi/wk Average Use of
radionuclides listed in a) or >
10 mCi/wk average use of beta emitter
with E-MAX > 0.2 MEV; includes Na-22,
Na-24, P-32, K-42, Ca-47, CO-60, Sr-89,
Sr-90, Mo-99, Cs-137

c) Neutron Badge P1 or B1
REQUIRED: PuBe sources, UW reactor, NPL

Refer to Boise VAMC Radiation Protection Guide for other requirements.
Use Form RC 7 to apply for dosimeter.

AREA SURVEY PROCEDURES

1. All laboratories must be surveyed by the laboratory staff according to the type of lab based on the Lab Rating Type. (Refer to Tables I and II - enclosed).

2. Waste storage areas and all other laboratory areas will be included in the survey.

3. The weekly and monthly surveys will consist of:

   a. A measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.1 mR/hr. or 0.01 μCi per 100 cm^2.

   b. A series of wipe tests to measure contamination levels. The method for performing wipe tests will be sufficiently sensitive to detect 0.01 μCi per 100 cm^2 for the contaminant involved. Wipes of preparation areas or other "high background" areas must be removed to a low background area for measurement.

4. A permanent record must be kept of all survey results, including negative results. The record will include:

   a. Location, date and identification of equipment used, including the serial number and pertinent counting efficiencies.

   b. Name of person conducting the survey.

   c. Drawing of area surveyed, identifying relevant features such as active storage areas, active waste areas, etc.

   d. Measured exposure rates, keyed to location on the drawing (point out rates that require corrective action).

   e. Detected contamination levels, keyed to locations on drawing.

   f. Corrective action taken in the case of contamination or excessive exposure rates, reduced contamination levels or exposure rates after corrective action, and any appropriate comments.

5. Area must be cleaned if the contamination level exceeds 0.01 μCi/100 cm^2.

6. It is suggested that a standard survey form be developed for each certified laboratory.

7. Retain the records of these surveys. They are subject to inspection by DSHS and must be consistent with the schedule of use of radioactive material.

TABLE I HAZARD GROUPS OF RADIONUCLIDES BASED ON LIMITS FOR INTAKE OF RADIONUCLIDES BY WORKERS (ICRP PUBLICATION 25)

HAZARD GROUPS

PROGRAM OR LABORATORY CATEGORY BASED ON AMOUNTS OF ACTIVITY OF HAZARD GROUP IN USE IN LABORATORY	GROUP I; ALI* is greater than 5000 µCi	GROUP II; ALI is less than 5000 µCi but greater than 500 µCi	GROUP III; ALI is less than 500 µCi but greater than 50 µCi	GROUP IV; ALI is less than 50 µCi
	H-3, C-14, Cr-51, Tc-99m, Fe-55, Co-57, In-113m	Na-24, S-35, Cl-36, K-42, Mn-54, Co-58, Fe-59, Cu-64, Ga-67, Se-75, Sr-85, Mo-99, Hg-197, Sn-113, I-123	Na-22, P-32, Ca-45, Ca-47, Co-60, Zn-65, Sr-89, Ag-110m, Au-198, Hg-203, Ir-192	Sr-90, I-125, I-131
	mCi in Use**	mCi in Use	mCi in Use	mCi in Use
M Type Lab Program	in Use $\leq$ 1.0	in Use $\leq$ 0.1	in Use $\leq$ 0.01	in Use $\leq$ 0.001
A Type Lab Program	1.0 < in Use $\leq$ 10	0.1 < in Use $\leq$ 1.0	0.01 < in Use $\leq$ 0.1	0.001 < in Use $\leq$ 0.01
B Type Lab Program	10 < in Use $\leq$ 100	1.0 < in Use $\leq$ 10.0	0.1 < in Use $\leq$ 1.0	0.01 < in Use < 0.1
C Type Lab Program	100 < in Use $\leq$ 1000	10.0 < in Use $\leq$ 100	1.0 < in Use < 10	0.1 < in Use $\leq$ 1.0
D Type Lab Program	1000 < in Use $\leq$ 10 Ci	100 < in Use $\leq$ 1000	10 < in Use < 100	1.0 < in Use $\leq$ 10.0
S Type Lab Program	More than 10 Ci in Use	More than 1000 mCi in Use	More than 100 mCi in Use	More than 10 mCi in Use

* ALI: Annual Limits of Intake, Table I, ICRP Report 25

** In Use Quantities specified are considered as monthly throughput amounts

NOTE: Solid, plated or sealed sources are adjusted by a factor of X0.001 and are reassigned to a column corresponding to a lesser hazard.
Microspheres are adjusted by a factor of X0.01 and reassigned.

