

## **SECTION 6**

### **RADIATION SAFETY PLAN**

NOTE: This radiation safety plan applies only to permitted users, associate users, and laboratories within SNARC. Permits and permit conditions issued by the USDA Radiological Safety Staff (RSS) under the USDA General Radiological License are specific to individual users and laboratories (see Section I.A.1.c). A separate radioactive materials permit and safety plan must be approved for each center/unit within the **SPBL** using radioactive materials. For further information contact USDA/RSS (see Section IV.A for contact information).

#### **I. INTRODUCTION**

- A. The United States Department of Agriculture, Agricultural Research Service, and the Stuttgart/Pine Bluff Location (**SPBL**), which consists of the Aquaculture Systems Research Unit (ASRU, 1500 Oliver Road, Pine Bluff, AR 71601), the Dale Bumpers National Rice Research Center (DB NRRC, P.O. Box 1090, Stuttgart, AR 72160), and the Harry K. Dupree Stuttgart National Aquaculture Research Center (SNARC, P.O. Box 1050, Stuttgart, AR 72160) are committed to the ideals of maintaining the highest safety, health, and environmental standards when using radioactive material and x-ray producing equipment.
- B. The general intent of this plan is to:
1. Comply with the rules and regulations governing radioactive materials use. Chief among these are:
    - a. 10 Code of Federal Regulations (CFR), Energy.
    - b. 29 CFR 1910.96, Ionizing Radiation.
    - c. License 19-00915-03, expiration date 9/30/2005, issued by the Nuclear Regulatory Commission (NRC) to the USDA.
      - ◆ The license specifies what USDA radiation permit holders are allowed to do.
      - ◆ If an activity is not specifically allowed under the license, we can assume that it is prohibited until we receive written guidance from the USDA Radiation Safety Staff (RSS) to the contrary.
  2. USDA Permit Conditions and standard operating conditions can be found in Appendix 6.1, the *USDA Radiation Safety Handbook*, and on the RSS web page: [www.rss.usda.gov](http://www.rss.usda.gov).
  3. Although the USDA is not legally required to meet State requirements, the USDA practices a 'good tenant' policy and seeks to meet State

standards and to maintain a good working relationship with State regulators. In most cases, state regulations mirror Federal regulations.

4. Protect Location employees from internal and external health hazards associated with the use of radioisotopes in our laboratory.
5. Identify, assess, and control potential radiation exposures at the Location, to ensure that SNARC employees are not exposed to radioactivity in excess of the permissible exposure limits as defined in 10 CFR 20 and 29 CFR 1910.96.
6. **Steven D. Rawles** (870-673-4483 x228) is designated as the Location Radiation Protection Officer (LRPO) for **SPBL**.
7. This plan will be available for all employees to review, and copies will be located in the libraries of DB NRRC (the central resource library for the **SPBL**) and SNARC as well as in the office of the LRPO located in the Fish Nutrition Laboratory, Room 112, SNARC.
8. The plan will be reviewed annually by the LRPO and will be updated as appropriate.

## II. REFERENCES

- A. 10 CFR, Energy
- B. 29 CFR 1910.96, Ionizing Radiation
- C. NRC License 19-00915-03
- D. USDA RSS Permit Conditions (found in Appendix 6.1 and on the RSS web page: [www.rss.usda.gov](http://www.rss.usda.gov))

## III. DEFINITIONS - For the purpose of this plan, the following definitions will apply:

- A. Associate User: An individual who is working with radiation sources under the terms and conditions of a radiation source permit, under the general supervision of the Permit Holder.
- B. Hazards, Radiation: Radiation hazards are usually divided into two categories - external and internal:
  1. External radiation hazards are those presented by a radiation source that is external to the human body. These are usually controlled by limiting the time personnel are exposed to radioisotopes, maximizing the distance between personnel and radioisotopes, and/or shielding the radiation sources. The LRPO can give consultation on specific questions that may

arise regarding control of external radiation hazards. Verification that external radiation hazards are under control is achieved by:

