RADIATION SAFETY MANUAL

Northport VA Medical Center
Radiation Safety Office
Bldg. 2 Room 123A
Extension 2498
RSO: Terry M. Button

Rules and Regulations
Covering the use of Ionizing Radiations

INTRODUCTION

1. General

2. Radiation Safety Responsibilities

   2.1 Radiation Control Committee Responsibility
   2.2 Radiation Safety Officer Responsibility
   2.3 Individual Responsibility (ALARA)
   2.4 Authorized User Responsibility (Radioactive Materials)
   2.5 Registrant Responsibility (X-ray machine)

3. Authorization to Use Radioactive Materials

   3.1 All applications
   3.2 Application for Human Use

      3.2.1 Radiation Dose to Subjects
      3.2.2 Limit On Radiation Dose
      3.2.3 Limit On Pharmacological Dose
      3.2.4 Quality of Radioactive Drug
      3.2.5 Qualification of Investigator
      3.2.6 Human Research Subjects
      3.2.7 Research Protocol
      3.2.8 Annual Report

   3.3 Authorization
   3.4 Clinical Use of Radioactive Materials

4. Registration of Electronic Radiation Devices

5. Policies and Procedures for Areas Using Radioactive Materials

   5.1 Proper Posting of Laboratories, Areas, and Equipment
   5.2 Shielding of Sources
   5.3 Aerosols, Dusts, and Gaseous Products
   5.4 Work Surfaces
   5.5 Periodic Surveys of Radiation Area
   5.6 Laboratory Monitors
   5.7 Removal of Equipment from the Laboratory
   5.8 Repair and Maintenance of Equipment in the Laboratory
   5.9 House Vacuum Lines
   5.10 Radioactive Contamination of Areas
   5.11 Animal Facility

6. Procurement of Radiation Sources

Northport Veterans Administration Medical Center

Rules and Regulations
Covering the use of Ionizing Radiations

INTRODUCTION

The Northport VA Medical Center is authorized to procure and use radioactive materials under licenses issued by the US Nuclear Regulatory Commission. These licenses are contingent upon the existence of a Radiation Committee and a Radiation Safety organization which, among other requirements must:

1. Assure that any investigator 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 requisite safety standards established by the Nuclear Regulatory Commission, National Council on Radiation Protection and Measurements, and other regulatory or standards setting agencies.

3. Keep records of the receipt, storage, use, transfer, and ultimate disposal of all radioisotopes used at Northport VAMC.

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

Northport VAMC is subject to periodic inspection to insure that all requirements of the licenses are being met. These inspections are very thorough, including monitoring checks of laboratory areas, inspection of procurement and disposition records, records of the qualifications of individual users, and records of administrations to patients. Violations of license requirements can result in a loss of the license.

1. GENERAL

1.1 These Rules and Regulations do not provide complete information on radiological health protection, but are intended to outline procedures approved by the Radiation Safety Committee.

1.2 The Radiation Safety Committee may amend or modify these Rules and Regulations from time to time. Such amendments shall become effective when published.

1.3 The Committee may impose requirements, as it seems appropriate or necessary, to protect health or to minimize danger to property.

1.4 All radioactive material shall be procured through the Radiation Safety Office. (See Section 6.)

1.5 Violations of safety practices may result in the loss of Committee approval to use sources of ionizing radiation until corrective measures are fulfilled. Such violations which are not corrected after reasonable notice and negoation will be reported by the Committee to the Director of the Medical Center.

1.6 The Committee may, upon application by interested persons or upon its own initiative, grant exemptions from the requirements of these regulations which will not result in undue hazard, and which are in agreement with all Federal, State and local regulations.

1.7 No radioactive materials or equipment producing ionizing radiation shall be brought into, or removed from, the Medical Institutions except through the procedures listed, or by special and written arrangements with the Committee. Interdepartmental transfer of these items is permissible only after approval is obtained from the Radiation Safety Officer (See Section 7).

1.8 Plans and specifications for the construction of new radiation facilities, or the major modification of existing facilities, shall be approved by the Committee. The approval of such plans shall not preclude the requirement of additional modifications should a subsequent analysis of operating conditions indicate the possibility of an individual receiving a dose in excess of the applicable standards. The responsibility of presenting the specification for approval rests with the Head of the Service concerned.

2. RADIATION SAFETY RESPONSIBILITIES

2.1 Radiation Safety Committee Responsibility

The Committee shall have the following responsibilities:

2.1.1 Review all applications for the use of all radiation sources within the Medical Center from the standpoint of radiological health safety and other factors which the Committee may wish

to establish for medical use of these materials.

2.1.2 Prescribe special conditions which may be necessary, such as physical examinations, additional training, designation of limited area or location of use, waste disposal methods, etc.

2.1.3 Review records and receive reports from the Radiation Safety Officer or other individuals responsible for health safety practices.

2.1.4 Recommend remedial action when a person fails to observe safety recommendations and rules.

2.1.5 Keep a record of actions taken by the Committee.

2.2 Radiation Safety Officer Responsibility

The Radiation Safety Officer shall have the following responsibilities:

2.2.1 Administration of the Radiation Safety Office for the reception and distribution of all radioactive materials entering the Medical Center.

2.2.2 Recommending operational procedures regarding the safe handling and administration of radioactive materials.

2.2.3 Maintenance of an inventory record system to record all radioactive materials entering the Medical Center and distributed by the Radiation Safety Office.

2.2.4 Administration of personnel monitoring program, including the maintenance of all necessary records.

2.2.5 Systematic inspection of all radiation areas within the Medical Center to determine the extent to which safety requirements are being met.

2.2.6 Maintenance of a radioactive waste disposal system.

2.2.7 Report to the Committee annually, and at such other times as may be necessary on findings revealed by inspections.

2.2.8 To assist the Committee in the development of such safety programs as may seem desirable.

2.2.9 To take immediate charge in the case of all accidents where radioactive materials have been involved and to take such

measures as may be required to return the area to a safe operating condition.

2.2.10 Report for the Committee as may be required by the Federal, State, and City agencies concerned with community radiation control.

2.3 Individual Responsibility

Each individual who, at any time, has control over a source of ionizing radiation is responsible for:

2.3.1 Keeping personal exposure to radiation as low as reasonably achievable (ALARA), and specifically below the maximum permissible exposure as listed in the following table:

REMS PER CALENDAR QUARTER:

Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads	1.25
Hands and forearms; feet and ankles	18.75
Skin of whole body	7.25

To maintain exposure to personnel ALARA, the Radiation Safety Office will examine all exposures exceeding 10% of the above maximum permissible doses.

2.3.2 Wearing the prescribed monitoring equipment such as film badges, finger TLD and pocket dosimeters in radiation areas. Personnel who work only with pure beta emitters having a maximum energy of less than 0.2 Me V (e.g., H-3, C-14, S-35) will not be required to wear film badges.

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

2.3.4 Utilizing all appropriate protective measures such as:

(a) Wearing protective clothing whenever contamination is possible, and not wearing such clothing outside of the laboratory area.

(b) Using protective barriers whenever possible (including syringe shields).

(c) Using mechanical devices (forceps) whenever their aid will assist in reducing exposure.

(d) Using pipette filling devices. Never pipette radioactive solutions by mouth.

(e) Performing radioactive work within confines of an approved hood or glove box unless serious consideration has indicated the safety of working in the open.

2.3.5 Dispose of waste only in specially designated receptacles.

2.3.6 Abstaining from smoking, drinking, or eating in isotope laboratories. Refrigerators shall not be used jointly for foods and radioactive materials.

2.3.7 Maintaining good personal hygiene.

(a) Keep fingernails short and clean.

(b) Do not work with radioactive materials if there is a break in skin below the wrist.

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

2.3.8 Checking the immediate areas, e.g., hoods, benches, etc., in which radioactive materials are being used for contamination. It is recommended that such checks be made at least once weekly. A log record should be maintained of these surveys including results which are entirely negative. Any contamination observed should be immediately cleaned and re-checked. (See Section 8 for permissible contamination levels.)

2.3.9 Keeping the laboratory neat and clean. The work area should be free from equipment and materials not required for the immediate procedure. Keep or transport materials in such a manner as to prevent breakage or spilage (double container), and to insure adequate shielding. Whenever practical, keep work surfaces covered with absorbent material, preferable in a stainless steel tray or pan, to limit and collect spillage in case of accident.

2.3.10 Labeling and isolating radioactive waste and equipment such as glassware, used in laboratories for radioactive materials. Once used for radioactive substances, equipment should not be used for other work, sent from the area to central cleaning facilities, or repair shops until demonstrated to be free of contamination.

2.3.11 Requesting Radiation Safety Office supervision of any emergency repair of contaminated equipment in the laboratory. At no time shall servicing personnel be permitted to work on equipment in radiation areas without the presence of a member of the laboratory staff to provide specific information.

2.3.12 Reporting accidental inhalation, ingestion, or injury involving radioactive materials or radiation source to his supervisor and the Radiation Safety Office, and carrying out their recommended corrective measures. The individual shall cooperate in any and all attempts to evaluate his exposure.

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

2.3.14 Complying with requests from the Radiation Safety Office for body burden measurements and the submission of urine samples for radioassay. Requests for these tests may be made in the case of workers using significant quantities of both β and γ emitters. (See Appendix A.4)

2.3.15 Promptly reporting any condition which may cause a violation of regulations or unnecessary exposure to radiation or to radioactive materials. (See Section 11, Notification of Incidents).

2.4 Authorized User Responsibility (Radioactive Materials)

Authorized users are responsible for insuring that individual responsibilities are discharged by those under their control, and are further responsible for:

2.4.1 Adequate planning. Before an experiment is performed, the supervisor should determine the types and amount of radiation or radioactive material to be used. This will generally give a good indication of the protection required. The procedure must be well outlined. In many cases, before the procedure is actually performed with radiation, it should be rehearsed so as to preclude slip-ups or unexpected circumstances. In any situation where there is appreciable radiation hazard, the Radiation Safety Office shall be consulted before proceeding.

2.4.2 Insuring that all individuals working in a restricted area have been instructed in the following:

(1) Procedures and precautions to minimize exposure.

(2) Purposes and functions of protective devices.

(3) Reporting requirements (Section 11).

(4) Responses to emergencies or malfunctions (Section 10).

(5) Availability of radiation exposure reports.

(6) Health protection problems associated with radiation exposure.

The extent of these instructions shall be commensurate with potential radiological health protection problems.

2.4.3 Furnishing the Radiation Safety Office with information concerning individuals and activities in their areas, and pertinent changes in their personnel rosters.

2.4.4 Contacting the Radiation Safety Office whenever major changes in operational procedures, new techniques, alterations in physical plant, (e.g., the removal of radiochemical fume hood), or when new operations which might lead to personnel exposure are anticipated.

2.4.5 Complying with the regulations governing the use of radioactive materials as established by the Radiation Safety Committee, for:

(a) Correct procedure for the procurement of radioactive materials by purchase or transfer (See Section 6).

(b) Posting areas where radiosiotopes are kept and used, or where radiation fields may exist. (See Appendix D.)

(c) Seeing that each sign carries the name of the personnel currently responsible for the associated area.

(d) Recording the receipt, transfer, and disposal of radioactive materials in this area. This includes sealed sources. The authorized user must be prepared to submit inventory data upon request.

(e) Assuring that all radioactive waste materials are disposed of in accordance with regulations. (See Section 9.)

(f) Taking steps to prevent the transfer of radioactive materials to unauthorized individuals. (See Section 7.)

2.4.6 Keeping stocks of stored radioactive materials to a minimum within laboratory areas.

2.4.7 Complying with proper procedures for termination of employment or termination of any experiment using radioactive materials. The authorized user is reminded that, under the terms and conditions of the license, he must return to the Radiation Safety Officer all radioactive materials, including waste, assigned to him under the license. Particular care should also be exercised to see that personnel monitoring devices (e.g., film badges) are returned to the Radiation Safety Officer. A final termination survey should also be requested by telephone.

2.5 Registrant Responsibility (X-ray machine)

The registrant*shall be responsible for directing the operation of the x-ray machine which he has registered with the Committee. He or his agent shall assure that the following provisions are met in the operation of the x-ray

* Service Chief

machine(s):

2.5.1 Individuals who will be operating the x-ray equipment shall be adequately instructed in the safe operating procedures and be competent in the safe use of the equipment.

2.5.2 In the vicinity of each x-ray system's control panel a chart shall be provided, which specifies for all examinations which are performed by the system a listing of information, including but not limited to the following, for each projection within that examination:

Patient's anatomical size versus technique factors to be utilized.

Type of grid to be used if any, and focal distance.

Source to image receptor distance to be used, and,

2.5.3 Written safety procedures and rules shall be provided to each individual operating x-ray equipment under his control, including any restrictions of the operating technique required for the safe operation of the particular x-ray system. The operator shall be able to demonstrate familiarity with these rules.

2.5.4 Except for patients who cannot be moved out of the room, only the staff and ancillary personnel required for the medical procedure or training shall be in the room during the radiographic exposure. Other than the patient being examined:

All individuals shall be positioned such that no part of the body including the extremities not protected by 0.5 mm lead equivalent, will be struck by the useful beam.

Staff and ancillary personnel shall be protected from the direct scatter radiation by protective aprons or whole body protective barriers of not less than 0.25 mm lead equivalent.

Patients who cannot be removed from the room shall be protected from the direct scatter radiation by whole body protective barriers of 0.25 mm lead equivalent or shall be so positioned that the nearest portion of the body is at least 2 meters from both the tube head and the nearest edge of the image receptor.

2.5.5 Gonadal shielding of not less than 0.25 mm lead equivalent shall be used for patients who have not passed the reproductive age during radiographic procedures in which the gonads are in the direct (useful) beam, except for cases in which this would interfere with the diagnostic procedure.

2.5.6 Persons shall not be exposed to the useful beam except for diagnoses, therapy or approved research projects, each exposure of which has been authorized by a licensed physician.

2.5.7 When a patient or film must be provided with auxiliary support during a radiation exposure:

Mechanical holding devices shall be used when the technique permits.

For selecting a holder and the procedure the holder shall follow:

The human holder shall be protected as required by paragraph 2.5.4;

No person shall be used routinely to hold film or patients;

A record shall be made of the examination and shall include the name of the human holder, date of the examination, number of exposures and technique for factors utilized for the exposure(s);

In those cases where the patient must hold the film, except during intraoral examinations, any portion of the body other than the area of clinical interest struck by the useful beam shall be protected by not less than 0.5 mm lead equivalent material;

Such holding shall be permitted only in very unusual and rare situations.

2.5.8 Procedures and auxiliary equipment designed to minimize patient and personnel exposure commensurate with the needed diagnostic information shall be utilized. This is interperted to include but not limited to:

The speed of film or screen and film combinations shall be the fastest speed consistent with the diagnostic objective of the examinations.

The radiation exposure to the patient shall be the minimum exposure required to produce images of acceptable diagnostic quality.

Portable or mobile equipment shall be used only for examinations where it is impractical to transfer the patient(s) to a stationary radiographic installation.

2.5.9 Personnel monitoring devices are worn by all persons who are associated with the operation of an x-ray system.

When an apron is worn, the monitoring device shall be worn at the collar outside the apron.

2.5.10

Written explanation must be submitted through the department chairman to the RSO when fluoro time in excess of 10 minutes is used.

3. AUTHORIZATION TO USE RADIOACTIVE MATERIALS

The use of radioactive materials by personnel is authorized by a Type A License of Broad Scope granted to the Medical Center. All applications for such use shall be submitted to the Committee through the Radiation Safety Officer. (11E). Radioactive materials, including what are sometimes called exempt quantities, shall not be used within the Medical Institutions 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 Safety Officer. (See Section 6).

3.1 All Applications

As the recipient of a Type A License of Broad Scope for use of radioactive material, the Medical Center is charged with the responsibility of insuring that such materials as are procured under the license be used in a manner that is completely safe and without hazard to personnel or to property. The Radiation Safety Committee has been delegated this responsibility and has the authority to issue or withdraw authorizations for the use of radioisitopes. 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 Radiation Safety Officer. 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 must contain a complete statement of the applicant's training and experience. This is, of course, in addition to the statement of the kind, quantity, and proposed use of the material. 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 use 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 and his technical staff shall provide satisfactory 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

An acceptable formal training course is available to the VAMC personnel. The Radiation Safety Course offered annually includes subjects essential for approval for an individual to use radioactive materials. In addition to the training requirement, 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.

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 time 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 Item 12 of the application.

Applications for possession and use of radioactive material are to be made on RSO Forms Nos. 1 and 2. Copies of these Forms are available in Appendix C of this document. Both Forms are to be completed for the initial application of a prospective user . These 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 No. 1.