TABLE II

Required	Lab Rating Type M	A	B	C	D	S
No eating, etc.	X	X	X	X	X	X
Use gloves	X	X	X	X	X	X
Wear lab coats	O	O	X	X	X	X
Leave lab coats	O	O	O	X	X	X
User Survey	X Monthly	X Monthly	X Weekly	X Daily or after use	X Daily and after use	X After use
RSO Survey	X Semi-annually	X Quarterly	X Bi-monthly	X Monthly	X Weekly	X After use
Instrument	O	O	X Availability	X In use	X In use	X In use
Rad Disposal Sink	O	O	X Adjacent	X In lab	X In lab	X In lab
Hood > 80 LVFM	-	-	X	X	-	-
Hood > 100 LFPM	-	-	-	-	X In lab	X Work location
Bioassay	-	-	-	X	X	X After use
Waste Receptacle	X Adjacent	X Adjacent	X Adjacent	X In lab	X In lab	X In lab

O Recommended
X Required
- Not Applicable

STATEMENT OF TRAINING AND EXPERIENCE IN RADIATION WORK

Form RC 20 (9/84)

1. Name:_____ Social Security No._____

Title/Position: _____ Mail Stop:_____

Service _____ Telephone:_____

Authorized person who will supervise your work:_____

2. Education (List degrees, major subject, emphasis, date, and school)

_____

_____

_____

_____

3. Formal Training in Radiation Safety

Provide statement of training in the following areas. Include name of person or institution providing the training. Give duration and date.

a) Principles and practices of radiation protection._____

_____

Where:_____ Duration:_____ When:_____

b) Radioactivity measurement standardization and monitoring techniques and instruments.

_____

Where:_____ Duration:_____ When:_____

c) Mathematics and calculation of radioactivity._____

_____

Where:_____ Duration:_____ When:_____

d) Biological effects of radiation._____

_____

Where:_____ Duration:_____ When:_____

4. Radiation Work: (Describe briefly your current work with radiation)

STATEMENT OF TRAINING AND EXPERIENCE IN RADIATION WORK

Form RC 20

Experience: **Provide a resume of your work experience with radiation including where experience was obtained. Experience with radiation should be commensurate with the proposed use. Include list of radioisotopes and maximum activity of each used.**

6. Statement. This information is correct to the best of my knowledge. I agree to conform with the Radiation Protection Guide and Radiation Safety policies of the Boise VA Medical Center.

Signature _____ Date _____

Print Name _____

APPLICATION FOR AUTHORIZATION TO USE RADIATION WITH HUMAN SUBJECTS

Form RC 30 (9/84)

Docket No. _____

Applicant _____

☐ New ☐ Renewal ☐ Amendment

	Name and Position	Dept/Division	Telephone	Mail Stop	RSC 20*
I. Investigator:					
Associates:					
II. Other persons responsible for procedures					

III. Title of Proposed Activity

Grant/Contract Number (Renewal and Amendment Applications)

IV. Beginning Date of Proposed Acitivity

* Complete and attach form RC 20 for each person listed in I and II above. If this information is already on file check appropriately after each name. (At least one member of the research team must be a licensed professional in the healing arts.)

If the radiation will not be administered in a hospital, radiology facility, or in a facility currently approved for radiation use an Application for Authorization to Use Radiation (Form RC 10) is required also.

1. Description of Research Project.
   a) Describe the rational for the project and an overall description.

   b) Describe the objectives of this study and the expected benefit or justification. Explain the importance of the expected increased knowledge.

APPLICATION FOR AUTHORIZATION TO USE RADIATION WITH HUMAN SUBJECTS

Form RC 30 (9/84)

Docket No. _____

Applicant _____

2. *Description of Radiation Source*
Describe all the radiation sources that subjects will encounter.

a) *Radioactive Material*

Each Radionuclide	Activity Each Administration	Compound and Method Administration	Number of Administrations Each Subject

Where will the material be administered and by whom?

b) *X-Ray Radiography*

Type Exam	Film Size	kVp	mAs/film	Film/Exam	Distance	Filter	Entrance mR

Where will radiography occur and who will supervise?

c) *Fluoroscopy*

Anatomical Area	Beam Size	kVp	mA	Fluoroscopy Time	Entrance Rate (mR/mA · minute)

Where will fluoroscopy occur and who will supervise?