- a. Surveys of operations and facilities performed or coordinated by the LRPO and Permit Holder to determine compliance with RSS Permit conditions. The time interval of these surveys depends upon RSS Permit Conditions for the given operation.
  - b. Wipe tests performed or coordinated by the LRPO and Permit Holder of rooms in which radioisotopes are used. The time interval of these tests depends upon RSS Permit Conditions for the given operation.
2. Internal radiation hazards are those presented by a radiation source that has entered the human body. These are usually controlled by preventing inhalation, ingestion, or absorption of radioactive contaminants into the body. Examples of such controls include performing operations with volatile radioactive materials under the fume hood (preventing inhalation), prohibiting food or drink in the laboratory (preventing ingestion), and using shields or wearing protective apparel while handling radioisotopes (preventing absorption). Verification that internal radiation hazards are under control is achieved by:
- a. Audits performed or coordinated by the LRPO and Permit Holder to determine that personnel are following appropriate procedures in handling radioisotopes or X-ray producing equipment.
  - b. Monitoring of personal dosimeter results on a monthly basis by the LRPO to verify that employees are not receiving excessive or unnecessary radiation doses.
  - c. If specific situations are encountered (such as radioiodinations) and it is judged by the LRPO to be appropriate to conduct bioassay tests, such tests will be performed as appropriate. No radioiodination experiments can be conducted without prior consultation with and approval by the LRPO and Area Safety and Health Manager (ASHM).
- C. Permit Holder: An individual authorized to possess and use radioactive materials or x-ray producing equipment at a USDA location, and who is responsible for their safe and proper use. The term "Permit Holder" replaces and supersedes previously used titles such as "Independent User", "Authorized User", and "Principle Investigator".
- D. RSS Permit Conditions: The instructions and requirements for specific operations (e.g., using electron capture detectors, handling unsealed radioactive materials, and disposing of radioactive waste) published by the RSS. The RSS

Permit conditions for SNARC are contained in Appendix 6.1 of this Plan and on the RSS web page: [www.rss.usda.gov](http://www.rss.usda.gov)).

#### IV. RESPONSIBILITIES

- A. The Radiation Safety Staff (RSS), located 5601 Sunnyside Avenue Mail Stop 5510, Beltsville, MD 20705-5510. Primary phone numbers are (301)504-2440/2444/2445/2447. For complete list of names and phone numbers, see the RSS website, [www.rss.usda.gov](http://www.rss.usda.gov). The RSS is responsible for:
1. Serving as Agency contact on matters involving radioactive materials and X-ray producing equipment.
  2. Prescribing specific radiation safety measures, rules, and procedures.
  3. Maintaining records of the purchase, receipt, use, transfer, and disposal of radioactive material and X-ray producing equipment.
  4. Conducting inspections of the facilities and operations of locations that use radioactive material and/or X-ray producing equipment.
  5. Preparing formal reports as required by licensing requirements.
  6. Maintaining liaison with agency safety officials.
  7. Providing assistance on radiation safety matters to locations that use radioactive material and/or X-ray producing equipment.
  8. Staying abreast of current regulations involving radioactive materials and X-ray producing equipment.
- B. The Location Coordinator  
**Current LC is Don Freeman**
1. Approves, by signature, this plan.
  2. Authorizes and supports the implementation of this plan, the annual review of this plan, and amendments or changes to this plan.
  3. Provides resources for training, equipment, and other support called for in this plan.
  4. Reviews initial and renewal requests for radiation source permit applications.
  5. Appoints the LRPO.

6. Assures Permit Holders have appropriate safety elements in their Performance Plans and job descriptions.
7. Ensures the prompt abatement of hazardous conditions.

C. Research Leaders, lead scientists, and department heads will:

1. Ensure employees under their jurisdiction comply with provisions of this plan.
2. Ensure that technical support personnel have received proper training prior to initiating operations involving radioactive materials or radiation emitting devices.
3. Correct work errors or conditions that may result in violations of the USDA permit.
4. Notify the LRPO and maintenance personnel when equipment or facilities critical to radiation safety are inadequate or are not performing according to specification.