3.2 Application for Human Use

Applications for the administration of radiation (x-rays or radioisotopes) to human subjects in research projects must be made on RSO Form No. 3.

The completed form and a copy of the Research Project Notification should be sent to the Radiation Safety Office. The application is then reviewed by the Radiation Safety Committee. The following guidelines have been imposed for research projects involving a non-FDA approved radiopharmaceutical:

3.2.1 Radiation Dose to Subjects

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

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

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.

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.

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

3.2.2 Limit On Radiation Dose

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.

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 exceed the following:

Whole body, active blood-forming organs, lens of the eye, and gonads:

	Rems
Single dose	3.0
Annual and total dose commitment	5.0

Other organs:

	Rems
Single dose	5.0
Annual and total commitment	15.0

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.

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 followup studies shall be considered for inclusion in the dose calculations.

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.

3.2.3 Limit On Pharmacological Dose

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 CFR, 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.

3.2.4 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 Safety Committee shall determine that radioactive materials

for parenteral use are prepared in sterile and pryogen-free form.

3.2.5 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 physican'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 3.1 plus, Clinical Radioisotope Training Consisting of:

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

(2) 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;

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

(4) Study and discussion with preceptor of case histories to establish most appropriate diagnostic and/or therapeutic procedures, limitations, contraindications, etc.

3.2.6 Human Research Subjects

Each investigator shall select appropriate human subjects and shall obtain the consent of such human being 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 Safety

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.

3.2.7 Research Protocol

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 Safety 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).

3.2.8 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:

(1) Title of the research project.

(2) Brief description of the purpose of the research project.

(3) Name of the investigator responsible.

(4) Pharmacological dose:

a. Active ingredients.

b. Maximum amount administered per subject.

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

(6) 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:

a. Age, sex

b. Amount of each radionuclide administered

c. 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.

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

(7) A claim of confidentiality, if any.

3.2.9 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 no more than that permitted by the FDA for a single study."

3.3 Authorizations

When the submitted application is approved by the Committee, the investigator is notified by receipt of an Authorization Form 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.

If an investigator has no positive plans for the use of a given authorization, he should consider its retirement in order to save on bookkeeping by the Radiation Safety Office. Such a retired authorization can usually be reactivated in one day should need for it develop. Whenever an authorization 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. Personnel monitoring services are discontinued.

3.4 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 results or diagnostic result.

Every person who receives radiation in any amount and from any source shall have this fact recorded in a permanent record of the Medical Center. This will be included in the patient's medical history record in addition to the permanent records maintained by the department concerned. These notations will be made by the physician responsible for administering the radiation.

If a patient dies or requires emergency surgery within two weeks after receiving a therapeutic dose of any radioisotope, the Radiation Safety Officer 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 Radiation Safety Officer or his designate. For purposes of this section "therapeutic amounts" is defined as ten millicuries or more of any radioisotope with a half-life greater than 1 day.

Patients who receive amounts of radioactive materials which 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. Radiation levels listed on Appendix B, "Permissible Doses, Levels, and Concentrations" shall not be exceeded.

When therapeutic amounts of gamma emitting materials are being used in

patient treatment, pregnant Medical Center personnel shall be transferred from the area of radiation exposure. No visitors are permitted without specific permission from the Radiation Safety Office.

Tissue specimens, blood, ascitic fluid, feces, urine, emesis, etc., from patients undergoing radioisotope therapy shall not be sent to the clinical laboratories without permission of the responsible radiotherapist or the Radiation Safety Office.

4. REGISTRATION OF ELECTRONIC RADIATION DEVICES

4.1 Each electronic device capable of producing ionizing radiation shall be registered with the Committee.

The Committee may incorporate restrictions and conditions upon the use of the registered radiation device. The registrant must notify the Committee in writing before making any changes which would render the information contained in the registration no longer accurate.

4.2 Plans and specifications for the construction of new radiation facilities, or the major modification of existing facilities, shall be approved by the Committee. The approval of such plans shall not preclude the requirement of additional modifications should a subsequent analysis of operating conditions indicate the possibility of an individual receiving a dose in excessive of the applicable standards. The plans should show as a minimum, the following:

The normal location of the radiation producing equipment's radiation port; the port's travel and traverse limits; general direction(s) of the radiation beam; locations of any windows; the location of the operator's booth; and the location of the equipment's control console.

Structural composition and thickness of all walls, doors, partitions, floor and ceiling of the room(s) concerned.

The type of occupancy of all adjacent areas inclusive of space above and below the room(s) concerned. If there is an exterior wall, shown distance to the closet existing occupied area(s).

The make and model of the radiation producing equipment including the maximum energy output (for x-ray machines is the kilovolt peak potential).

The type of examination(s) or treatment(s) which will be performed with the equipment (e.g., dental, orthodontal, chest, gastro-intestinal, fluoroscopic, podiatry, fixed therapy, rotational therapy, etc.).

Information on the anticipated workload should be provided, if available. Any other information considered pertinent in support of the application.

5. POLICIES AND PROCEDURES FOR AREA USING RADIOACTIVE MATERIALS

5.1 Proper Posting of Laboratories, Areas, and Equipment

5.1.1 A "CAUTION RADIOACTIVE MATERIALS" sign must be conspicuously posted on the doors to laboratory areas where radioactive materials are being used or stored. (See Appendix D). The name and home phone numbers of the individual responsible for the posted area shall be shown in order to facilitate contact in case of emergency. The authorized user shall be responsible for seeing that the posted information is current. The signs must not be removed from any room except by Radiation Safety Office personnel following an inspection survey.

5.1.2 Storage areas 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 also state the quantities and kinds of radioactive materials in the containers and the date of measurement of the quantity.

5.1.3 Radiation areas in the laboratory, i.e., areas where radiation levels might expose individuals to 5 millirem in any one hour; or in any five consecutive days, a dose in excess of 100 mrem, shall be posted with the sign "CAUTION RADIATION AREA".

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

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

5.2 Shielding of Sources

The Radiation Safety Office will check during periodic surveys to insure that adequate shielding is used in all radiological operations. The total amount of shielding materials that will be necessary will depend on the amount of activity and the type of radiation involved. In some instences, it may be necessary to construct a "hot cell" or large shielding barrier to meet shielding requirements. The Radiation Safety Office will be available for

consultation on all shielding problems encountered.

5.3 Aerosols, Dusts, and Gaseous Products

5.3.1 Procedures involving aerosols, dusts, or gaseous products or procedures which might produce airborne contamination in excess of regulatory limits shall be conducted in a hood, dry box, or other suitable closed system. (See Appendix E.)

5.3.2 All release from such systems shall not exceed the maximum permissible concentration in air for nuclide in question, when averaged over one year. However, where practical, traps should be incorporated in the experimental set-up to insure that environmental releases are as low as possible.

5.3.3 Radioactive gases must be stored in gas-tight containers and must be kept in areas having approved ventillation.

5.3.4 Hoods to be used for radioisotope work must be tested by the Radiation Safety Office to insure that they meet the minimum requirements for air velocity at the face of the hood.

5.4 Work Surfaces

All work areas (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 purpose a plastic-baked absorbent paper (e.g., Kimpak") will be satisfactory. However, if such paper is used, it should be discarded frequently to prevent active materials from dusting off the surface.

5.5 Periodic Surveys of Radiation Areas

It is recommended that areas (e.g., hoods, bench tops) in which radioactive materials are being used should be checked for contamination periodically by the radiation workers in that laboratory. In addition, these areas shall be inspected each and every time there is reason to suspect a contamination incident. (See Section 8.1.2.)

5.6 Laboratory Monitors

Each Laboratory or area (other than those where ^{3}H is used exclusively or where only exempt quantities of other radionuclides are handled) shall have available a portable or semiportable monitoring device to be used for personnel and area monitoring.

5.7 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 cleaning facilities, repair shops, or returned to the source of supply, until demonstrated to be free of contamination.

5.8 Repair of 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 a member of the Radiation Safety Office staff, who will assure that the necessary safeguards are taken. It is the responsibility of the laboratory personnel to request this supervision from the Radiation Safety Office.

5.9 House Vacuum Lines

House vacuum lines are vulnerable to contamination. If house vacuum lines are to be used, the withdrawn gas must be free of radioactivity. It is advisable to use a separate vacuum system whenever possible, such as a separate vacuum pump exhausting into a hood.

5.10 Radioactive Contamination of Areas

In general, no radioactive contamination can be tolerated. Exceptions to this will include certain hood trays, stainless steel trays, Kimpak covered surfaces, or other equipment which is used frequently for active work and which will be clearly marked with the standard radiation caution signs or stickers. Any contamination that is not confined to protected surfaces should be reported immediately to the Radiation Safety Office. The Radiation Safety staff will supervise the decontamination of such areas or equipment.

5.11 Animal Facility

The following provisions shall be met in all facilities where radioactive animals are maintained:

5.11.1 Gloves, lab coats, and personnel dosimeters (if warranted) shall be worn while handeling such animals or their excreta.

5.11.2 Animals injected with radioactive material shall be kept in a room marked: "CAUTION RADIOACTIVE MATERIAL". Each cage shall be clearly marked with the following information:

(a) Isotope and activity administered to each animal.

(b) Date of injection.

(c) Principal investigator name.

(d) "CAUTION - RADIOACTIVE MATERIALS" tag or tape affixed to each cage.

5.11.3 All excreta from such animals shall be collected and retained separate from the others. In the event that excreta shows no significant activity above background with an appropriate survey instrument for the isotope involved, the excreta may be mixed and disposed of with excreta from other animals. That which is in excess of normal background may be:

Stored for decay or a commercial disposal company in an appropriately marked container (date, isotope and activity).

Discharged to the sanitary system provided a log (date, isotope and activity) is maintained and concentrations are less than those specified in Appendix B, Table II, Column 2 of this part.

5.11.4 Cages for animals injected with radioactive materials shall be cleaned separate from the rest. Scrub brushes, mild detergent, and disposable gloves shall be used. Each such cage shall be verified not contaminated before being placed back into service.

5.11.5 Contaminated carcasses and biological samples will be disposed of as indicated in 9.1.11.

6. PROCUREMENT OF RADIATION SOURCES

The following procedures for the procurement of radioactive materials are intended to insure compliance with the terms and conditions of the licenses issued to the Medical Center. The Committee requires that all orders for radioactive materials be placed through the Medical Center via the Radiation Safety Office. In cases other than purchase, the same procedure shall be followed to notify the Radiation Safety Office that the receipt of radioactive materials is contemplated through gifts or transfers from any source.

6.1 Ordering Procedures

Before the purchase request is initiated, the individual shall have the Committee's authorization for the possession and use of the particular radionuclide, activity, and chemical form requested. The Radiation Safety Office will approve the purchase request if the Committee's authorization is verified. This verification will be a signature by the Radiation Safety Officer on the VA Form 07-2237. The order then will be placed by the Radiation Safety Office with the designated vendor through Purchasing Service.

Materials which are used routinely will be replenished by a standing order from one or more reputable radiopharmaceutical suppliers. Use and receipt will be monitored so that station limits are not exceeded.

6.2 Receiving and Distribution

The Radiation Safety Officer or designee will process all order forms for radioactive material to ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded. Each order form with include isotope, activity and chemical form, as well as the following shipping instructions:

Normal hours: Deliver to Nuclear Medicine Service, Building 200

After working hours: Deliver to the Radioactive Storage Vault, Building 200, via the Administrative Officer of the Day (AOD)

Approved: _____
RSO or Deputy RSO

All requests for Group V and VI materials will include a written request by the physician who will perform the procedure.

7. TRANSFER OF RADIOACTIVE MATERIALS

7.1 Transfer within the Institution

Transfer of materials between Authorized Users is sometimes permissible, but only with prior approval by the Radiation Safety Office.

Each container used in transporting radioactive materials shall be marked or tagged with the radiation symbol to warn personnel approaching from all reasonable directions. It should be tagged with all necessary information to provide the reader with knowledge of the hazards such as radiation levels and handling precautions. It should be adequately sealed against leakage, and if fragile protected against breakage. No significant external contamination should be present.

7.2 Transfer from the Institution

When radioactive material is to be sent from the Northport VAMC, the sender must notify the Radiation Safety Office. The Radiation Safety Office staff will pick up these shipments on telephone request and will assist with the packaging to insure compliance with Department of Transportation regulations.

The recipient of any material to be sent from Northport VAMC must provide evidence of an NRC license by furnishing a copy of his license to the Radiation Safety Office before shipment can be made. Noncompliance with this requirement is a violation of the Federal and State regulations and is subject to criminal prosecution as well as denial to Northport VAMC of further radioisotopes. Check first with the Radiation Safety Office staff by phone to see if the recipient's license is already on file. If not, then request a copy from the recipient in order to fulfill this requirement.

8. CONTAMINATION LIMITS AND DECONTAMINATION PROCEDURES

8.1 Maximum Permissible Levels of Radioactive Contamination

The maximum permissible levels of radioactive contamination on hoods, bacteriological cabinets, laboratory benches, other working surfaces, floors and other areas shall not exceed the following limits:

8.1.1 Alpha activity detectable at the surface in excess of 1×10^{-4} microcuries per 100 cm^2 by smear tests.

8.1.2 Removable beta or gamma activity in excess of 1×10^{-3} microcuries per 100 cm^2 by smear tests.

The permissible levels on glassware, tongs, lead bricks, and other laboratory equipment will be the same as those for working surfaces; however, it is expected that, in certain instances in which such equipment is to be used over again in radiological operations, contaminated equipment will be present and is permissible as long as it is appropriately labeled and stored separately from uncontaminated equipment. The glassware will be labeled as being contaminated with radioactivity and not to be removed from the laboratory.

To insure that these levels are maintained, the Authorized User will perform and document routine (see Appendix F) wipe tests of all areas under his control. Any contamination that is not confined to protected surfaces and can not be decontaminated shall be reported immediately to the Radiation Safety Office. The Radiation Safety staff will supervise the decontamination of such areas of equipment.

8.2 Decontamination of Areas Contaminated with Radioactivity

Preparations for decontamination shall be started promptly. Determine the extent and hazard of contamination. The Radiation Safety Office staff will assist in this evaluation. The individual responsible for the contamination will be expected to do most of the cleanup under the supervision of the Radiation Safety staff. After decontamination, the area or equipment shall be considered contaminated until proved otherwise by the Radiation Safety Office.

8.3 Decontamination of Personnel Contaminated with Radioactivity

8.3.1 Notify the Radiation Safety Office immediately after the contaminating accident.

8.3.2 Wash body 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 to the skin may impede the success of more suitable procedures. Avoid the use of organic solvents. They make the skin more permeable to radioactive contaminants.

9. DISPOSAL OF RADIOACTIVE MATERIALS

Generally no radioactive waste shall be disposed of by conventional methods. This means particularly that solid wastes may not be placed in the standard waste containers to be collected by housekeeping personnel.

Radioactive materials shall not be discharged into the sanitary sewer system, unless they are readily soluble or dispersible in water and the activity discharged is approved by the Radiation Safety Office.

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). Similar considerations shall also be given to other highly toxic or hazardous substances.

9.1 All radioactive wastes will be segregated separately into 11 different categories:

9.1.1 Short Lived Liquid and Solid Wastes

This classification includes all solid and contained liquid wastes with half lives less than or equal to 8 days. Some isotopes used on station which fit this classification are: Ga-67, Tc-99m, In-111, I-123, I-131, Hg-197 and Tl-201. Since these radioisotopes decay rapidly, they will be stored on station until radiation levels are low enough to allow regular trash disposal. It is, therefore, required that all radiation labels be removed before the waste is bagged, labeled and placed into the hot waste receptacle.

9.1.2 Medium Lived Solid Noncombustibles

This classification includes all test tubes, vials, syringes, etc., with half lives greater than 8 days and less than or equal to 60 days. Some radioisotopes used on station which fit this classification are Cr-51, Fe-59, and I-125. These wastes will be stored on station until radiation levels allow treatment as regular trash. It is required that all radiation labels be removed before the isotope is bagged and placed into the hot waste receptacle. Type, date, approximate activity and radioisotope must also be recorded on each bag.

9.1.3 Medium Lived Solid Combustibles

This classification includes combustibles (plastic-backed absorbent paper, disposable gloves and cardboard, etc.) contaminated with radioisotopes listed in 9.1.2. These wastes will be incinerated. All such items must be contained in a labeled

(type, date, approximate activity and radioisotope) bag prior to placement into the hot trash receptacle.

9.1.4 Medium Lived Liquid Wastes

This classification includes liquid forms of the isotopes as listed in 9.1.2. Such liquids will be suctioned into a solidification container supplied by the Radiation Safety Office and labeled with the following information: date, isotope and activity. After filling and solidifying the liquid waste, place the entire kit into a hot waste receptacle.