3. *Experimental Limitations for Use of Radiation.*

a) *Explain why it is necessary to use radiation rather than alternate procedures.*

b) *Explain the factors that determine the minimum amount of radiation that is necessary, e.g., limits based on instrument sensitivity or physiological parameters.*

PLEASE TYPE

APPLICATION FOR AUTHORIZATION TO USE RADIATION WITH HUMAN SUBJECTS

Form RC 30 (9/84)

Docket No. _____

Applicant _____

4. *Description of Subjects and Selection Criteria*

a) *Age distribution:* b) *Sex*

c) *Special basis for selection (diseases, abnormality, occupation, etc.)*

d) *Number of special selected subjects*

e) *Indicate time frame; how many subjects will be studied each year?*

f) *How will the subject benefit from the study?*

g) *Are potential subjects rejected if they are or might be pregnant? How is non-pregnancy assured?*

h) *Are potential subjects rejected if they:*
1. *Had volunteered for similar studies within the past year?*
2. *Had significant medical exposure?*
3. *Receive significant occupational exposure?*

How are these conditions assured?

5. *Radiation Protection for Subjects*

Describe all methods for protecting the subject from unnecessary radiation, e.g., gonadal shielding, thyroid block against iodine, etc.

PLEASE TYPE

APPLICATION FOR AUTHORIZATION TO USE
RADIATION WITH HUMAN SUBJECTS
Form RC 30 (9/84)

Docket No. _____

Applicant _____

6. Radiation Dosimetry
This section should include the dosimetry calculation and summary of radiation doses. References should be cited if used.

7. Summary of Risk to Subject.
The paragraph to be included in the consent form should be stated here (or the consent form attached).

PLEASE TYPE

8. Have you consulted with a radiation specialist in developing this protocol? Specify how and in what capacity.

The applicant accepts full responsibility for the safe use of radiation as described in this application. The applicant further agrees to conform to the Radiation Protection Guide of the Boise VA Medical Center, NRC Radioactive Materials License conditions, and Radiation Control and Radioactive Drug Research Committee policies.

Service Chief: _____ DATE

Applicant: _____ DATE

APPLICATION FOR AUTHORIZATION TO USE RADIATION WITH HUMAN SUBJECTS - SHORT FORM Form RC 31(9/84)

Docket No. _____

Investigator _____

Investigator(s):

Title of Proposed Activity (Consistent with Human Subjects Review Committee Application:

Brief Description of Radiation Use:

This form was provided by: _____ Date _____

APPROVAL

It has been established that the use of radiation described for this project:

☐ (a) will involve only minimal radiation exposure and risk to individual subjects.

☐ (b) is necessary and/or directly associated with the medical care of the subjects.

☐ (c) is considered to be outside of the purview of the Radiation Safety Committee.

This application when signed below shall indicate that there has been sufficient review of the radiation use to assure compliance with the applicable regulations.

☐ No statement of risk is necessary on the consent form.

_____ Chairman, Radiation Control and Radioactive Drug Research Committee

_____ Radiation Safety Officer

cc: Human Subjects Review Committee

APPLICATION FOR AUTHORIZATION TO USE RADIATION WITH HUMAN SUBJECTS - RENEWAL

RC Form 32 (9/84)

Docket No. _____

Applicant _____

Investigator(s)

Title of Program (Consistent with Human Subjects Review Committee Application)

Brief Description of Radiation Use

Status of Project

Minor Changes in Project

Personnel Changes

The project described above will continue unchanged (except as noted) from the original program approved by the Radiation Safety Committee on _____, Docket No. _____.

Applicant _____ Date _____

AUTHORIZATION

Authorization No. _____

Amendment No. _____

It has been established that this project is unchanged from the original proposal and does not need to be reviewed in detail at this time.