D. The LRPO acts in consultation with Location management and the RSS, and:

1. Maintains files and records of program activities.
2. Maintains this plan.
3. Publicizes this plan.
4. Maintains records of personnel dosage for employees who are or may be working with/near radiation producing sources.
5. Maintains records of monthly facility radiation inspections.
6. Forwards facility radiation survey reports to the RSS on a quarterly basis.
7. Maintains records of correspondence between the Location and RSS.
8. Coordinates disposal of all radioactive waste, including going through outside contractors if and when appropriate.
9. Assures that personal dosimeter radiation film badges are distributed at the beginning of each month to personnel who request or require them, are collected at the end of each month, and are forwarded to the contractor for analysis.

10. Monitors monthly personnel dosimeter reports of personnel who request or require personal dosimeter radiation film badges.
11. Serves as a source of advice and counsel to all employees at the Location on issue involving radiation safety and license compliance.
12. Provides or arranges appropriate training for employees regarding radiation hazards, controls, and emergency procedures at SNARC.
13. In consultation with the Southern Plains ASHM, reviews this plan annually and monitors its effectiveness.

NOTE: The LRPO does not assume responsibilities that are assigned specifically to Permit Holders. Each Permit Holder and Associate User at SNARC is charged with assuring that he or she conducts all research in full compliance with Agency, Department, and Nuclear Regulatory Commission rules and guidelines.

E. The Permit Holder:

1. Performs radiation operations in accordance with the RSS Permit Conditions and NRC rules and guidelines.
2. Maintains current inventory of ionizing radiation sources in the Location under his/her control.
3. Maintains appropriate authorizations and approvals as required from the RSS.
4. Maintains records of use, transfer, and disposal of radioactive materials used in his/her laboratory.
5. Performs surveys and inspections in accordance with RSS Permit Conditions and in coordination with LRPO.
6. Performs appropriate dosimetry monitoring of personnel who work with radioisotopes or X-ray producing equipment.
7. Assures proper labeling, storage, use, transfer, and disposal of radioactive materials.
8. Assures proper signage and security in laboratories or other areas where radioactive materials and/or X-ray producing equipment are in use.
9. Assures personnel wear appropriate personal protective equipment and have received proper training prior to initiating operations involving radioactive materials or X-ray producing equipment.

Note: Although the above responsibilities reside with the individual Permit Holder and Associate User, the LRPO is committed to work with each Permit Holder and Associate User to assure full compliance and smooth operation. Any individual at the Location should feel free to call on the LRPO at any time if questions or concerns arise. In addition, any employee should feel free to contact RSS personnel directly with any problems or concerns.

The Associate User shall follow the directions of the Permit Holder in matters of radiation operations.

**V. USDA-WIDE PROGRAM ELEMENTS: The RSS has issued Permit Conditions, Technical Bulletins, and Forms that guide and govern USDA radiation operations under the NRC license. They are found in the USDA Radiation Safety Handbook, a copy of which is located in the Fish Nutrition Lab, Room 112, SNARC.**

A. Permit Conditions have been issued for the following subjects (refer to Appendix 6.2 for a copy of the RSS Letter and User Permit for 2003-06):

1. Electron capture detectors
2. Electron microscopy facilities
3. General research using radioactive materials
4. Iodine-125 bioassay and effluent monitoring
5. Moisture/density gauges
6. Personnel dosimetry
7. Self shielded irradiators
8. Tritium bioassay and effluent monitoring
9. X-ray producing equipment

B. Technical Bulletins have been issued on the following subjects:

1. Determining lower limit of detection and minimum detectable activity for radiation measurements
2. Performing close-out surveys in radioisotope laboratories
3. Radiation safety considerations for the Declared Pregnant Woman
4. Radioactive waste management