Liquids with low specific activity may be disposed of directly to the sewer system via designated sinks provided certain concentrations are not exceeded (see Appendix B.5). A log containing date, isotope and activity must be maintained at the sink.

9.1.5 Long Lived Solid Noncombustibles

This classification includes all solids contaminated with radioisotopes with half lives greater than 60 days such as: H-3, C-14, and Mn-54. Type, date, approximate activity and isotope must be recorded on each bag placed into the hot waste receptacle. These wastes will be picked up by a commercial disposal company.

9.1.6 Long Lived Solid Combustibles

This classification includes combustibles (plastic-backed absorbent paper, disposable gloves, cardboard, etc.) contaminated with the radioisotopes listed in 9.1.5. These wastes will be incincerated. All such wastes must be contained in a labeled (type, date, approximate activity and radioisotope) bag prior to placement in a hot waste receptacle.

9.1.7 Long Lived Liquid Wastes

This classification includes the same isotopes as listed in 9.1.5. The liquid is to be suctioned into a solidification container supplied by the Radiation Safety Office and labeled with the following information: date, isotope and activity. After filling and solidifying the liquid waste, place the entire kit into a hot waste receptacle.

Liquids with low specific activity may be disposed of directly to the sewer system via designated sinks provided certain concentrations are not exceeded (see Appendix B.5). A log containing date, isotope and activity must be maintained at the sink. This classification does <u>not</u> include any liquids which contain scintillation fluid.

9.1.8 Bactec Vial Wastes

This classification includes bactec vials which contain C-14. These vials will be disposed of through the sewer system at a designated sink after autoclaving. A log must be maintained with the following information: date, vials disposed, and total activity.

9.1.9 Scintillation - Less Than 0.05 uCi/ml H-3 or C-14

This classification includes scintillation media which contains less than 0.05 uCi/ml of H-3 or C-14. Such waste is considered nonradioactive though toxic and will therefore be removed by a commercial toxic waste disposal company. These liquids will be collected by the user in a glass bottle (at least one gallon) in a hood and stored for removal.

9.1.10 Scintillation - All Other

This classification includes all other contaminated liquids or solids which have come in contact with scintillation fluid. Isotope and approximate activity disposed of must be recorded on each bag placed into the hot waste receptacle. These wastes will be picked up by commercial disposal companies.

9.1.11 Contaminated Animal Carcasses and Tissues

This includes all animal carcasses and tissue samples contaminated with radioisotope. Such waste will be placed in leak proof plastic bags and stored in research freezer. Approximate activity, isotope and date must be documented on to the sheet provided. An identification tag bearing the same information must be placed on the carcass or sample. These materials will be picked up by a commercial waste disposal company or incinerated.

9.2 Waste Pickup

Each laboratory will be provided with disposal drums. All waste must be segregated as described above and labeled. It will be the responsibility of each service to notify the Radiation Safety Office that drums need changing a week in advance, and supply the manpower required for transporting the wastes.

10. EMERGENCIES

10.1 Preventive Measures

Many accidents involving radioactive materials can be avoided if the recommended procedures for safe handling are followed by all laboratory personnel. New techniques and procedures should be approved by the Radiation Safety Officer and, when necessary, tested by dummy runs. Where danger of contaminating the person exists, suitable protective clothing and rubber gloves shall be mandatory. Workers shall be thoroughly familiar with the location of telephone, exits, and all available safety devices.

10.1.1 Spills

Where danger of spills of radioactive solution exists plastic backed absorbent paper (e.g., Kimpak") or trays shall always be used. Containers should be kept covered whenever possible, and only those amounts of radioactive solutions that are immediately necessary should be drawn from stock.

10.1.2 Dusts, Mists, Fumes, Organic Vapors, and Gases

Adequate forced ventillation is always a first precaution to be considered in laboratories working with radioactive dusts, mists, fumes, organic vapors, or gases. The use of glove boxes and hoods, provided with adequate exhaust fans, is mandatory. Floors of hoods and glove boxes should be covered with disposable papers to catch dust, spray, or condensate. Radioactive gases and volatile materials, whether, in the laboratory or in storage areas, should always be kept in gasketed, gas tight containers.

10.1.3 Fires and Other Major Emergencies

If possible, all radioactive materials in the laboratory not immediately in use should be stored in a manner that will

safeguard against possible accidental spread of radioactive contamination in the event of a major disaster.

10.2 Emergency Procedures

10.2.1 Minor Spills Involving No Radiation Hazard to Personnel

(1) Notify all other persons in the room at once.

(2) Permit only the minimum number of persons necessary to deal with the spill into the area.

(3) Confine the spill immediately.

Liquid Spills:

Don protective gloves.
Drop absorbent paper on spill.

Dry Spills:

Don protective gloves.
Dampen thoroughly, taking care not to spread contamination (unless mixing with water causes volatilization).

(4) Notify the Radiation Safety Office as soon as possible. The Radiation Safety staff will be responsible for the remaining steps.

(5) Decontaminate.

(6) Monitor all persons involved in the spill and cleaning.

(7) Permit no person to resume work in the area until a survey is made.

(8) Prepare a complete history of the accident and subsequent activity related thereto for the necessary records.

10.2.2 Major Spills Involving Radiation Hazard to Personnel

(1) Notify all persons not involved in the spill to vacate the room at once.

(2) If the spill is liquid, and the hands are protected, right the container.

(3) If the spill is on the skin, flush thoroughly.

(4) If the spill is on clothing, discard outer or protective clothing at once.

(5) Switch off all fans.

(6) Vacate the room.

(7) Notify the Radiation Safety Office as soon as possible. The Radiation Safety staff will be responsible for the remaining steps.

(8) Take immediate steps to decontaminate personnel involved, as necessary.

(9) Decontaminate the area. (Personnel involved in decontamination must be adequately protected).

(10) Monitor all persons involved in the spill and cleaning to determine adequacy of decontamination.

(11) Permit no person to resume work in the area until a survey is made.

(12) Prepare a complete history of the accident and subsequent activity related thereto for the necessary records.

10.2.3 Accidents Involving Radioactive Dusts, Mists, Fumes, Organic Vapors and Gases

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

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

(3) Vacate the room.

(4) Notify the Radiation Safety Office at once.

(5) Ascertain that all doors giving access to the room are closed and post conspicuous warning or guards to prevent accidental opening of doors.

(6) Report at once all known or suspected inhalations of radioactive materials. The Radiation Safety staff will be responsible for the remaining steps.

(7) Evaluate the hazard and the necessary safety devices for safe reentry.

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

(9) Decontaminate the area.

(10) Perform air survey of the area before permitting work to be resumed.

(11) Monitor all persons suspected of contamination.

(12) Prepare a complete history of the accident and subsequent activity related thereto for the necessary records.

10.2.4 Injuries to Personnel Involving Radiation Hazard

(1) Wash minor wounds immediately, under running water while spreading the edges of the gash.

(2) Report all radiation accidents to personnel (wounds, over-exposure, ingestion, inhalation) to the Radiation Safety Officer as soon as possible.

(3) Call a physician qualified to treat radiation injuries at once.

(4) Permit no person involved in a radiation injury to return to work without the approval of the Radiation Safety Officer and the attendant physician.

(5) Prepare a complete history of the accident and subsequent activity related thereto for the necessary records.

10.2.5 Fires or Other Major Emergencies

(1) Alert all personnel in immediate danger.

(2) Report the fire immediately regardless of size.

(3) Try to put out manageable fires. If fire is not manageable, leave the area immediately, close the door, wait for assistance.

(4) Notify the Radiation Safety Office.

(5) Govern fire-fighting or other emergency activities by the restrictions of the Radiation Safety Officer. The Radiation Safety staff will be responsible for the remaining steps.

(6) Following the emergency, monitor the area and determine the protective devices necessary for safe decontamination.

(7) Decontaminate.

(8) Permit no person to resume work until conditions allow.

(9) Monitor all persons involved in combating the emergency.

(10) Prepare a complete history of the emergency and subsequent activity related thereto for the necessary records.

11. NOTIFICATION OF INCIDENTS

11.1 Each authorized user shall report to the Radiation Safety Office the theft or loss of any source of radiation immediately after such occurence becomes known.

11.2 Each authorized user shall immediately notify the Radiation Safety Office of any incident involving any source of radiation which may have caused or threatens to cause:

(a) A radiation exposure in excess of applicable limits to any individual; or

(b) the release of radioactive materials which will cause excessive levels and concentrations of radionuclides in air or water; or

(c) a loss of one day or more of the operation of any facilities affected; or

(d) damage to property in excess of $100.

APPENDIX A
PERSONNEL MONITORING

A.1 Personnel Monitoring Requirements

Each authorized user/registrant shall require the use of personnel monitoring equipment by:

(a) Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in the excess of 25 percent of the applicable value specified in B.1 (a), Appendix B.

(b) Each individual under 18 years of age who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in any calendar quarter in excess of 5 percent of the applicable value specified in B.1 (a), Appendix B.

(c) Each individual who enters a high radiation area.

A.2 Personnel Dosimeter Badge Instructions

(a) Service Chiefs, authorized users, and the Radiation Safety Office have joint responsibility of ensuring that Personnel Dosimeter Badges are worn by personnel who are exposed to significant levels of radiation. A Personnel Dosimeter request form must be completed by the individual requiring the badge.

(b) The badge is a measure of your own personal exposure. Do not give it to other people to wear.

(c) Once a month, the TLD within the badge must be changed. Failure to change the film at the proper time negates the usefulness.

(d) The badge is used to document exposure to head and trunk of the body. The badge should be worn at the waist or chest level. Never wear the badge on the extremities. When wearing a lead apron, wear the film badge outside the apron at the collar.

(e) If you lose or damage your badge, a new badge must be

obtained before continuance of activities involving possible radiation exposure. There is a charge for exchange of damaged holders.

(f) Take care of your badge. Your badge is also sensitive to heat, moisture, and pressure. Appropriate precautions should be observed.

(g) Never wear the badge when you are receiving radiation exposure as a patient.

(h) Your badge is to be used exclusively for the Northport VA Medical Center. If you have occasion to be exposed to radiation at other facilities, they have the responsibility of providing monitors.

(i) The badges must be returned to the Radiation Safety Office upon termination of employment, of reassignment to areas not involving radiation exposure.

A.3 Personnel Monitoring Records

Personnel monitoring records are maintained in the Radiation Safety Office.

A.4 Personnel Contamination Monitoring

Each user of I-125 or I-131:

(a) Shall have a routine uptake examination within 72 hours after processes in which quantities greater than one millicurie of volatile or dispersable I-125 or I-131 are involved. It is the employees responsibility to contact the Radiation Safety Officer in all such instances.

(b) Shall have a routine uptake examination on a semi-annual basis when microcurie quantities of I-125, I-123, or I-131 are used in either volatile or nonvolatile form. Employees will be notified by the Radiation Safety Officer when this examination is required.

Each user of Tritium:

(a) Shall have a routine 24 hour collection urinalysis after processing 10mCi of tritium in any form. It is the employees responsibility to contact the Radiation Safety Officer in all such instances.

(b) Shall have a routine urinalysis on a quarterly basis when smaller amounts of tritium are processed. Employees will be notified by the Radiation Safety Officer when this examination is required.

One milliliter sample of urine should be submitted in labeled, (name/ social security number/date), glass liquid scintillation vials to the Radiation Safety Office when quarterly urinalysis sampling is required.

All records and subsequent analysis will be undertaken by the Radiation Safety Office.

APPENDIX B
PERMISSIBLE DOSES, LEVELS, AND CONCENTRATIONS

B.1 Radiation Dose to Individuals in Restricted Areas

(a) Except as provided in B.1 (b), no authorized user shall possess, use, receive, or transfer sources of radiation in such a manner as to cause any individual in a restricted area to receive any period of one calendar quarter from all sources of radiation in the licensee's or registrant's possession a dose in excess of the limits specified in the table:

	Rems per Calendar Quarter
Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads	1.25
Hands and forearms; feet and ankles	18.75
Skin of whole body	7.50

(b) An authorized user may permit an individual in a restricted area to receive a dose to the whole body greater than that permitted under B.1(a), provided:

1. During any calendar quarter the dose to the whole body from sources of radiation in the authorized user's possession shall not exceed 3 rems;

2. The dose to the whole body, when added to the accumulated occupational dose to the whole body, shall not exceed 5(N-18) rems where "N" equals the individual's age in years at his last birthday;

B.2 Exposure of Individuals to Concentrations of Radioactive Material in Restricted Areas

(a) No authorized user shall possess, use, receive, or transfer radioactive material in such a manner as to cause an individual in a restricted area to be exposed to airborne radioactive material in an average concentration in excess of the limits specified in Appendix B, Table 1, of this part. "Expose", as used in this section means that the individual is present in an airborne concentration. No allowance shall be made for the use of protective clothing or equipment, or particle size, except as authorized.

(b) The limits given in Appendix B, Table 1, of this part are based upon exposure to the concentrations specified for forty (40) hours in any period of seven (7) consecutive days. In any such period where the number of hours of exposure is less than forty (40), the limits specified in the table may be increased proportionately. In any such period where the number of hours of exposure is greater than forty (40), limits specified in the table shall be decreased proportionately.

B.3 Exposure of Minors

(a) No authorized user shall possess, use, or transfer sources of radiation in such a manner as to cause any individual within a restricted area, who is under 18 years of age, to receive in any period of one calendar quarter from all sources of radiation in such licensee's or registrant's possession a dose in excess of 10 percent of the limits specified in the table in B.1 (a).

(b) No authorized user shall possess, use, or transfer radioactive materials in such a manner as to cause any individual within a restricted area, who is under 18 years of age, to be exposed to airborne radioactive materials in an average concentration in excess of the limits specified in Appendix B, Table II, of this part. For purposes of this paragraph, concentrations may be averaged over periods no greater than a week.

B.4 Permissible Levels of Radiation From External Sources in Unrestricted Areas

(a) Except as authorized pursuant to B.4 (b) no authorized user shall possess, use, or transfer sources of radiation in such a manner as to create in any unrestricted area from such sources of radiation in his possession:

1. Radiation levels which, if an individual were continuously present in the area, could result in his receiving a dose in excess of 2 millirems in any 1 hour; or

2. 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 7 consecutive days.

(b) Any person may apply for proposed limits upon levels of radiation in unrestricted areas in excess of those specified in B.4 (a) resulting from the applicant's possession or use

of sources of radiation. Such applications should include information as to anticipated average radiation levels and anticipated occupancy times for each unrestricted area involved. The Committee will seek State approval of the proposed limits if the applicant demonstrates that the proposed limits are not likely to cause any individual to receive a dose to the whole body in any period of the calendar year in excess of 0.5 rem.

B.5 Concentration of Effluents to Unrestricted Areas

(a) An authorized user shall not possess, use, or transfer licensed material so as to release to an unrestricted area radioactive material in concentrations which exceed the limits specified in Appendix B, Table I, except as authorized pursuant to B.5 (b). For purposes of this section concentrations may be averaged over a period not greater not one year.

(b) An application for an authorization or amendment may include proposed limits higher than those specified in B.5 (a) if the applicant demonstrates:

1. That the applicant has made a reasonable effort to minimize the radioactivity contained in effluents to unrestricted areas;

2. That it is not likely that radioactive material discharged in the effluent would result in the exposure of an individual to concentrations of radioactive material in the air or water exceeding the limits specified in Appendix B, Table II of this part.