_____

Chairman, Radiation Control and Radioactive Drug Research Committee

_____

Radiation Safety Officer

VA MEDICAL CENTER RADIATION SAFETY OFFICE 500 W. FORT ST., BOISE, ID 83702

VETERANS ADMINISTRATION MEDICAL CENTER
BOISE, IDAHO
RADIATION CONTROL AND RADIOACTIVE DRUG RESEARCH COMMITTEE

POLICY STATEMENT

RISK STATEMENT FOR RADIATION DOSE TO HUMAN SUBJECTS

MODEL FORMAT

ADOPTED AUGUST 27, 1984

Whenever a human subject is exposed to radiation as part of the experimental protocol, whether it be part of the diagnostic procedures or an integral part of parameters under investigation, the subject must be informed of the risk from the radiation dose as part of the"Consent Form". Many investigators are not familiar with the concepts of radiation risk; the prospective human subjects are even less familiar. This model format was developed and approved by the Radiation Control and Radioactive Drug Research Committee to serve as a general model for most projects. The specific choice of words should be made with the advice of a person knowledgeable in radiation safety. When this model is obviously not appropriate a proper statement must be "custom made."

The model statement is as follows:

> The radiation dose to the [body] [organ] from the [radioisotope] [x-ray] used in this study is estimated at _____ millirems. This dose is [less than] [about equal to] [_____ times] the dose received from natural sources, by everyone living in Boise for one year (about 120 millirems per year). [Optional sentence] And it is [_____ %] [_____ times] the annual dose allowed for radiation workers such as x-ray technicians and radiologists (5,000 millirems per year). Many routine diagnostic medical procedures result in comparable doses. Harmful effects from radiation, such as genetic damage and malignancies, have been demonstrated in animals and man from somewhat larger doses of radiation. Harmful effects, although possible, are extremely unlikely for the levels of exposure of this study.

RADIOACTIVE MATERIAL LABORATORY REGISTRATION (RAM LAB)

Form RC 58 (9/84)

Building _____ Room _____

Service _____

Authorized User _____

1. Laboratory Supervisor _____

2. Title/Position _____ 3. Lab Phone _____

4. Type: (Circle) Standard Lab, Counting Room, Waste Storage, Cold Room, Animal Room, Sealed Source, Other _____

5. Special Facilities: (Circle)

- Fume Hood* ____LFM, Use: Iodination, Waste, Other _____
- Ref/Fre for RAM Storage, Shield Spaces, Gamma Counter, LSC
- Other _____
- Estimate total air ventilation rate CFM _____

*NOTE: Work with > 0.5 mCi I-125 or I-131 or > 25 mCi H-3 require hood with > 100 LFM

6. Inventory: (Circle radionuclides which might be used in this room and estimate appropriate millicuries used per month and total stored.)

^{3}H* _____mCi/month, _____mCi stored		^{51}Cr _____mCi/month, _____mCi stored	
^{14}C _____mCi/month, _____mCi stored		^{57}Co _____mCi/month, _____mCi stored	
^{32}P** _____mCi/month, _____mCi stored		^{125}I _____mCi/month, _____mCi stored	
^{33}P _____mCi/month, _____mCi stored		^{131}I _____mCi/month, _____mCi stored	
^{35}S _____mCi/month, _____mCi stored		Other _____mCi/month, _____mCi stored	

*See Note 5 above ** P-32 work must use beta shields

7. General RAM Use: Describe type of work done.

TYPE LAB _____
M A B C D S

8. Special RAM Use: (Circle)

Radioiodinations > 25 mCi any nuclide Other _____

^{32}P-ATP PREPS

9. Laboratory Monitoring Instruments:

Type	Manufacturer	Model	Age	Normal Location	Use

Boise VAMC

RADIOACTIVE MATERIAL LABORATORY REGISTRATION (RAM LAB)

Form RC 50 (9/84)

Building _____ Room _____

Service _____

Authorized User _____

10. Waste Disposal: (Circle) 200 µCi/mo Sink No _____
Dry Waste No LSA Boxes/mo _____ Absorbed Liquid Pails/mo _____
Animal carcasses Kg/mo _____ LSC Vials/mo _____
Other (describe) _____
Are disposal records established for sink _____ hood ____ dry _____ LSC _____
absorbed liquid ____ animals _____

11. Surveys: How often does User monitor lab _____ Records _____
Are records kept of the results? Yes No

12. Miscellaneous Information Posted: Emergency Procedure

13. Inventory Record: Are inventory records established? Yes No

14. Security: Is radioactive material secured when lab not occupied? Locked cabinet, locked lab door Other _____

15. Sketch of Lab:

The information and description on this form have been verified by inspection of the Radiation Safety Office. The work described and amount of material in use are compatible with the space and facilities of this laboratory. The work described is hereby registered for radiation use.

Signed _____ Date _____

Reviewed by RADIATION SAFETY OFFICE