- C. Forms have been issued for the following activities:
1. Application to use:
    - a. Radiation producing sources
    - b. Radioactive materials use
    - c. Nuclear gauges
    - d. Electron capture detectors
    - e. Self-shielded irradiators
    - f. X-ray producing equipment
  2. Inventory records for:
    - a. Sealed sources
    - b. X-ray producing equipment
  3. Worksheets for:
    - a. Tritium bioassay
    - b. Thyroid bioassay
    - c. Radioactive iodine effluent monitoring
    - d. Contamination survey
    - e. Instrument efficiency for I-129 standards
    - f. Thyroid bioassay instrument efficiency
  4. Dosimetry:
    - a. Service request
    - b. Additions to dosimetry service
    - c. Deletion or change request
    - d. Visitor dosimetry assignment report

**VI. SNARC-SPECIFIC PROGRAM ELEMENTS: All SNARC operations involving radioactive materials or X-ray emitting devices will conform to RSS Permit Conditions, Technical Bulletins, and Forms. The following activities are in support of those conditions and are specific to activities at SNARC:**

- A. Electron Capture Detectors (ECDs).
1. SNARC's use of electron capture detectors shall conform with RSS *Permit Conditions for Electron Capture Detectors*. This document is appended to this plan as Appendix 6.3.
  2. The SNARC ECD(s) is/are used in the SNARC Chemistry Lab, Room 128. When not in a gas chromatograph, the detector cells shall be kept locked in the SNARC Chemistry Lab, Room 128. The DB NRRC ECD is used in the DB NRRC Instrument Laboratory, Room L4. When not in

a gas chromatograph, the detector cells shall be kept locked in the DB NRRC Instrument Laboratory, Room L4.

3. Transfer or disposal of ECDs will only be performed with the coordination of the LRPO and the foreknowledge and written approval of the RSS.
4. If an ECD is lost or stolen, the Permit Holder or Associate User must notify the RSS, LRPO, and ASHM immediately.

B. General Use of Check Sources, Calibration Standards, Small Sealed Sources, and Unsealed Radioactive Materials.

1. SNARC's use of radioactive materials for general research shall conform with RSS *Permit Conditions for General Research Using Radioactive Materials*. This document is appended to this plan as Appendix 6.1.
2. Radioactive materials for general research are located in SNARC Fish Nutrition Lab Room 112 and Physiology Lab Room 126. Radioactive materials in these rooms will be stored in appropriately shielded storage boxes secured within designated refrigerators/freezers. These storage boxes shall be kept locked and secured within refrigerators/freezers when radioactive materials are not under the immediate supervision or use of the Permit Holder or Associate User. Furthermore, rooms 112 and 126 shall be kept locked to prevent unauthorized entrance if unattended during periods that radioactive materials are actively being used.
3. Transfer or disposal of radioactive materials for general research will only be performed with the coordination of the LRPO and the foreknowledge and written approval of the RSS.
4. Immediately notify the LRPO after the theft or loss of radioactive materials for general research is discovered. The LRPO shall notify the RSS, appropriate regulatory agencies, and police, as required by the Permit Conditions for the situation.

C. Iodine-125 Bioassay and Effluent Monitoring.

1. SNARC's use of Iodine-125 for bioassay and effluent monitoring shall conform with RSS *Permit Conditions for Iodine-125 Bioassay and Effluent Monitoring*. This document is appended to this plan as Appendix 6.4. Use of Iodine-125 labeled compounds at SNARC is currently limited by permit (see Appendix 6.4) to total quantities and activities below those requiring Iodine-125 Bioassay and Effluent Monitoring.
2. No radioiodination experiments may be conducted without prior consultation with and approval by the LRPO, the Southern Plains ASHM

and the RSS. Radioiodination experiments are not approved for SNARC under the current RSS permit.