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I Column 1 Air (μc/ml)	Table I Column 2 Water (μc/ml)	Table II Column 1 Air (μc/ml)	Table II Column 2 Water (μc/ml)
Technetium (43)	Tc 96m	S	8×10^{-3}	4×10^{-1}	3×10^{-6}	1×10^{-3}
		I	3×10^{-3}	3×10^{-1}	1×10^{-6}	1×10^{-3}
	Tc 96	S	6×10^{-7}	3×10^{-3}	2×10^{-9}	1×10^{-6}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	5×10^{-6}
	Tc 97m	S	2×10^{-6}	1×10^{-2}	8×10^{-9}	4×10^{-6}
		I	2×10^{-7}	5×10^{-3}	5×10^{-9}	2×10^{-6}
	Tc 97	S	1×10^{-3}	5×10^{-3}	4×10^{-7}	2×10^{-3}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-6}
	Tc 99m	S	4×10^{-3}	2×10^{-1}	1×10^{-6}	6×10^{-3}
		I	1×10^{-3}	8×10^{-2}	5×10^{-7}	3×10^{-3}
	Tc 99	S	2×10^{-6}	1×10^{-2}	7×10^{-8}	3×10^{-6}
		I	6×10^{-8}	5×10^{-3}	2×10^{-9}	2×10^{-6}
Tellurium (52)	Te 125m	S	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-6}
		I	1×10^{-7}	3×10^{-3}	4×10^{-9}	1×10^{-6}
	Te 127m	S	1×10^{-7}	2×10^{-3}	5×10^{-9}	6×10^{-6}
		I	4×10^{-8}	2×10^{-3}	1×10^{-9}	5×10^{-6}
	Te 127	S	2×10^{-6}	8×10^{-3}	6×10^{-8}	3×10^{-6}
		I	9×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-6}
	Te 129m	S	8×10^{-8}	1×10^{-3}	3×10^{-9}	3×10^{-6}
		I	3×10^{-8}	6×10^{-4}	1×10^{-9}	2×10^{-6}
	Te 129	S	5×10^{-6}	2×10^{-2}	2×10^{-7}	8×10^{-6}
		I	4×10^{-6}	2×10^{-2}	1×10^{-7}	8×10^{-6}
	Te 131m	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-6}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-6}
	Te 132	S	2×10^{-7}	9×10^{-4}	7×10^{-9}	3×10^{-6}
		I	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-6}
Terbium (65)	Tb 160	S	1×10^{-7}	1×10^{-3}	3×10^{-9}	4×10^{-6}
		I	3×10^{-8}	1×10^{-3}	1×10^{-9}	4×10^{-6}
Thallium (81)	Tl 200	S	3×10^{-6}	1×10^{-2}	9×10^{-8}	4×10^{-6}
		I	1×10^{-6}	7×10^{-3}	4×10^{-8}	2×10^{-6}
	Tl 201	S	2×10^{-6}	9×10^{-3}	7×10^{-8}	3×10^{-6}
		I	9×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-6}
	Tl 202	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-6}
		I	2×10^{-7}	2×10^{-3}	8×10^{-9}	7×10^{-6}
	Tl 204	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-6}
		I	3×10^{-8}	2×10^{-3}	9×10^{-10}	6×10^{-6}
Thorium (90)	Th 228	S	9×10^{-12}	3×10^{-4}	3×10^{-13}	7×10^{-6}
		I	6×10^{-12}	4×10^{-4}	2×10^{-12}	1×10^{-5}
	Th 230	S	2×10^{-12}	5×10^{-5}	8×10^{-14}	2×10^{-6}
		I	1×10^{-11}	9×10^{-4}	3×10^{-13}	3×10^{-5}
	Th 232	S	3×10^{-11}	5×10^{-5}	1×10^{-12}	2×10^{-6}
		I	3×10^{-11}	1×10^{-3}	1×10^{-12}	4×10^{-5}
	Th natural	S	3×10^{-11}	3×10^{-5}	1×10^{-12}	1×10^{-6}
		I	3×10^{-11}	3×10^{-4}	1×10^{-12}	1×10^{-5}
	Th 234	S	6×10^{-8}	5×10^{-4}	2×10^{-9}	2×10^{-5}
		I	3×10^{-8}	5×10^{-4}	1×10^{-9}	2×10^{-5}
Thulium (69)	Tm 170	S	4×10^{-8}	1×10^{-3}	1×10^{-9}	5×10^{-5}
		I	3×10^{-8}	1×10^{-3}	1×10^{-9}	5×10^{-5}
	Tm 171	S	1×10^{-7}	1×10^{-2}	4×10^{-9}	5×10^{-4}
		I	2×10^{-7}	1×10^{-2}	8×10^{-9}	5×10^{-4}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I Column 1 Air (μc/ml)	Table I Column 2 Water (μc/ml)	Table II Column 1 Air (μc/ml)	Table II Column 2 Water (μc/ml)
Tin (50)	Sn 113	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	9×10^{-6}
		I	5×10^{-8}	2×10^{-3}	2×10^{-9}	8×10^{-6}
	Sn 125	S	1×10^{-7}	5×10^{-4}	4×10^{-9}	2×10^{-6}
		I	8×10^{-8}	5×10^{-4}	3×10^{-9}	2×10^{-6}
Tungsten (Wolfram) (74)	W 181	S	2×10^{-6}	1×10^{-2}	8×10^{-8}	4×10^{-6}
		I	1×10^{-7}	1×10^{-2}	4×10^{-9}	3×10^{-6}
	W 185	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-6}
		I	1×10^{-7}	3×10^{-3}	4×10^{-9}	1×10^{-6}
	W 187	S	4×10^{-7}	2×10^{-3}	2×10^{-8}	7×10^{-6}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-6}
Uranium (92)	U 230	S	3×10^{-10}	1×10^{-4}	1×10^{-11}	5×10^{-6}
		I	1×10^{-10}	1×10^{-4}	4×10^{-12}	5×10^{-6}
	U 232	S	1×10^{-10}	8×10^{-4}	3×10^{-12}	3×10^{-5}
		I	3×10^{-11}	8×10^{-4}	9×10^{-13}	3×10^{-5}
	U 233	S	5×10^{-10}	9×10^{-4}	2×10^{-11}	3×10^{-5}
		I	1×10^{-10}	9×10^{-4}	4×10^{-12}	3×10^{-5}
	U 234	S	6×10^{-10}	9×10^{-4}	2×10^{-11}	3×10^{-5}
		I	1×10^{-10}	9×10^{-4}	4×10^{-12}	3×10^{-5}
	U 235	S	5×10^{-10}	8×10^{-4}	2×10^{-11}	3×10^{-5}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	U 236	S	6×10^{-10}	1×10^{-3}	2×10^{-11}	3×10^{-5}
		I	1×10^{-10}	1×10^{-3}	4×10^{-12}	3×10^{-5}
	U 238	S	7×10^{-11}	1×10^{-3}	3×10^{-12}	4×10^{-5}
		I	1×10^{-10}	1×10^{-3}	5×10^{-13}	4×10^{-5}
	U 240	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	3×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	3×10^{-5}
	U natural	S	7×10^{-11}	5×10^{-4}	3×10^{-12}	2×10^{-5}
		I	6×10^{-11}	5×10^{-4}	2×10^{-12}	2×10^{-5}
Vanadium (23)	V 48	S	2×10^{-7}	9×10^{-4}	6×10^{-9}	3×10^{-5}
		I	6×10^{-8}	8×10^{-4}	2×10^{-9}	3×10^{-5}
Xenon (54)	Xe 131m	Sub	2×10^{-5}	.....	4×10^{-7}	.....
	Xe 133	Sub	1×10^{-5}	.....	3×10^{-7}	.....
	Xe 133m	Sub	1×10^{-5}	.....	3×10^{-7}	.....
	Xe 135	Sub	4×10^{-6}	.....	1×10^{-7}	.....
Ytterbium (70)	Yb 175	S	7×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-6}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-6}
Yttrium (39)	Y 90	S	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-6}
		I	1×10^{-7}	6×10^{-4}	3×10^{-9}	2×10^{-6}
	Y 91m	S	2×10^{-5}	1×10^{-1}	8×10^{-7}	3×10^{-3}
		I	2×10^{-5}	1×10^{-1}	6×10^{-7}	3×10^{-3}
	Y 91	S	4×10^{-8}	8×10^{-4}	1×10^{-9}	3×10^{-5}
		I	3×10^{-8}	8×10^{-4}	1×10^{-9}	3×10^{-5}
	Y 92	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-6}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-6}
	Y 93	S	2×10^{-7}	8×10^{-4}	6×10^{-9}	3×10^{-5}
		I	1×10^{-7}	8×10^{-4}	5×10^{-9}	3×10^{-5}
Zinc (30)	Zn 65	S	1×10^{-7}	3×10^{-3}	4×10^{-9}	1×10^{-6}
		I	6×10^{-8}	5×10^{-3}	2×10^{-9}	2×10^{-6}
	Zn 69m	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-6}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-6}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I		Table II	
			Column 1 Air (μc/ml)	Column 2 Water (μc/ml)	Column 1 Air (μc/ml)	Column 2 Water (μc/ml)
Zinc (30)	Zn 69	S	7×10^{-6}	5×10^{-3}	2×10^{-7}	2×10^{-3}
		I	9×10^{-6}	5×10^{-3}	3×10^{-7}	2×10^{-3}
Zirconium (40)	Zr 93	S	1×10^{-7}	2×10^{-3}	4×10^{-9}	8×10^{-4}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-4}
	Zr 95	S	1×10^{-7}	2×10^{-3}	4×10^{-9}	6×10^{-3}
		I	3×10^{-8}	2×10^{-3}	1×10^{-9}	6×10^{-3}
	Zr 97	S	1×10^{-7}	3×10^{-4}	4×10^{-9}	2×10^{-3}
		I	9×10^{-8}	5×10^{-4}	3×10^{-9}	2×10^{-3}
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours.		Sub	1×10^{-6}		3×10^{-8}	
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours.			3×10^{-9}	9×10^{-3}	1×10^{-10}	3×10^{-4}
Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.			6×10^{-12}	4×10^{-7}	2×10^{-14}	3×10^{-9}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I		Table II	
			Column 1	Column 2	Column 1	Column 2
			Air (μc/ml)	Water (μc/ml)	Air (μc/ml)	Water (μc/ml)
Iodine (53)	I 134	I	3×10^{-6}	2×10^{-3}	1×10^{-7}	6×10^{-4}
	I 135	S	1×10^{-7}	7×10^{-4}	1×10^{-9}	4×10^{-6}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-3}
Iridium (77)	Ir 190	S	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
		I	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-4}
	Ir 192	S	1×10^{-7}	1×10^{-3}	4×10^{-9}	4×10^{-5}
		I	3×10^{-8}	1×10^{-3}	9×10^{-10}	4×10^{-5}
	Ir 194	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	3×10^{-5}
		I	2×10^{-7}	9×10^{-4}	5×10^{-9}	3×10^{-5}
Iron (26)	Fe 55	S	9×10^{-7}	2×10^{-3}	3×10^{-8}	8×10^{-4}
		I	1×10^{-6}	7×10^{-3}	3×10^{-8}	2×10^{-3}
	Fe 59	S	1×10^{-7}	2×10^{-3}	5×10^{-9}	6×10^{-5}
		I	5×10^{-8}	2×10^{-3}	2×10^{-9}	5×10^{-5}
Krypton (36)	Kr 85m	Sub	6×10^{-6}		1×10^{-7}	
	Kr 85	Sub	1×10^{-5}		3×10^{-7}	
	Kr 87	Sub	1×10^{-6}		2×10^{-8}	
	Kr 88	Sub	1×10^{-6}		2×10^{-8}	
Lanthanum (57)	La 140	S	2×10^{-7}	7×10^{-4}	5×10^{-9}	2×10^{-5}
		I	1×10^{-7}	7×10^{-4}	4×10^{-9}	2×10^{-5}
Lead (82)	Pb 203	S	3×10^{-6}	1×10^{-3}	9×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-3}	6×10^{-8}	4×10^{-4}
	Pb 210	S	1×10^{-10}	4×10^{-4}	4×10^{-12}	1×10^{-7}
		I	2×10^{-10}	5×10^{-3}	8×10^{-12}	2×10^{-4}
	Pb 212	S	2×10^{-8}	6×10^{-4}	6×10^{-10}	2×10^{-5}
		I	2×10^{-8}	5×10^{-4}	7×10^{-10}	2×10^{-5}
Lutetium (71)	Lu 177	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Manganese (25)	Mn 52	S	2×10^{-7}	1×10^{-3}	7×10^{-9}	3×10^{-5}
		I	1×10^{-7}	9×10^{-4}	5×10^{-9}	3×10^{-5}
	Mn 54	S	4×10^{-7}	4×10^{-3}	1×10^{-8}	1×10^{-4}
		I	4×10^{-8}	3×10^{-3}	1×10^{-8}	1×10^{-4}
	Mn 56	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Mercury (80)	Hg 197m	S	7×10^{-7}	6×10^{-3}	3×10^{-8}	2×10^{-4}
		I	8×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-4}
	Hg 197	S	1×10^{-6}	9×10^{-3}	4×10^{-8}	3×10^{-4}
		I	3×10^{-6}	1×10^{-2}	9×10^{-8}	5×10^{-4}
	Hg 203	S	7×10^{-8}	5×10^{-4}	2×10^{-9}	2×10^{-5}
		I	1×10^{-7}	3×10^{-3}	4×10^{-9}	1×10^{-4}
Molybdenum (42)	Mo 99	S	7×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-4}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}
Neodymium (60)	Nd 144	S	8×10^{-11}	2×10^{-3}	3×10^{-12}	7×10^{-5}
		I	3×10^{-10}	2×10^{-3}	1×10^{-11}	8×10^{-5}
	Nd 147	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
		I	2×10^{-7}	2×10^{-3}	8×10^{-9}	6×10^{-5}
	Nd 149	S	2×10^{-6}	8×10^{-3}	6×10^{-8}	3×10^{-4}
		I	1×10^{-6}	8×10^{-3}	5×10^{-8}	3×10^{-4}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I		Table II	
			Column 1	Column 2	Column 1	Column 2
			Air (μc/ml)	Water (μc/ml)	Air (μc/ml)	Water (μc/ml)
Neptunium (93)	Np 237	S	4×10^{-12}	9×10^{-3}	1×10^{-13}	3×10^{-4}
		I	1×10^{-10}	9×10^{-4}	4×10^{-12}	3×10^{-5}
	Np 239	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	7×10^{-7}	4×10^{-3}	2×10^{-8}	1×10^{-4}
Nickel (28)	Ni 59	S	5×10^{-7}	6×10^{-3}	2×10^{-8}	2×10^{-4}
		I	8×10^{-7}	6×10^{-3}	3×10^{-8}	2×10^{-4}
	Ni 63	S	6×10^{-8}	8×10^{-4}	2×10^{-9}	3×10^{-5}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-5}
	Ni 65	S	9×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Niobium (Columbium) (41)	Nb 93m	S	1×10^{-7}	1×10^{-3}	4×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	5×10^{-9}	4×10^{-5}
	Nb 95	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	1×10^{-7}	3×10^{-3}	3×10^{-9}	1×10^{-4}
	Nb 97	S	6×10^{-6}	3×10^{-3}	2×10^{-7}	9×10^{-5}
		I	5×10^{-6}	3×10^{-3}	2×10^{-7}	9×10^{-5}
Osmium (76)	Os 185	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	7×10^{-5}
		I	5×10^{-8}	2×10^{-3}	2×10^{-9}	7×10^{-5}
	Os 191m	S	2×10^{-5}	7×10^{-2}	6×10^{-7}	3×10^{-3}
		I	9×10^{-6}	7×10^{-3}	3×10^{-7}	2×10^{-3}
	Os 191	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
		I	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-4}
	Os 193	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
		I	3×10^{-7}	2×10^{-3}	9×10^{-9}	5×10^{-5}
Palladium (46)	Pd 103	S	1×10^{-6}	1×10^{-2}	5×10^{-8}	3×10^{-4}
		I	7×10^{-7}	8×10^{-3}	3×10^{-8}	3×10^{-4}
	Pd 109	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-5}
Phosphorus (15)	P 32	S	7×10^{-8}	5×10^{-4}	2×10^{-9}	2×10^{-5}
		I	8×10^{-8}	7×10^{-4}	3×10^{-9}	2×10^{-5}
Platinum (78)	Pt 191	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
	Pt 193m	S	7×10^{-6}	3×10^{-2}	2×10^{-7}	1×10^{-3}
		I	5×10^{-6}	3×10^{-2}	2×10^{-7}	1×10^{-3}
	Pt 197m	S	6×10^{-6}	3×10^{-2}	2×10^{-7}	1×10^{-3}
		I	5×10^{-6}	3×10^{-2}	2×10^{-7}	9×10^{-4}
	Pt 197	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Plutonium (94)	Pu 238	S	2×10^{-12}	1×10^{-4}	7×10^{-14}	5×10^{-6}
		I	3×10^{-11}	8×10^{-4}	1×10^{-12}	3×10^{-5}
	Pu 239	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	5×10^{-6}
		I	4×10^{-11}	8×10^{-4}	1×10^{-12}	3×10^{-5}
	Pu 240	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	5×10^{-6}
		I	4×10^{-11}	8×10^{-4}	1×10^{-12}	3×10^{-5}
	Pu 241	S	9×10^{-11}	7×10^{-3}	3×10^{-12}	2×10^{-4}
		I	4×10^{-8}	4×10^{-3}	1×10^{-9}	1×10^{-4}
	Pu 242	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	5×10^{-6}
		I	4×10^{-11}	9×10^{-4}	1×10^{-12}	3×10^{-5}
	Pu 243	S	2×10^{-8}	1×10^{-2}	6×10^{-10}	3×10^{-4}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I		Table II	
			Column 1 Air (μc/ml)	Column 2 Water (μc/ml)	Column 1 Air (μc/ml)	Column 2 Water (μc/ml)
Plutonium (94)	Pu 244	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	4×10^{-6}
		I	3×10^{-11}	3×10^{-4}	1×10^{-12}	1×10^{-5}
Polonium (84)	Po 210	S	5×10^{-10}	2×10^{-3}	2×10^{-11}	7×10^{-7}
		I	2×10^{-10}	8×10^{-4}	7×10^{-12}	3×10^{-5}
Potassium (19)	K 42	S	2×10^{-6}	9×10^{-3}	7×10^{-8}	3×10^{-4}
		I	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-5}
Praseodymium (59)	Pr 142	S	2×10^{-7}	9×10^{-4}	7×10^{-9}	3×10^{-5}
		I	2×10^{-7}	9×10^{-4}	5×10^{-9}	3×10^{-5}
	Pr 143	S	3×10^{-7}	1×10^{-3}	1×10^{-8}	5×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	5×10^{-5}
Promethium (61)	Pm 147	S	6×10^{-8}	6×10^{-3}	2×10^{-9}	2×10^{-4}
		I	1×10^{-7}	6×10^{-3}	3×10^{-9}	2×10^{-4}
	Pm 149	S	3×10^{-7}	1×10^{-3}	1×10^{-8}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
Protoactinium (91)	Pa 230	S	2×10^{-9}	7×10^{-3}	6×10^{-11}	2×10^{-4}
		I	8×10^{-10}	7×10^{-3}	3×10^{-11}	2×10^{-4}
	Pa 231	S	1×10^{-12}	3×10^{-3}	4×10^{-14}	9×10^{-7}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	2×10^{-5}
	Pa 233	S	6×10^{-7}	4×10^{-3}	2×10^{-8}	1×10^{-4}
		I	2×10^{-7}	3×10^{-3}	6×10^{-9}	1×10^{-4}
Radium (88)	Ra 223	S	2×10^{-9}	2×10^{-3}	6×10^{-11}	7×10^{-7}
		I	2×10^{-10}	1×10^{-4}	8×10^{-12}	4×10^{-6}
	Ra 224	S	5×10^{-9}	7×10^{-3}	2×10^{-10}	2×10^{-4}
		I	7×10^{-10}	2×10^{-4}	2×10^{-11}	5×10^{-6}
	Ra 226	S	3×10^{-11}	4×10^{-7}	3×10^{-12}	3×10^{-8}
		I	5×10^{-11}	9×10^{-4}	2×10^{-12}	3×10^{-5}
	Ra 228	S	7×10^{-11}	8×10^{-7}	2×10^{-12}	3×10^{-8}
		I	4×10^{-11}	7×10^{-4}	1×10^{-12}	3×10^{-5}
Radon (86)	Rn 220	S	3×10^{-7}		1×10^{-8}	
	Rn 222	S	1×10^{-7}		3×10^{-9}	
Rhenium (75)	Re 183	S	3×10^{-6}	2×10^{-2}	9×10^{-8}	6×10^{-4}
		I	2×10^{-7}	8×10^{-3}	5×10^{-9}	3×10^{-4}
	Re 186	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	5×10^{-5}
	Re 187	S	9×10^{-6}	7×10^{-2}	3×10^{-7}	3×10^{-3}
		I	5×10^{-7}	4×10^{-2}	2×10^{-8}	2×10^{-3}
	Re 188	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
		I	2×10^{-7}	9×10^{-4}	6×10^{-9}	3×10^{-5}
Rhodium (45)	Rh 103m	S	8×10^{-5}	4×10^{-1}	3×10^{-6}	1×10^{-2}
		I	6×10^{-5}	3×10^{-1}	2×10^{-6}	1×10^{-2}
	Rh 105	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Rubidium (37)	Rb 86	S	3×10^{-7}	2×10^{-3}	1×10^{-8}	7×10^{-5}
		I	7×10^{-8}	7×10^{-4}	2×10^{-9}	2×10^{-5}
	Rb 87	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	7×10^{-8}	5×10^{-3}	2×10^{-9}	2×10^{-4}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I		Table II	
			Column 1 Air (μc/ml)	Column 2 Water (μc/ml)	Column 1 Air (μc/ml)	Column 2 Water (μc/ml)
Ruthenium (44)	Ru 97	S	2×10^{-6}	1×10^{-2}	8×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-2}	6×10^{-8}	3×10^{-4}
	Ru 103	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
		I	8×10^{-8}	2×10^{-3}	3×10^{-9}	8×10^{-5}
	Ru 105	S	7×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
	Ru 106	S	8×10^{-8}	4×10^{-4}	3×10^{-9}	1×10^{-5}
		I	6×10^{-8}	3×10^{-4}	2×10^{-10}	1×10^{-5}
Samarium (62)	Sm 147	S	7×10^{-11}	2×10^{-3}	2×10^{-12}	6×10^{-5}
		I	3×10^{-10}	2×10^{-3}	9×10^{-12}	7×10^{-5}
	Sm 151	S	6×10^{-8}	1×10^{-2}	2×10^{-9}	4×10^{-4}
		I	1×10^{-7}	1×10^{-2}	5×10^{-9}	4×10^{-4}
	Sm 153	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
Scandium (21)	Sc 46	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
		I	2×10^{-8}	1×10^{-3}	8×10^{-10}	4×10^{-5}
	Sc 47	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	5×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
	Sc 48	S	2×10^{-7}	8×10^{-4}	6×10^{-9}	3×10^{-5}
		I	1×10^{-7}	8×10^{-4}	5×10^{-9}	3×10^{-5}
Selenium (34)	Se 75	S	1×10^{-6}	9×10^{-3}	4×10^{-8}	3×10^{-4}
		I	1×10^{-7}	8×10^{-3}	4×10^{-9}	3×10^{-4}
Silicon (14)	Si 31	S	6×10^{-6}	3×10^{-2}	2×10^{-7}	9×10^{-4}
		I	1×10^{-6}	6×10^{-3}	3×10^{-8}	2×10^{-4}
Silver (47)	Ag 105	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	8×10^{-8}	3×10^{-3}	3×10^{-9}	1×10^{-4}
	Ag 110m	S	2×10^{-7}	9×10^{-4}	7×10^{-9}	3×10^{-5}
		I	1×10^{-8}	9×10^{-4}	3×10^{-10}	3×10^{-5}
	Ag 111	S	3×10^{-7}	1×10^{-3}	1×10^{-8}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
Sodium (11)	Na 22	S	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
		I	9×10^{-9}	9×10^{-4}	3×10^{-10}	3×10^{-5}
	Na 24	S	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
		I	1×10^{-7}	8×10^{-4}	5×10^{-9}	3×10^{-5}
Strontium (38)	Sr 85m	S	4×10^{-5}	2×10^{-1}	1×10^{-6}	7×10^{-3}
		I	3×10^{-5}	2×10^{-1}	1×10^{-6}	7×10^{-3}
	Sr 85	S	2×10^{-7}	3×10^{-3}	8×10^{-9}	1×10^{-4}
		I	1×10^{-7}	5×10^{-3}	4×10^{-9}	2×10^{-4}
	Sr 89	S	3×10^{-8}	3×10^{-4}	3×10^{-10}	3×10^{-6}
		I	4×10^{-8}	8×10^{-4}	1×10^{-9}	3×10^{-5}
	Sr 90	S	1×10^{-9}	1×10^{-5}	3×10^{-11}	3×10^{-7}
		I	5×10^{-9}	1×10^{-5}	2×10^{-10}	4×10^{-5}
	Sr 91	S	4×10^{-7}	2×10^{-3}	2×10^{-8}	7×10^{-5}
		I	3×10^{-7}	1×10^{-3}	9×10^{-9}	5×10^{-5}
	Sr 92	S	4×10^{-7}	2×10^{-3}	2×10^{-8}	7×10^{-5}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
Sulfur (16)	S 35	S	3×10^{-7}	2×10^{-3}	9×10^{-9}	6×10^{-5}
		I	3×10^{-7}	8×10^{-3}	9×10^{-9}	3×10^{-4}
Tantalum (73)	Ta 182	S	4×10^{-8}	1×10^{-3}	1×10^{-9}	4×10^{-5}