3. Iodine-125 materials are located in the SNARC Physiology Lab Room 126. Iodine-125 materials in Room 126 will be stored in appropriately shielded storage boxes secured within designated refrigerators/freezers. These storage boxes shall be kept locked and secured within refrigerators/freezers when Iodine-125 materials are not under the immediate supervision or use of the Permit Holder or Associate User. Furthermore, room 126 shall be kept locked to prevent unauthorized entrance if unattended during periods that Iodine-125 materials are actively being used.
4. Immediately notify the LRPO after the theft or loss of an Iodine-125 is discovered. The LRPO shall notify the RSS, appropriate regulatory agencies, and police, as required by the Permit Conditions for the situation.

D. Personnel Dosimetry.

1. SNARC's use of dosimeters to measure radiation dose shall conform with RSS *Permit Conditions for Personnel Dosimetry*. This document is appended to this plan as Appendix 6.5. Use of radioactive materials at SNARC is currently limited by permit (see Appendix 6.5) to total quantities and activities below those requiring the use of personnel dosimeters, however, see Sections VI.D.2 - 5 below for special conditions.
2. Dosimeters are required for users of irradiators and neutron probes. Irradiators and neutron probes are not currently approved or anticipated for use at SNARC. Although SNARC expects no employee or visitor to be exposed to radioactive materials in excess of allowable dose limits, anyone working in or around radioactive materials may request inclusion in the dosimetry program.
3. Dosimeters may be requested by contacting the LRPO (see Section I.B for contact information).
4. USDA policy dictates that radiation operations shall be designed and performed in a fashion to keep employee exposure to radioactivity As Low As Reasonably Achievable (ALARA). 10 CFR 20 and 29 CFR 1910.96 limit radiation exposure to the following:
  - a. Whole body; head and trunk; active blood forming organs - 5 rems per year.
  - b. Hands and forearms; feet and ankles; extremities - 50 rems per year.

- c. Lens of eye - 15 rems per year.
- d. Exposure to individuals under eighteen (18) years of age shall not exceed one-tenth the above levels.

5. Prenatal Exposure

- a. Additional dosimetry conditions are required for declared pregnant workers. The LRPO and the RSS Technical Bulletin *Radiation Safety Considerations for the Declared Pregnant Woman* should be consulted for these (see RSS website, [www.rss.usda.gov](http://www.rss.usda.gov) ).
- b. Pregnant women or women of childbearing age shall receive special training (prior to initiation of work with radioisotopes or X-ray producing equipment regarding prevention of fetal exposure to radiation.
- c. Exposure of pregnant women to radioactivity shall not exceed 0.125 rem during the entire gestation period.
  - ◆ The National Council on Radiation Protection (NCRP) recommends keeping prenatal exposure below 0.5 rem during the gestation period. This is required by 10 CFR 20.
  - ◆ The USDA's Radiation Safety Committee requires that prenatal exposure be kept ALARA, and in no case shall it exceed twenty-five percent (25%) of the NCRP's 0.5 rem limit, or 0.125 rem, during the gestation period.

E. Disposal of Radioactive Waste.

- 1. SNARC's radioactive waste activities shall conform to RSS Technical Bulletin, *Radioactive Waste Management* (see RSS website at [www.rss.usda.gov](http://www.rss.usda.gov) ).
- 2. Burial of radioactive waste on the grounds of SNARC or any USDA facility is forbidden.
- 3. Disposal of Short Half-life Materials by Decay-in-Storage
  - a. All decay-in-storage activities shall be done with the foreknowledge and coordination of the LRPO.

- b. Radioactive waste materials with half-lives of 120 days or less shall be segregated and held for a minimum of ten half-lives for decay.
  - c. During the decay period, the material shall be placed in containers that prevent or contain spills and held in a secured and shielded area, approved or designated by the LRPO. The Radiological Waste Shed located in the SNARC Chemical Bunker B is designated as the site for decay-in-storage of Iodine-125 waste.
  - d. During decay-in-storage, all signage, label, and survey requirements of the RSS shall be complied with.
  - e. After the ten half-life decay period has elapsed, the material shall be surveyed to determine if its radiation level is indistinguishable from background. Once its radiation is indistinguishable from background, the material may be disposed of as normal waste, after all radiation labels have been removed or obliterated.
4. All radioactive waste disposal shall be documented by the Permit Holder in accordance with RSS documentation requirements.