APPENDIX B

Concentrations in Air and Water Above Natural Background

(See notes at end of appendix)

Element (atomic number)	Isotope		Table I		Table II	
			Column 1 Air (μc/ml)	Column 2 Water (μc/ml)	Column 1 Air (μc/ml)	Column 2 Water (μc/ml)
Actinium (89)	Ac 227	S	2×10^{-12}	6×10^{-3}	8×10^{-14}	2×10^{-4}
		I	3×10^{-11}	9×10^{-3}	9×10^{-13}	3×10^{-4}
	Ac 228	S	8×10^{-8}	3×10^{-3}	3×10^{-9}	9×10^{-5}
		I	2×10^{-8}	3×10^{-3}	6×10^{-10}	9×10^{-5}
Americium (95)	Am 241	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	2×10^{-5}
	Am 242m	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	3×10^{-10}	3×10^{-3}	9×10^{-12}	9×10^{-5}
	Am 242	S	4×10^{-8}	4×10^{-3}	1×10^{-9}	1×10^{-4}
		I	5×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Am 243	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	Am 244	S	4×10^{-6}	1×10^{-1}	1×10^{-7}	5×10^{-3}
		I	2×10^{-5}	1×10^{-1}	8×10^{-7}	5×10^{-3}
Antimony (51)	Sb 122	S	2×10^{-7}	8×10^{-4}	6×10^{-9}	3×10^{-5}
		I	1×10^{-7}	8×10^{-4}	5×10^{-9}	3×10^{-5}
	Sb 124	S	2×10^{-7}	7×10^{-4}	5×10^{-9}	2×10^{-5}
		I	2×10^{-8}	7×10^{-4}	7×10^{-10}	2×10^{-5}
	Sb 125	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	2×10^{-8}	3×10^{-3}	9×10^{-10}	1×10^{-4}
Argon (18)	A 37	Sub[2]	6×10^{-3}	.....	1×10^{-4}	.....
	A 41	Sub	2×10^{-6}	.....	4×10^{-8}	.....
Arsenic (33)	As 73	S	2×10^{-6}	1×10^{-2}	7×10^{-8}	5×10^{-4}
		I	4×10^{-7}	1×10^{-2}	1×10^{-8}	5×10^{-4}
	As 74	S	3×10^{-7}	2×10^{-3}	1×10^{-9}	5×10^{-5}
		I	1×10^{-7}	2×10^{-3}	4×10^{-9}	5×10^{-5}
	As 76	S	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-5}
		I	1×10^{-7}	6×10^{-4}	3×10^{-9}	2×10^{-5}
	As 77	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
Astatine (85)	At 211	S	7×10^{-9}	3×10^{-3}	2×10^{-10}	2×10^{-4}
		I	3×10^{-8}	2×10^{-3}	1×10^{-9}	7×10^{-5}
Barium (56)	Ba 131	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
		I	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-4}
	Ba 140	S	1×10^{-7}	8×10^{-4}	4×10^{-9}	3×10^{-5}
		I	4×10^{-8}	7×10^{-4}	1×10^{-9}	2×10^{-5}
Berkelium (97)	Bk 249	S	9×10^{-10}	2×10^{-2}	3×10^{-11}	6×10^{-4}
		I	1×10^{-7}	2×10^{-2}	4×10^{-9}	6×10^{-4}
	Bk 250	S	1×10^{-7}	6×10^{-3}	5×10^{-9}	2×10^{-4}
		I	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
Beryllium (4)	Be 7	S	6×10^{-6}	5×10^{-2}	2×10^{-7}	2×10^{-3}
		I	1×10^{-6}	5×10^{-2}	4×10^{-8}	2×10^{-3}
Bismuth (83)	Bi 206	S	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
		I	1×10^{-7}	1×10^{-3}	5×10^{-9}	4×10^{-5}
	Bi 207	S	2×10^{-7}	2×10^{-3}	6×10^{-9}	6×10^{-5}
		I	1×10^{-8}	2×10^{-3}	5×10^{-10}	6×10^{-5}
	Bi 210	S	6×10^{-9}	1×10^{-3}	2×10^{-10}	4×10^{-5}
		I	6×10^{-9}	1×10^{-3}	2×10^{-10}	4×10^{-5}
	Bi 212	S	1×10^{-7}	1×10^{-3}	3×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope[1]		Table I		Table II	
			Column 1 Air (μc/ml)	Column 2 Water (μc/ml)	Column 1 Air (μc/ml)	Column 2 Water (μc/ml)
Bromine (35)	Br 82	S	1×10^{-6}	8×10^{-3}	4×10^{-8}	3×10^{-4}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
Cadmium (48)	Cd 109	S	5×10^{-8}	5×10^{-3}	2×10^{-9}	2×10^{-4}
		I	2×10^{-8}	5×10^{-3}	3×10^{-9}	2×10^{-4}
	Cd 115m	S	4×10^{-8}	7×10^{-4}	1×10^{-9}	3×10^{-5}
		I	4×10^{-8}	7×10^{-4}	1×10^{-9}	3×10^{-5}
	Cd 115	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	3×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
Calcium (20)	Ca 45	S	3×10^{-8}	3×10^{-4}	1×10^{-9}	9×10^{-6}
		I	1×10^{-7}	5×10^{-3}	4×10^{-9}	2×10^{-4}
	Ca 47	S	2×10^{-7}	1×10^{-3}	6×10^{-9}	5×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	3×10^{-5}
Californium (98)	Cf 249	S	2×10^{-12}	1×10^{-4}	5×10^{-14}	4×10^{-6}
		I	1×10^{-10}	7×10^{-4}	3×10^{-12}	2×10^{-5}
	Cf 250	S	5×10^{-12}	4×10^{-4}	2×10^{-13}	1×10^{-5}
		I	1×10^{-10}	7×10^{-4}	3×10^{-12}	2×10^{-5}
	Cf 251	S	2×10^{-12}	1×10^{-4}	6×10^{-14}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	3×10^{-12}	3×10^{-5}
	Cf 252	S	2×10^{-11}	7×10^{-4}	7×10^{-13}	2×10^{-5}
		I	1×10^{-10}	7×10^{-4}	4×10^{-12}	2×10^{-5}
	Cf 253	S	8×10^{-10}	4×10^{-2}	3×10^{-11}	1×10^{-4}
		I	6×10^{-10}	4×10^{-2}	3×10^{-11}	1×10^{-4}
	Cf 254	S	5×10^{-12}	4×10^{-4}	2×10^{-13}	1×10^{-6}
		I	5×10^{-12}	4×10^{-4}	2×10^{-13}	1×10^{-6}
Carbon (6)	C 14	S	4×10^{-6}	2×10^{-2}	1×10^{-7}	8×10^{-4}
	(CO_2)	Sub	5×10^{-5}		1×10^{-6}	
Cerium (58)	Ce 141	S	4×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	2×10^{-7}	3×10^{-3}	5×10^{-9}	9×10^{-5}
	Ce 143	S	3×10^{-7}	1×10^{-3}	9×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}
	Ce 144	S	1×10^{-8}	3×10^{-4}	3×10^{-10}	1×10^{-5}
		I	6×10^{-9}	3×10^{-4}	2×10^{-10}	1×10^{-5}
Cesium (55)	Cs 131	S	1×10^{-5}	7×10^{-2}	4×10^{-7}	2×10^{-3}
		I	3×10^{-6}	3×10^{-2}	1×10^{-7}	9×10^{-4}
	Cs 134m	S	4×10^{-5}	2×10^{-1}	1×10^{-6}	6×10^{-3}
		I	6×10^{-6}	3×10^{-2}	2×10^{-7}	1×10^{-3}
	Cs 134	S	4×10^{-8}	3×10^{-4}	1×10^{-9}	9×10^{-6}
		I	1×10^{-8}	3×10^{-4}	4×10^{-10}	4×10^{-6}
	Cs 135	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	9×10^{-8}	7×10^{-3}	3×10^{-9}	2×10^{-4}
	Cs 136	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	9×10^{-5}
		I	2×10^{-7}	2×10^{-3}	6×10^{-9}	6×10^{-5}
	Cs 137	S	6×10^{-8}	4×10^{-4}	2×10^{-9}	2×10^{-5}
		I	1×10^{-8}	1×10^{-3}	5×10^{-10}	4×10^{-5}
Chlorine (17)	Cl 36	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
		I	2×10^{-6}	2×10^{-3}	8×10^{-10}	6×10^{-5}
	Cl 38	S	3×10^{-6}	1×10^{-2}	9×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-2}	7×10^{-8}	4×10^{-4}
Chromium (24)	Cr 51	S	1×10^{-5}	5×10^{-2}	4×10^{-7}	2×10^{-3}
		I	2×10^{-6}	5×10^{-2}	8×10^{-8}	2×10^{-3}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I Column 1 Air (μc/ml)	Table I Column 2 Water (μc/ml)	Table II Column 1 Air (μc/ml)	Table II Column 2 Water (μc/ml)
Cobalt (27)	Co 57	S	3×10^{-6}	2×10^{-2}	1×10^{-7}	5×10^{-4}
		I	2×10^{-7}	1×10^{-2}	6×10^{-9}	4×10^{-4}
	Co 58m	S	2×10^{-5}	8×10^{-2}	6×10^{-7}	3×10^{-3}
		I	9×10^{-6}	6×10^{-2}	3×10^{-7}	2×10^{-3}
	Co 58	S	8×10^{-7}	4×10^{-3}	3×10^{-8}	1×10^{-4}
		I	5×10^{-6}	3×10^{-3}	2×10^{-9}	9×10^{-5}
	Co 60	S	3×10^{-7}	1×10^{-3}	1×10^{-8}	5×10^{-5}
		I	9×10^{-9}	1×10^{-3}	3×10^{-10}	3×10^{-5}
Copper (29)	Cu 64	S	2×10^{-6}	1×10^{-2}	7×10^{-8}	3×10^{-4}
		I	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
Curium (96)	Cm 242	S	1×10^{-10}	7×10^{-4}	4×10^{-12}	2×10^{-5}
		I	2×10^{-10}	7×10^{-4}	6×10^{-12}	3×10^{-5}
	Cm 243	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	5×10^{-6}
		I	1×10^{-10}	7×10^{-4}	3×10^{-12}	2×10^{-5}
	Cm 244	S	9×10^{-12}	2×10^{-4}	3×10^{-13}	7×10^{-6}
		I	1×10^{-10}	8×10^{-4}	3×10^{-12}	3×10^{-5}
	Cm 245	S	5×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	Cm 246	S	5×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	Cm 247	S	5×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
		I	1×10^{-10}	6×10^{-4}	4×10^{-12}	2×10^{-5}
	Cm 248	S	6×10^{-13}	1×10^{-5}	2×10^{-14}	4×10^{-7}
		I	1×10^{-11}	4×10^{-5}	4×10^{-13}	1×10^{-6}
	Cm 249	S	1×10^{-3}	6×10^{-2}	4×10^{-7}	2×10^{-3}
		I	1×10^{-3}	6×10^{-2}	4×10^{-7}	2×10^{-3}
Dysprosium (66)	Dy 165	S	3×10^{-6}	1×10^{-2}	9×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-2}	7×10^{-8}	4×10^{-4}
	Dy 166	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}
Einsteinium (99)	Es 253	S	8×10^{-10}	7×10^{-4}	3×10^{-11}	2×10^{-5}
		I	6×10^{-10}	7×10^{-4}	2×10^{-11}	2×10^{-5}
	Es 254m	S	5×10^{-9}	3×10^{-4}	2×10^{-10}	2×10^{-5}
		I	6×10^{-9}	5×10^{-4}	2×10^{-10}	2×10^{-5}
	Es 254	S	2×10^{-11}	4×10^{-4}	6×10^{-13}	1×10^{-5}
		I	1×10^{-10}	4×10^{-4}	4×10^{-12}	1×10^{-5}
	Es 255	S	5×10^{-10}	8×10^{-4}	2×10^{-11}	3×10^{-5}
		I	4×10^{-10}	8×10^{-4}	1×10^{-11}	3×10^{-5}
Erbium (68)	Er 169	S	6×10^{-7}	3×10^{-3}	2×10^{-8}	9×10^{-5}
		I	4×10^{-7}	3×10^{-3}	1×10^{-8}	9×10^{-5}
	Er 171	S	7×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
		I	6×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
Europium (63)	Eu 152	S	4×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
	(T/2 = 9.2 hrs)	I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
	Eu 152	S	1×10^{-8}	2×10^{-3}	4×10^{-10}	8×10^{-5}
	(T/2 = 13 yrs)	I	2×10^{-8}	2×10^{-3}	6×10^{-10}	8×10^{-5}
	Eu 154	S	4×10^{-9}	6×10^{-4}	1×10^{-10}	2×10^{-5}
		I	7×10^{-9}	6×10^{-4}	2×10^{-10}	2×10^{-5}
	Eu 155	S	9×10^{-8}	6×10^{-3}	3×10^{-9}	2×10^{-4}
		I	7×10^{-8}	6×10^{-3}	3×10^{-9}	2×10^{-4}