F. Dry, Solid Waste

1. Dry solid radioactive waste (lab trash, soil, vegetation) shall not contain visible liquids, lead pigs, or biological hazards.
2. Solid waste containers shall be sturdy and marked "Caution Radioactive Materials".
3. Solid waste containers shall be properly marked as to date, researcher, contents, and activity.
4. Deliver the container to the LRPO for storage and ultimate disposal.
5. All radioactive waste disposal shall be documented by the Permit Holder on Form RSS-83 (attached as Appendix 6.6).

G. Disposal of Liquid Scintillation Vials Containing Scintillation Cocktail

1. SNARC researchers may not use "hazardous" scintillation cocktail, as defined below; without prior consultation and approval of the LRPO.
2. To be categorized as "non-hazardous", scintillation cocktail must meet ALL of the following requirements:

- a. It may contain no more than 0.05 microCurie ( $\mu\text{Ci}$ ) per gram of hydrogen-3 and/or carbon-14. Dilution may be used to achieve this level of activity.
  - b. It may not contain gamma emitters or higher energy beta emitters.
  - c. It must be identified as biodegradable and non-hazardous by its manufacturer.
  - d. It may not contain xylene, toluene, or other solvents with Environmental Protection Agency disposal restrictions. Cocktails identified as biodegradable and non-hazardous meet this requirement.
3. To be categorized as "hazardous", scintillation cocktail need only meet one, or any combination, of the following conditions:
- a. Its activity is greater than 0.05  $\mu\text{Ci}$  of any radioisotope per gram of cocktail.
  - b. It contains gamma emitters or beta emitters other than hydrogen-3 or carbon-14.
  - c. It is not positively identified as biodegradable or non-hazardous by its manufacturer.
  - d. It contains xylene, toluene, or other solvents with Environmental Protection Agency disposal restrictions. Cocktails not labeled as biodegradable and non-hazardous shall be assumed to contain one of more of these solvents that have disposal restrictions.
4. Disposal of either "non-hazardous" or "hazardous" liquid scintillation cocktail and vials via contract disposal.
- a. Leave the vials intact, and place them in an appropriate box or bag, labeled as to researcher, date, isotope present (C-14, H-3, or both), type of cocktail (non-hazardous or hazardous), and certified that they contain on average less than 0.05  $\mu\text{Ci}$  per gram of cocktail of C-14 and/or H-3.
  - b. Deliver the box or bag of vials to the LRPO who will transport them to SNARC Chemical Bunker B for temporary secured storage until ultimate disposal by contract hauler.
5. Drain disposal of "non-hazardous" liquid scintillation cocktail and vials is NOT allowed at SNARC.

6. Disposal of scintillation cocktail from HPLC-linked radioisotope detectors
  - a. Effluent from HPLC radioisotope detectors shall be treated as liquid scintillation cocktail vial waste subject to the same restrictions described above.
  - b. This liquid shall be transferred to liquid scintillation cocktail vials, capped securely, labeled as above, and delivered to the LRPO for disposal as liquid scintillation cocktail vial waste.

#### H. Disposal of Liquid Waste

1. It is laboratory policy that the generation and accumulation of organic liquid radioactive waste (i.e., containing organic solvents) be minimized to the extent possible. Researchers should, where possible, remove organic solvents by vacuum distillation, disposing of the solvent waste as normal (non-radioactive) hazardous waste and disposing of the radioisotopes by accepted techniques (sanitary sewer system, dissolved in water or other acceptable media).
2. Organic liquids and aqueous liquids shall be kept segregated from each other and not mixed.
3. Liquid containers shall be sturdy and properly marked as to date, researcher, contents, and activity. The containers shall be marked "Caution Radioactive Materials".
4. Liquid organic waste identified for disposal shall be delivered to the LRPO for disposal via contract hauler. Liquid radioactive waste may NOT be disposed of via SNARC laboratory sinks or on-site drains.
5. Liquid aqueous wastes which are readily soluble or dispersible in water shall be delivered to the LRPO for disposal via contract hauler. Liquid radioactive waste may NOT be disposed of via SNARC laboratory sinks or on-site drains.