APPENDIX B

Concentrations in Air and Water Above Natural Background—Continued

(See notes at end of appendix)

Element (atomic number)	Isotope [1]		Table I Column 1 Air (μc/ml)	Table I Column 2 Water (μc/ml)	Table II Column 1 Air (μc/ml)	Table II Column 2 Water (μc/ml)
Fermium (100)	Fm 254	S	6×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
		I	7×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Fm 255	S	2×10^{-8}	1×10^{-3}	6×10^{-10}	3×10^{-5}
		I	1×10^{-8}	1×10^{-3}	4×10^{-10}	3×10^{-5}
	Fm 256	S	3×10^{-9}	3×10^{-3}	1×10^{-10}	9×10^{-5}
		I	2×10^{-9}	3×10^{-3}	6×10^{-11}	9×10^{-5}
Fluorine (9)	F 18	S	5×10^{-6}	2×10^{-3}	2×10^{-7}	8×10^{-5}
		I	3×10^{-6}	1×10^{-3}	9×10^{-8}	5×10^{-5}
Gadolinium (64)	Gd 153	S	2×10^{-7}	6×10^{-3}	8×10^{-9}	2×10^{-4}
		I	9×10^{-8}	6×10^{-3}	3×10^{-9}	2×10^{-4}
	Gd 159	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
		I	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
Gallium (31)	Ga 72	S	2×10^{-7}	1×10^{-3}	8×10^{-9}	4×10^{-5}
		I	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
Germanium (32)	Ge 71	S	1×10^{-5}	5×10^{-2}	4×10^{-7}	2×10^{-3}
		I	6×10^{-6}	5×10^{-2}	2×10^{-7}	2×10^{-3}
Gold (79)	Au 196	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
		I	6×10^{-7}	4×10^{-3}	2×10^{-8}	1×10^{-4}
	Au 198	S	3×10^{-7}	2×10^{-3}	1×10^{-8}	5×10^{-5}
		I	2×10^{-7}	1×10^{-3}	8×10^{-9}	5×10^{-5}
	Au 199	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
		I	8×10^{-7}	4×10^{-3}	3×10^{-8}	2×10^{-4}
Hafnium (72)	Hf 181	S	4×10^{-8}	2×10^{-3}	1×10^{-9}	7×10^{-5}
		I	7×10^{-8}	2×10^{-3}	3×10^{-9}	7×10^{-5}
Holmium (67)	Ho 166	S	2×10^{-7}	9×10^{-4}	7×10^{-9}	3×10^{-5}
		I	2×10^{-7}	9×10^{-4}	6×10^{-9}	3×10^{-5}
Hydrogen (1)	H3	S	5×10^{-6}	1×10^{-1}	2×10^{-7}	3×10^{-3}
		I	5×10^{-6}	1×10^{-1}	2×10^{-7}	3×10^{-3}
		Sub	2×10^{-3}		4×10^{-5}	
Indium (49)	In 113m	S	8×10^{-6}	4×10^{-3}	3×10^{-7}	1×10^{-3}
		I	7×10^{-6}	4×10^{-3}	2×10^{-7}	1×10^{-3}
	In 114m	S	1×10^{-7}	5×10^{-4}	4×10^{-9}	2×10^{-5}
		I	2×10^{-8}	5×10^{-4}	7×10^{-10}	2×10^{-5}
	In 115m	S	2×10^{-6}	1×10^{-2}	8×10^{-8}	4×10^{-4}
		I	2×10^{-6}	1×10^{-2}	6×10^{-8}	4×10^{-4}
	In 115	S	2×10^{-7}	3×10^{-3}	9×10^{-9}	9×10^{-5}
		I	3×10^{-8}	3×10^{-3}	1×10^{-9}	9×10^{-5}
Iodine (53)	I 125	S	5×10^{-9}	4×10^{-3}	8×10^{-11}	2×10^{-4}
		I	2×10^{-7}	6×10^{-3}	6×10^{-9}	2×10^{-4}
	I 126	S	8×10^{-9}	5×10^{-3}	9×10^{-11}	3×10^{-7}
		I	3×10^{-7}	3×10^{-3}	1×10^{-8}	9×10^{-5}
	I 129	S	2×10^{-9}	1×10^{-3}	2×10^{-11}	6×10^{-8}
		I	7×10^{-8}	6×10^{-3}	2×10^{-9}	2×10^{-4}
	I 131	S	9×10^{-9}	6×10^{-3}	1×10^{-10}	3×10^{-7}
		I	3×10^{-7}	2×10^{-3}	1×10^{-8}	6×10^{-5}
	I 132	S	2×10^{-7}	2×10^{-3}	3×10^{-9}	8×10^{-6}
		I	9×10^{-7}	5×10^{-3}	3×10^{-8}	2×10^{-4}
	I 133	S	3×10^{-8}	2×10^{-4}	4×10^{-10}	1×10^{-6}
		I	2×10^{-7}	1×10^{-3}	7×10^{-9}	4×10^{-5}
	I 134	S	5×10^{-7}	4×10^{-3}	6×10^{-9}	2×10^{-4}

*¹ Soluble (S); Insoluble (I).

† "Sub" means that values given are for submersion in a semispherical infinite cloud of airborne material.

NOTE: In any case where there is a mixture in air or water of more than one radionuclide, the limiting values for purposes of this Appendix should be determined as follows:

1. If the identity and concentration of each radionuclide in the mixture are known, the limiting values should be derived as follows: Determine, for each radionuclide in the mixture, the ratio between the quantity present in the mixture and the limit otherwise established in Appendix B for the specific radionuclide when not in a mixture. The sum of such ratios for all the radionuclides in the mixture may not exceed "1" (i.e., "unity").

EXAMPLE: If radionuclides A, B, and C are present in concentrations C_A, C_B, and C_C, and if the applicable MPC's are MPC_A, and MPC_B, and MPC_C, respectively, then the concentrations shall be limited so that the following relationship exists:

$$\frac{C_A}{MPC_A}+\frac{C_B}{MPC_B}+\frac{C_C}{MPC_C}\leq 1$$

*2. If either the identity or the concentration of any radionuclide in the mixture is not known, the limiting values for purposes of Appendix B shall be:

a. For purposes of Table I, Col. 1—6×10^{-13}
b. For purposes of Table I, Col. 2—4×10^{-7}
c. For purposes of Table II, Col. 1—2×10^{-11}
d. For purposes of Table II, Col. 2—3×10^{-6}

3. If any of the conditions specified below are met, the corresponding values specified below may be used in lieu of those specified in paragraph 2 above.

a. If the identity of each radionuclide in the mixture is known but the concentration of one or more of the radionuclides in the mixture is not known, the concentration limit for the mixture is the limit specified in Appendix "B" for the radionuclide in the mixture having the lowest concentration limit; or

b. If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in Appendix "B" are not present in the mixture, the concentration limit for the mixture is the lowest concentration limit specified in Appendix "B" for any radionuclide which is not known to be absent from the mixture; or

26 FR 11046

4. If the mixture of radionuclides consists of uranium and its daughter products in ore dust prior to chemical processing of the uranium ore, the values specified below may be used in lieu of those determined in accordance with paragraph 1 above or those specified in paragraphs 2 and 3 above.

25 FR 13952

a. For purposes of Table I, Col. 1—1×10^{-10} μc/ml gross alpha activity; or 2.5×10^{-11} μc/ml natural uranium; or 75 micrograms per cubic meter of air natural uranium.

b. For purposes of Table II, Col. 1—3×10^{-12} μc/ml gross alpha activity; or 8×10^{-13} μc/ml natural uranium; or 3 micrograms per cubic meter of air natural uranium.

26 FR 11046

5. For purposes of this note, a radionuclide may be considered as not present in a mixture if (a) the ratio of the concentration of that radionuclide in the mixture (C_A) to the concentration limit for that radionuclide specified in Table II of Appendix "B" (MPC_A) does not exceed $1/10$ $\left(\text{i.e. } \frac{C_A}{MPC_A}\leq\frac{1}{10}\right)$, and (b) the sum of such ratios for all the radionuclides considered as not present in the mixture does not exceed ½, i.e.

$$\frac{C_A}{MPC_A}+\frac{C_B}{MPC_B}+\ldots\ldots\leq\tfrac{1}{2}).$$

30 FR 15801

c. Element (atomic number) and isotope	Table I		Table II	
	Column 1 Air (μc/ml)	Column 2 Water (μc/ml)	Column 1 Air (μc/ml)	Column 2 Water (μc/ml)
If it is known that Sr 90, I 125, I 126, I 129, I 131, (I 133, table II only), Pb 210, Po 210, At 211, Ra 223, Ra 224, Ra 226, Ac 227, Ra 228, Th 230, Pa 231, Th 232, Th-nat, Cm 248, Cf 254, and Fm 256 are not present	----------	9×10^{-9}	----------	3×10^{-6}
If it is known that Sr 90, I 125, I 126, I 129, (I 131, I 133, table II only), Pb 210, Po 210, Ra 223, Ra 226, Ra 228, Pa 231, Th-nat, Cm 248, Cf 254, and Fm 256 are not present	----------	6×10^{-8}	----------	2×10^{-6}
If it is known that Sr 90, I 129, (I 125, I 126, I 131, table II only), Pb 210, Ra 226, Ra 228, Cm 248, and Cf 254 are not present	----------	2×10^{-8}	----------	6×10^{-7}
If it is known that (I 129, table II only), Ra 226, and Ra 228 are not present	----------	3×10^{-6}	----------	1×10^{-7}
If it is known that alpha-emitters and Sr 90, I 129, Pb 210, Ac 227, Ra 228, Pa 230, Pu 240, and Bk 249 are not present	3×10^{-9}	----------	1×10^{-10}	----------
If it is known that alpha-emitters and Pb 210, Ac 227, Ra 228, and Pu 241 are not present	3×10^{-10}	----------	1×10^{-11}	----------
If it is known that alpha-emitters and Ac 227 are not present	3×10^{-11}	----------	1×10^{-12}	----------
If it is known that Ac 227, Th 230, Pa 231, Pu 238, Pu 239, Pu 240, Pu 242, Pu 244, Cm 248, Cf 249 and Cf 251 are not present	3×10^{-12}	----------	1×10^{-13}	----------

*Revised 30 FR 15801.

**ERRATUM: This line should read: "210, Ac 227, Ra 228, Pa 230, Pu 241, and Bk 249 are not".

NORTHPORT VA MEDICAL CENTER
APPLICATION FOR RADIOACTIVE MATERIAL AUTHORIZATION

INSTRUCTIONS - Complete RSO Form No. 1 (and No. 2 if this is an initial application). If application is for renewal or amendment of a license, complete Items 1 through 10 and indicate new information or changes in the program as requested on RSO Form No. 2. Use reverse side of this form if necessary. Mail two copies to: RADIATION SAFETY OFFICE

1. Name of individual user:	2. Room, Building, and Telephone:
3. Department to use Radioactive Material:	4. Previous Authorization Number(s). (If this is an application for renewal or amendment of a license, please indicate and give number).
5. Radioactive Material (Element and mass number of each)	6. Chemical and/or Physical Form and Maximum Number of millicuries of each chemical and/or physical form that you will possess at any one time.

Describe purpose for which Radioactive Material will be used. Include estimate of maximum amount to be used in any single procedure. If material is for human use RSO Form No. 3 must be completed in lieu of this item.

8. Plan for Personnel Monitoring and Radiation Protection:

9. Plan for Disposing of Radioactive Wastes:

For Use by Radiation Control Unit Date Received Conditional Approval Committee Approval	10. Signature of Applicant: Date: Signature of Departmental Chairman: Date:

RSO FORM NO. 1

TRAINING AND EXPERIENCE OF INDIVIDUAL USER

11. Type of Training	Where Trained	Duration of Training	On The Job (Circle)	Formal Course (Circle)
A. Principles and Practices of Radiation Protection			Yes No	Yes No
B. Radioactivity Measurement Techniques and Instruments			Yes No	Yes No
C. Mathematics Basic to Measurement of Radioactivity			Yes No	Yes No
D. Biological Effects of Radiation			Yes No	Yes No

12. Experience With Radioisotopes: (Actual use or equivalent experience)

Isotope	Maximum Amount	Where Experience was Gained	Duration of Experience	Type of Use

DESCRIPTION OF EQUIPMENT AND FACILITIES

13. Radiation Detection Instruments: (Use supplemental sheets if necessary)

Type of Instruments	Number Available	Radiation Detected	Sensitivity Range	Window Thickness (mg/cm^2)	Use Monitoring, Surveying, Measuring

14. Method, Frequency, and Standards used in Calibrating Instruments Listed Above:

15. Describe Laboratory Facilities and Remote Handling Equipment Storage Containers, Shielding, Fume Hoods, etc. Provide Explanatory Sketch of Facility on Reverse Side.

THE NORTHPORT VA MEDICAL CENTER PROPOSAL

FOR THE USE OF RADIOACTIVE MATERIALS IN HUMAN PATIENTS

Send completed form and a copy of research protocol to Secretary, Committee on Radiation Safety, Nuclear Medicine Service.

1. Total number of subjects to be studied: _____
   Subjects to be studied include:
   a) Normals or controls # _____ Age Range _____
   b) Methods of selection:

   c) Persons with manifest disease # _____ Age Range _____
      Nature of Pathology:
      Method of Selection:

   d) Will any subjects be under 18 years of age? _____Yes _____No
   e) Will pregnant women be included in this study? _____Yes _____No

2. Radiation absorbed dose from x-ray or other procedures that are part of the research study.

3. Radionuclide
   a) Radionuclide administered:_____
   b) Chemical and physical form:_____
   c) Pharmacology dose:
      i) Active ingredients:

      ii) Maximum amount administered per study:
      _____millicuries _____microcuries
   d) Number of times study will be repeated:
   e) Route of administration:
   f) Expected fate of radioactive material in body:

   g) Expected effect on body (therapeutic only):

   h) Half-life of radionuclide:
   i) Biological half-time of radioactive material in form used:

   j) Radiation absorbed dose (Include literature reference of supply data on which dose estimates are based):
      Whole body: _____rads. Critical organs: _____rads. (Specify organs)

   k) Complementary drugs used? _____Yes _____No Indicate which:

4. Study will be completed by (give date): _____ _____

5. Is this study covered by an investigational new drug application? ____Yes ____No
   If yes, give I.N.D.# _____

6. Supplier of radiopharmaceutical: _____

7. Maximum activity you propose to have on hand at any one time:
   _____ millicuries

8. Method of disposal of radioactive wastes:

9. How will radioactive material be assayed for quantity and quality?

10. Will material be supplied to you in sterile form? ____Yes ____No
    Will material be supplied to you in apyrogenic form? ____Yes ____No

    If no to either of the above, indicate the method for insuring sterility and apyrogenicity:

11. Professional staff who will be working on this project in addition to the authorized user include:

Name	Degree	Rank	Cite Experience with Radioactive Materials

12. I am licensed to practice medicine/dentistry in _____
    (give states) effective _____ until _____.

13. I agree to abide by the regulations promulgated by the Northport VA Medical Center Committee on Radiation Safety and Radioactive Drug Research. Further, I agree to supply any data required by the Food and Drug Administration concerning this research project.

_____
Signature

_____
Date

HAZARD WARNING SIGNS

D.1 Purpose

This guide describes signs and sets forth the conditions under which the signs are to be posted. It is important that all employees and visitors comply with the policy for entering areas where these signs have been posted.

D.2 Policy

It is the responsibility of the investigator to determine the need for the warning and to contact the Radiation Safety Officer to determine the level of hazard in the area. The Radiation Safety Officer will maintain records of all areas posted.

The text accompanying Exhibits 1-4 specifies the conditions under which hazard warning signs will be posted.

D.3 Availability

The Radiation Safety Office will maintain the supply of warning signs.

CAUTION

RADIATION AREA

The sign illustrated in Exhibit 1 shall be posted in any area, accessible to personnel, in which there exists radiation at such levels that a portion of the body could receive in any one hour a dose in excess of 5 millirem, or in any 5 consecutive days a dose in excess of 100 millirems.

Only persons who work in this area and patients may enter when this sign is posted. All personnel should wear or carry personnel monitoring equipment.

DAY

During the working day, service personnel such as housekeepers, engineers, repair crews, etc., shall not enter unless accompanied by the investigator or supervisor in charge of the area. Mechanical failures in such an area will be left alone until the investigators named on the sign have verified that the area can be safely entered.

NIGHT

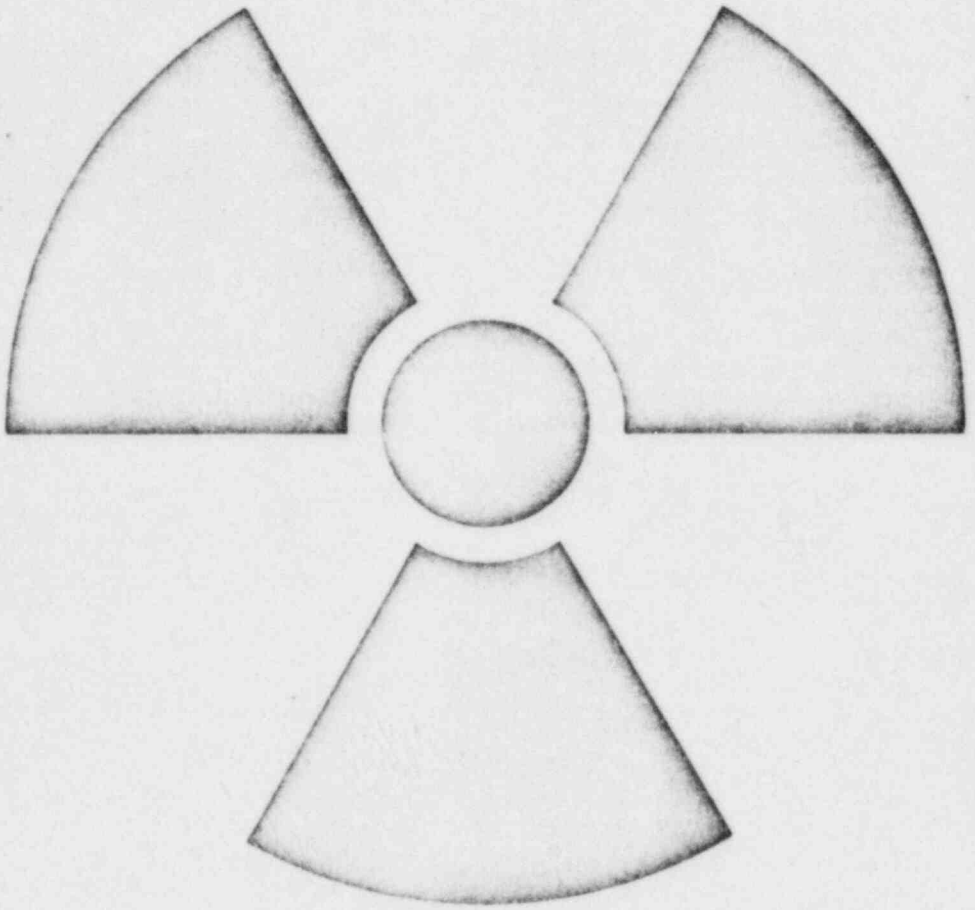
At the end of each working day the area shall be secured. Radioactive materials shall be shielded, if necessary, and stored in properly posted cabinets, refrigerators, etc., table tops, trays and equipment shall be decontaminated; radioactive glassware and equipment for cleaning shall be in pans and radioactive waste should be in labeled disposal cans or barrels. All hazards sources shall have been contained for the night. Housekeeping and facilities maintenance procedures, restricted during the working day, may be performed at night.

Emergency crews, fire brigade, firemen may respond to fires, floods and other emergencies in the area. Equipment posted with this CAUTION - RADIATION AREA sign shall be left alone, except to disconnect external sources of electrical power, gas or water until the investigators named on the sign or the Radiation Safety Officer are present to determine the safety of further emergency procedures.

Failure to observe this sign may result in exposure to extremely hazardous radiation and can also result in disciplinary action.

This CAUTION - RADIATION AREA sign shall be removed when the hazard no longer exists.

CAUTION



RADIATION AREA

09-547 NUCLEAR ASSOCIATES, Inc. • CARLE PLACE, N.Y. PRINTED IN U.S.A.

EXHIBIT 1

CAUTION

HIGH RADIATION AREA

The sign illustrated in Exhibit 2 shall be posted in any area, accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem.

Only persons who work in this area and patients may enter when this sign is posted. All personnel should wear or carry personnel monitoring equipment.

DAY

During the working day, service personnel such as housekeepers, engineers, repair crews, etc., shall not enter unless accompanied by the investigator or supervisor in charge of the area. Mechanical failures in such an area will be left alone until the investigators named on the sign have verified that the area can be safely entered.

NIGHT

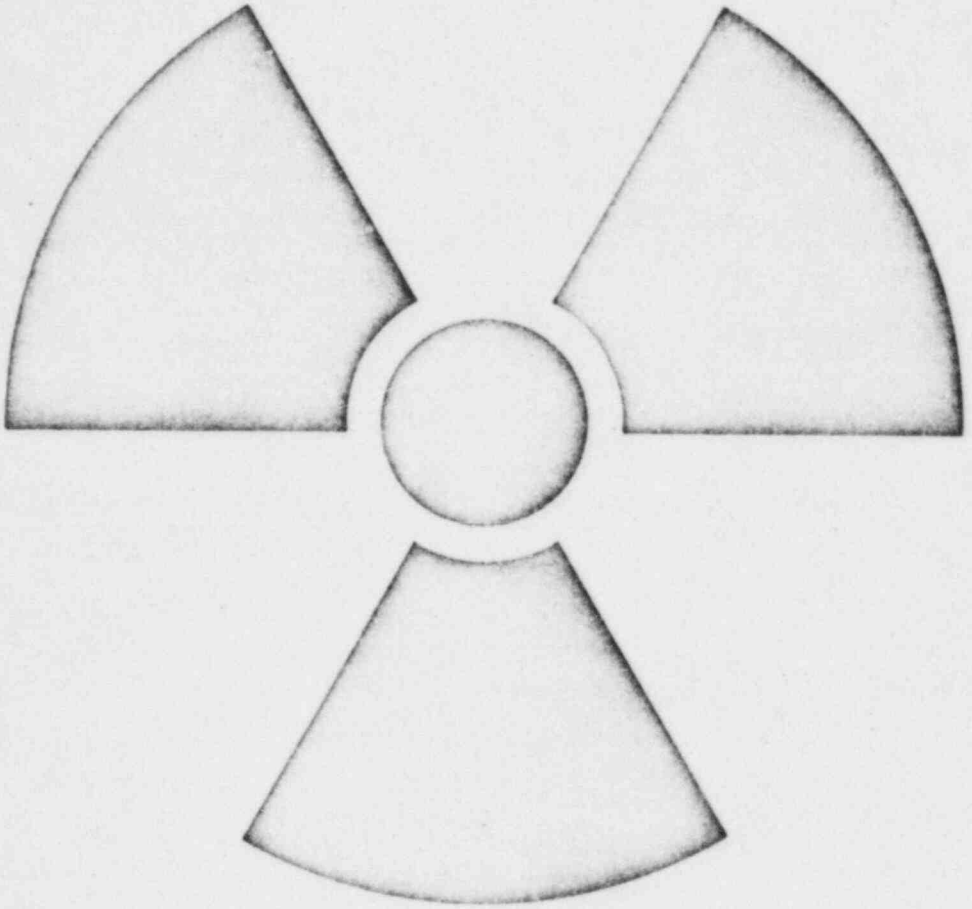
At the end of the working day the area shall be "secured" as described for Exhibit 1. All hazard sources shall have been contained. Housekeeping and facilities maintenance procedures, restricted during the working day, may be performed at night.

Emergency crews, fire brigade, firemen may respond to fires, floods and other emergencies in the area. Equipment posted with this CAUTION - HIGH RADIATION AREA sign shall be left alone, except to disconnect external sources of electrical power, gas or water until the investigators named on the sign or Radiation Safety Officer are present to determine the safety of further emergency procedures.

Failure to observe this sign may result in exposure to extremely hazardous radiation and can result in disciplinary action.

This CAUTION - HIGH RADIATION AREA sign shall be removed when the hazard no longer exists.

CAUTION



RADIATION AREA

HIGH ACTIVITY

EXHIBIT 2

CAUTION

RADIOACTIVE MATERIAL

The sign illustrated in Exhibit 3 shall be posted on the doors of each area or room in which radioactive material is used or stored and which contain radioactive materials. A smaller version (Exhibit 4) shall be posted on all refrigerators or cabinets in which radioactive materials are stored. All posted areas shall be registered with the Radiation Safety Officer.

The requirement for personnel monitoring equipment (film badges, pocket dosimeters, film rings, etc.) shall be determined by the Radiation Safety Officer who will supply the monitoring equipment and maintain the records of individual exposure to radiation.

DAY

Visits in these areas are prohibited unless the visitor has permission from the investigator, supervisor, or administrator in charge, who will be responsible for the safety of the visitor while he is in the area.

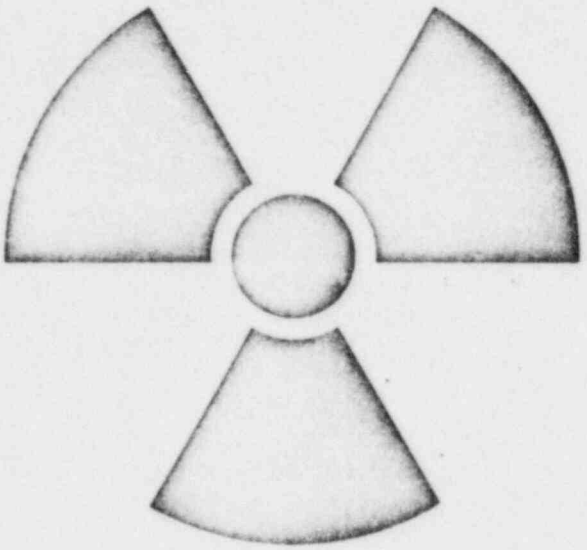
Housekeepers must receive work instructions which include specific procedures and precautions.

Maintenance personnel should contact the principal investigator or laboratory supervisor for clearance before working in the area.

NIGHT

Normally, each laboratory shall be "secured" at the end of each work day. Radioactive materials shall be shielded, if necessary, and stored in properly posted cabinets, refrigerators, etc.; table tops, trays and equipment shall be decontaminated; radioactive glassware and equipment for cleaning shall be in pans and radioactive waste should be in labeled disposal cans or barrels. All hazards sources shall have been contained for the night.

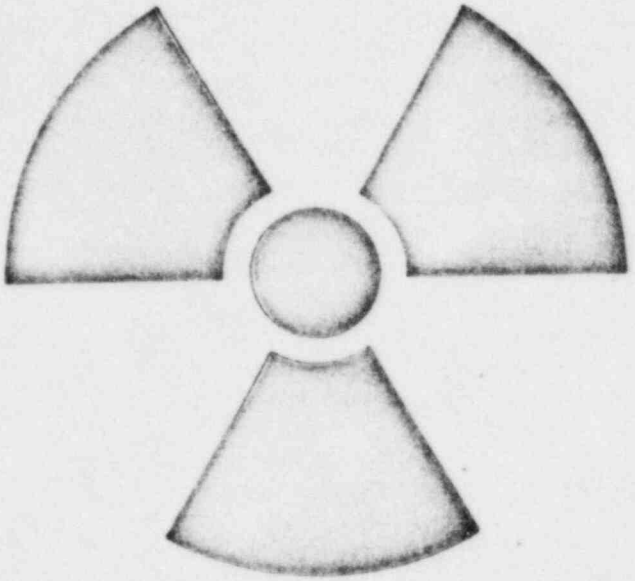
CAUTION



RADIOACTIVE MATERIALS

EXHIBIT 3

CAUTION



RADIOACTIVE MATERIALS

09-435 Nuclear Associates Inc. • Carle Place, N.Y. Printed in U.S.A.

EXHIBIT 4

CAUTION

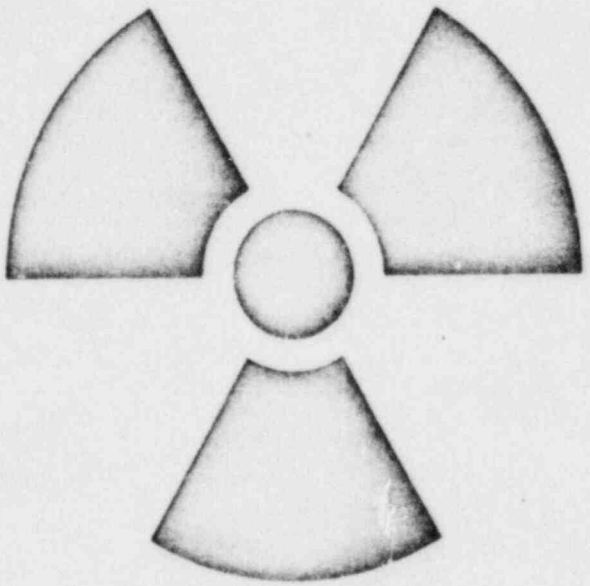
RADIOACTIVE MATERIAL

AIRBORNE

The sign illustrated in Exhibit 5 shall be posted in any area, accessible to personnel, where either radioactive aerosols, dusts, or gases are involved.