#### I. Disposal of Animal Tissue

1. Assumptions and Expectations
  - a. It is expected that animal tissue will only be contaminated with hydrogen-3 and/or carbon-14. If a Permit Holder expects to use other radioisotopes in an experiment involving animal tissue, the Permit Holder must coordinate with the LRPO and RSS prior to beginning the experiment.

- b. It is expected that experimental processes at SNARC will not result in animal carcasses being contaminated with more than 0.05  $\mu\text{Ci}$  per gram of hydrogen-3 and/or carbon-14, averaged over the weight of the entire animal. If the Permit Holder expects an experiment to exceed this threshold, the Permit Holder must coordinate with the LRPO and RSS prior to beginning the experiment.
  - c. Animal tissue containing not more than 0.05  $\mu\text{Ci}$  per gram of hydrogen-3 and/or carbon-14, averaged over the weight of the entire animal, may be disposed of without regard to its radioactivity; however, other nonradioactive hazards may restrict the disposal of the tissue.
  - d. Animal tissue, in any case, must be disposed of in a fashion to prevent its use as food for either humans or animals.
2. Off-site disposal
- a. It is laboratory policy that all animal tissue containing not more than 0.05  $\mu\text{Ci}$  per gram of hydrogen-3 and/or carbon-14 (averaged over the weight of the entire animal) shall be disposed of by contract hauler.
  - b. If off-site disposal is anticipated, the Permit Holder must coordinate with the LRPO prior to beginning the experiment.
3. On-site disposal of radiological waste is NOT permitted at SNARC.
- J. All radioactive waste disposal shall be documented by the Permit Holder on Form RSS-83 (attached as Appendix 6.6).
- K. Immediately notify the LRPO after the theft or loss of radioactive waste is discovered. The LRPO shall notify the RSS, appropriate regulatory agencies, and police, as required by the Permit Conditions for the situation.

## **VII. MEDICAL CONSULTATION**

- A. Should personnel monitoring indicate that an employee has been potentially exposed to hazardous levels of radiation, or should an event take place in the work area that could potentially expose employees to hazardous levels of radiation (spill, leak, explosion, etc.), or should an employee develop signs and symptoms associated with radiation exposure, the employee shall be provided the opportunity to receive appropriate medical examination through the Chemical Hygiene Program (CHP). All CHP-related medical examinations and consultations are provided by our OMSP contractor, Stuttgart Regional Medical Center, N. Buerkle Rd; P.O. Box 1905, Stuttgart, AR (870-673-3511). These

examinations are provided without cost to the employee, without loss of pay, and at a reasonable time.

- B. If a work-related illness or injury is apparent, the employee may file a Workers' Compensation claim, in which case medical services are provided by a physician of the employee's choice.
- C. The LRPO (or responsible supervisor) will provide the following information to the physician:
  - 1. Identity of the radioisotopes to which the employee may have been exposed.
  - 2. A description of the conditions of the exposure including exposure date if available.
  - 3. A description of signs and symptoms of exposure that the employee is experiencing (if any).
- D. If an internal exposure to radiation has occurred, the LRPO must notify the RSS and the ASHM immediately.
- E. Questions about the OMSP or workers' compensation program may be directed to the Personnel Specialist at the Area Administrative Office, 409-260-9443 or by contacting the CDSO (Diana Morian, 870-672-9300 x274).

## **VIII. EMERGENCY PREPAREDNESS**

- A. Section 4.4 of the USDA Radiation Safety Handbook (see Appendix 6.7 or the RSS website at [www.rss.usda.gov](http://www.rss.usda.gov) ), contains guidance for handling a variety of radiation emergencies.
- B. SNARC Assumptions
  - 1. In radiation emergency situations, the safety of humans (Location personnel, neighbors, and the surrounding community) is paramount.
  - 2. Given the scale of radiation operations at SNARC, it is unlikely that a radiation emergency will spread beyond laboratory property lines.
  - 3. Location personnel will perform their duties and will respond to radiation emergency situations in a logical and reasonable manner consistent with their expertise and consistent with what would be expected of any reasonable private company employee, private citizen, or good neighbor.
  - 4. Location personnel are not trained, nor do they have experience in handling large scale radiation emergencies.