Only persons who work in this area and patients may enter when this sign is posted. The requirements for personnel monitoring equipment shall be determined by the Radiation Safety Officer, who will supply the monitoring equipment and maintain the records of individual exposure to radiation.

CAUTION



RADIOACTIVE MATERIALS

AIRBORNE

EXHIBIT 5

APPENDIX E
IODINE-131 (> 1mCi) ORAL SOLUTION ADMINISTRATION CHECKLIST

1. Administration under BO-9 hood

   a. Prior to administration:

   ____Turn hood on and open to indicated mark
   ____Set high volume air sampler up in hood
   ____Turn air sampler on prior to opening any vials containing I-131 under the hood

   b. Post-administration:

   ____Turn air sampler off
   ____Place charcoal filter into a plastic bag and seal with tape marked with radiation symbol
   ____Survey the area: above bky? Yes____ No____
   ____Wipe test hood: bkg_____ wipe_____
   ____Decontaminate if required
   ____Count filter using uptake probe: bkg_____ filter_____
   ____Uptake (24-72 hours post): bkg_____ Body bkg_____ thyroid_____
   ____Sign and place this sheet and filter in RSO mailbox

2. Administration in patient's room

   a. Prior to administration:

   ____Wear lapel air sampler
   ____Record sampler pump reading_____
   ____Turn air sampler on prior to opening any vials

   b. Post-administration:

   ____Turn air sampler off and record pump reading_____
   ____Place charcoal filter into a plastic bag and seal with tape marked with radiation symbol
   ____Survey and wipe test area: bkg_____ wipe_____
   ____Clean up if required
   ____Count filter using uptake probe: bkg_____ filter_____ (Use spacer)
   ____Sign and place this sheet and filter in RSO mailbox

_____
Technologist Date

Amended 12/82

PREIODINATION CHECK-LIST:

_____ 1. Call Radiation Safety Office at X2498 and provide the following information: Activity to be used, date of iodination, name and convenient time for uptake examination.

_____2. Place all materials to be used for the iodination into the glovebox. Be sure to include a plastic bag for wastes.

_____3. Wear protective gloves which cover the forearms. Line the glovebox floor with disposable, absorbent paper

_____4. Open hood window to mark indicating 24 inches..

_____5. Turn glovebox on and set the pump to maximum speed. Listen to hear the pump working.

_____6. Turn on the air sampler and hood.

PROCEED WITH IODINATION

POSTIODINATION CHECK-LIST:

_____1. Bag and seal all rad. wastes in the glovebox. Leave the gloves in the glovebox.

_____2. Survey self and all pertinent equipment before removal from the area.

_____3. Turn off glovebox and airsampler.

_____4. Wipe test the following (100 cm^2) areas to verify less than three times background: exterior of glovebox surface, hood floor, and work bench to the right of the hood

_____5. Close hood window to 12 inch mark.

_____6. Bring air sampler filter to Nuclear Medicine with you when you come for your uptake. Use disposable gloves and a plastic bag.

_____7. Hood must remain on for one week after each iodination.

WIPE TEST DATA:

Area #1 _____
Area #2 _____
Area #3 _____
Bkg. _____

UPTAKE DATA:

Thyroid _____
Body _____
Bkg _____
Filter _____

_____
(user signature)

UPON COMPLETION, RETURN TO RADIATION SAFETY OFFICE.

APPENDIX F
LABORATORY SURVEY FREQUENCY

Each committee-authorized user is required to perform or have performed regular surveys of their laboratory areas. Such surveys include removable and fixed contamination measurements. The survey frequency is specified below:

Types of application:	G.M. survey frequency	Wipe test frequency*
Elution, preparation and injection areas	Daily	Daily
Areas involving high possibility of volatilization	Daily	Daily
Areas where an excess of 100uCi is utilized in a single procedure	Weekly	Weekly
Areas where less than 100uCi is utilized in a single procedure	Weekly	Monthly

*All wipe test results and action taken will be recorded.

Decontamination procedures will be required if removable beta or gamma contamination exceeds 10^{-3} uCi/100cm^2 or 10^{-4} uCi/100cm^2 for alpha emitters. In addition, each handler is expected to periodically survey hands and clothing for traces of contamination.

APPENDIX G

PRINCIPLES AND PRECAUTIONS FOR NURSING STAFF IN CARING FOR PATIENTS RECEIVING RADIOACTIVE MATERALS

(For information, call ext. 2773/2498)

Hazards of Radioactive Isotopes

Hazards may arise from three sources:

1) Contamination of the skin with radioactive materials.

2) Inhalation or ingestion of radioactive materials in the body.

3) Irradiation of the body from outside by radiations emitted from these materials.

No precautions are usually needed for those patients who have received tracer doses of radioactive materials for diagnostic tests, such as, Nuclear Medicine, brain, kidney, lung, cardiovascular, thyroid, liver/spleen, and pancreas studies. In general, precautions should be taken when doses of radioactivity above one mCi (millicurie) are used.

The hazards increase with increased level of the dose.

Information about special hazards should be obtained from the physician responsible for the administration of the radioactive material or the Radiation Safety Officer (RSO).

General Principles of Protection

1) Skin contamination, ingestion, or inhalation is prevented in part by practicing good housekeeping, hand washing, and clean work habits.

a. Radioactive materials should not be allowed to come into contact with the skin.

b. Where radioactivity is present, personnel should not be allowed to eat or smoke.

c. Monitoring, i.e., checking equipment or work areas for radioactivity with a geiger counter, is necessary when contamination is suspected. (Call the RSO at ext. 2498 or 2773).

2) External irradiation of the body may be reduced to permissable limits by:

a. Taking precautions in handling contaminated equipment.

b. Spending the minimum of time close to patients with therapeutic doses of radioactivity.

General Precautions

1) The length of time personnel should remain at any particular distance from the patient shall be determined by the RSO.

2) Wash hands after contact with patient. Give particular attention to fingernails. Avoid working with open cuts.

3) The RSO shall be informed if articles are likely to be contaminated. If the RSO is not immediately available, the articles shall be stored in a container (e.g., trash barrel) with a plastic liner to be provided by the Building Management Service, and will be monitored later by the RSO.

4) It is not necessary to limit visitors in general. In circumstances where very large or therapeutic doses are administered, limitations shall be specified by the RSO.

PRECAUTIONS IN CARING FOR PATIENTS RECEIVING TRACER DOSES OF ISOTOPES INTERNALLY FOR DIAGNOSTIC STUDIES

General Principles

1) There is no danger in carrying out routine nursing care.

2) Patients are allowed visitors in accordance with the usual hospital rules.

3) Precautions may be necessary if urine or stools are to be saved for isotope studies. Special orders will be written as indicated.

4) If the patient should vomit within the first few hours of oral ingestion of radioisotopes, call the RSO at ext. 2498 or 2773 and the responsible physician. (See below for special instructions concerning vomitus).

5) No special precautions are needed for dishes, instruments or utensils.

Special Instructions

1) If there are any special instructions for a particular case, they will be noted on the patient's order sheet.

2) When cleaning up vomitus or handling contaminated articles, the nurse or nursing assistant should wear disposable gloves. The RSO should be called for disposal of contaminated paper towels or other articles. These articles should be placed in a container with a plastic liner to await his arrival and should not be disposed of by routine methods.

PRECAUTIONS IN CARE OF PATIENT RECEIVING RADIOACTIVE IODINE

General Principles

1) Radioactive iodine is administered orally. That portion of the dose which is not retained by the thyroid is almost entirely excreted in the urine.

2) No precautions whatsoever are needed for patients who have received doses of radioactive iodine for diagnostic purposes or therapeutic doses for thyrotoxicosis or for heart disease except when vomiting occurs within the first hour of administration. (See special instructions in previous section.)

For patients who have received very large doses (30 millicuries or more) of radioactive iodine for the treatment of cancer, the form, Instructions for Nursing Staff for Patients Treated with Iodine-131 (included in this section), will be completed. A copy will be posted on the patient's chart. The following instructions will be followed:

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

2. Visitors will be limited to those 18 years of age or over unless other instructions are noted on the precaution sheet on the patient's chart.

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

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

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

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

7. Disposable items should be used in the care of these patients, whenever possible. These items should be placed in the designated waste container. Contact the Radiation Safety Officer or his designee for proper disposal of the contents of the designated waste container.

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

9. All nondisposable items should be placed in a plastic bag and should be left in the patient's room to be checked by the Radiation Safety Officer or his designee.

10. Surgical dressings should be changed only as directed by the physician. Such dressings should not be discarded but should be collected in plastic bags and turned over to the Radiation Safety Officer or his designee. Wear disposable gloves.

11. For I-131 patients if urine collection is required:

a. To the degree possible with cooperative patients, urine will be collected in special containers provided by the Radiation Safety Officer or his designee. The patient should be encouraged to collect his own urine in the container. If the patient is bedridden, a separate urinal or bedpan should be provided. The urinal or bedpan should be flushed several times with hot soapy water after use.

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

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

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

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

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

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

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

18. Unless specifically ordered by the doctor, the bath should be postponed for the first 48 hours.

PRECAUTIONS IN CARE OF PATIENT UNDERGOING BRACHY(IMPLANT) THERAPY

General Principles

Temporary or permanent sealed implants in the form of seeds, needles, or plaques may be used in the treatment of cancer. Since these are sealed sources, there is no danger of contamination unless a seed, needle or plaque is removed from the patient. The hazard, therefore, is external exposure.

Immediately after sources are implanted, the form Nursing Instructions for Patients Treated with Brachytherapy Sources (included in this part) will be completed and attached to the patient's chart. The following precautions will be followed:

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

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

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

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

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

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

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

8. Surgical dressings and bandages used to cover the area of needle or ribbon insertion may be changed only by the attending physician or radiologist and may not be discarded until directed by the radiologist. Dressings should be kept in a basin until checked by the Radiation Safety Officer or his designee. Special orders will be written for oral hygiene for patients with oral implants.

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

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

11. These patients must stay in bed unless orders to the contrary are written. In any event, patients will remain in their assigned rooms during the treatment period, in most cases.

12. Visitors will be limited to those 18 years of age or over unless other instructions are noted on the precaution sheet on the patient's chart.

13. Visitors should sit at least 3 feet (or 1m) from the patient and should remain no longer than the time specified on the form posted on the patient's door and on his chart.

14. No nurse, visitor, or attendant who is pregnant should be permitted in the room of a patient while brachytherapy sources are implanted in the patient. Female visitors should be asked whether they are pregnant.

15. Emergency procedures:

a. If an implanted source becomes loose or separated from the patient, or

b. If the patient dies, or

c. If the patient requires emergency surgery, immediately call:

Terry Button, Physicist/Radiation Safety Officer

Telephone: Days--ext. 2498; nights--(516) 654-0907

16. At the conclusion of treatment, call the Radiation Safety Officer to (a) survey the patient and room, (b) count the radiation sources to be sure that all temporary implants have been removed prior to discharging the patient, and (c) record a summary of the final survey results on the patient's chart. If any permanent implants are to remain in the patient, the Radiation Safety Officer will brief the patient on precautions for minimizing radiation exposure to others after discharge from the medical center.

PRECAUTIONS IN CARE OF PATIENT UNDERGOING TELETHERAPY (COBALT-60)

General Principles

There is no radiation hazard or precautions for patients that have had teletherapy. These patients have been exposed to the radiations of Cobalt-60 but do not come back to the unit with any radioactivity.

Emergency Situations

If there are any questions of contamination, techniques for handling contamination, or personnel exposure, the Radiation Safety Officer should be contacted at extension 2498 or 2773. After hours, the RSO may be reached at (516) 654-0907.

Review date: 12/30/82

Terry M. Button

TERRY M. BUTTON
Radiation Safety Officer

INSTRUCTIONS FOR NURSING STAFF
FOR PATIENTS TREATED WITH IODINE-131

DATE: _____

Patient's Name: _____

Room No.: _____ Physician's Name: _____

Radioisotope Administered: _____

Date and Time of Administration: _____

Dose Received: _____ Method of Administration: _____

(Comply with all checked items)

_____ 1. Visiting time permitted: _____

_____ 2. Visitors must remain _____ from patient.

_____ 3. Patient may not leave room.

_____ 4. Visitors under 18 are not permitted.

_____ 5. Pregnant visitors are not permitted.

_____ 6. A pocket dosimeter must be worn by all personnel attending the patient and exposure log maintained.

_____ 7. Gloves must be worn while attending patient.

_____ 8. Patient must use disposable utensils.

_____ 9. All items must remain in room until approved by the Radiation Safety Officer or his designee.

_____10. Smoking is not permitted.

_____11. Room is not to be released to Admitting Office until approved by the Radiation Safety Officer or his designee.

_____12. Other instructions (See accompanying sheet).

_____13. The following materials shall be posted - Caution Radioactive Materials:

_____ Patient (ID band)

_____ Patient Bed

_____ Patient Room

_____ Patient Chart

In case of an emergency contact:

RSO _____ _____

On-duty/Off-duty Telephone Numbers

Amended 12/82

NURSING INSTRUCTIONS FOR PATIENTS TREATED WITH BRACHYTHERAPY SOURCES

Patient's Name: _____

Room Number: _____ Physician's Name: _____

Isotope and Activity: _____

Date and Time of Administration: _____

Date and Time Sources Are To Be Removed: _____ Isotope: _____

Exposure Rates in mR/hr

Bedside	3 feet from bed	10 feet from bed

(Comply with all checked items.)

_____ 1. Wear film or TLD badge.

_____ 2. Wear pocket chambers for supplementary personnel monitoring of individual tasks.

_____ 3. Wear rubber gloves.

_____ 4. Tag the following objects and fill out the tag:

_____ door _____ chart

_____ bed _____ wrist

_____ 5. Place laundry in linen bag and save.

_____ 6. Housekeeping may not enter the room.

_____ 7. Visiting time permitted: _____

_____ 8. Visitors must remain _____ from patient.

_____ 9. Patient may not leave the room.

_____ 10. Patient may not have visitors.

_____ 11. Patient may not have pregnant visitors.

_____ 12. Patient may not have visitors under 18 years of age.

_____ 13. Patient must have a private room.

_____ 14. A dismissal survey must be performed before the patient is discharged.

_____ 15. All items must remain in the room until approved for disposal by the Radiation Safety Officer or his designee.

_____ 16. Contact the Radiation Safety Office when temporary sources (nonpermanent implants) are removed to perform a survey to be sure all sources are removed from the patient, to do a physical source count, and to be sure no sources remain in the room.

_____ 17. Contact the Radiation Safety Office when the patient is discharged to survey the room prior to its assignment to another patient.

_____ 18. Other instructions.

RSO

Name | On-duty/Off-duty Telephone Numbers

Note To: License Fee Management Section, ADM

From: Region 1

Subject: VOIDED APPLICATION

Control Number 104664

Applicant V. A. Medical Center

Date Voided 2/21/86

Reason for Void:

Amendment request was combined with renewal (control No. 13478)

Brenda Pilatchak 3/19/86
Signature Date

Attachment:
Official Record Copy
of Voided Action

JKLFMS

Veterans Administration

NRC Reg I

October 18, 1985

In Reply Refer To: 632/11E

Dr. James J. Smith
Director, Nuclear Medicine Service (115)
Veterans Administration Central Office
Washington, DC 20420

SUBJ: Amendment of License
(NRC License No. 31-13511-04)

Dear Dr. Smith:

Please review the attached amendments to our NRC License indicating new user status for Dr. Harold Carlson and Dr. Robert Hitzemann and forward these documents to Vandy L. Miller, Chief, Material Licensing Branch, Division of Fuel Cycle and Material Safety of the Nuclear Regulatory Commission.

Sincerely yours,

for Mary W. Forsyth
WILLIAM H. MANLEY
Director

Enclosures: Ltr to NRC
NRC Forms 313M (including attachments)

James J. Smith M.D. 11/11/85

JAMES J. SMITH, M. D. (115)
Director, Nuclear Medicine Service
VA Central Office
Washington, D.C. 20420

13478

"OFFICIAL RECORD COPY"

ML10 ~~104664~~

NOV 18 1985