5. The handling of radiation emergencies, including designations of authority, preplanning, liaison with outside emergency response agencies, and communications, shall be accomplished under the general procedures outlined in the Location Facility Self Protection Plan.
  6. Arkansas Radiation Control and Emergency Management Program (501-661-2301) is the action agency for handling large scale radiation emergencies that require support or equipment not available at the Location.
- C. In responding to a radiation emergency, the following factors should be addressed:
1. Assist People First.
    - a. Ensure that individuals who receive radiation exposure get immediate attention.
    - b. Monitor other individuals in the immediate area to determine if they have been contaminated.
    - c. Remove non-essential personnel from the area.
    - d. Require response personnel to wear appropriate personal protective equipment, including gloves, and outer garments if appropriate.
    - e. Given the nature and relatively small quantities of radioisotopes used at the Location, simply maintaining a distance of twenty or more feet from the contaminated area will generally be the best approach toward minimizing exposure.
  2. Stabilize the situation.
    - a. Identify the hazards.
      - ◆ Identify the radioisotope(s) involved and the approximate activity level.
      - ◆ Identify associated hazards (e.g., was the radioisotope mixed with a volatile solvent, what is the flammability of the materials involved, is there a chance for an explosion, are there any other operations in the area which may be hazardous to emergency response personnel, etc.).
    - b. Define the area of contamination.

- ◆ Limit personnel access to area.
  - ◆ Use ropes or barricades to identify the area of contamination. Limit traffic into and out of the area to prevent the spread of contamination.
  - ◆ Shield the area if appropriate. Shielding beta particles is relatively simple; however, shielding gamma or X-radiation is complex and should not be attempted without thorough knowledge. The LRPO can give assistance.
- c. Initiate cleanup or control activities.
3. If a fire is involved, the Permit Holder shall:
- a. Notify the fire department and LRPO as soon as possible.
  - b. Take action appropriate to the situation to protect personnel and emergency responders.
  - c. Stand by to assist fire fighters as to the nature, location, and potential hazards of radioactive materials.
  - d. Melting points:
    - (1) Stainless steel - 2550°F (1400°C)
    - (2) Carbide - 2000°F (1090°C)
    - (3) Aluminum - 1005°F (540°C)
    - (4) Lead - 620°F (327°C)
    - (5) Polyethylene - 257°F (125°C)
4. Notify proper authorities:

- a. Location Radiation Protection Officer (**Steven Rawles**, 870-673-4483 x249)
- b. Research Leader\Center Director (**Donald W. Freeman**, 870-673-4483 x269)
- c. Radiation Safety Staff (Primary phone numbers: (301-504-2440,-2444/2445/2447). For a complete list of names and contact information see the RSS website at [www.rss.usda.gov](http://www.rss.usda.gov) ; click on “Contact RSS”.
- d. Arkansas Radiation Control and Emergency Management Program (501-661-2301)
- e. Fire Department (911)
- f. Nuclear Regulatory Commission (817-860-8100)
- g. Area Safety & Health Manager or Area Director (Phil Smith, 409-260-9343)

Note: Unless prudence or the nature of the emergency dictates otherwise, authority notification will usually proceed in the order listed above, with an informed judgement being made at each level as to the appropriateness of notifying the next level.

## **IX. EMPLOYEE INFORMATION AND TRAINING**

- A. Refer to the SOP for ordering Radioactive Material. Copies of the RSS-83 are no longer sent to the LAO office. It is only necessary to record the RSS approval number on the AD-700 sent to the LAO office which documents their authority from RSS to obligate funds for a specific RAM order. RSS-83 is specifically to document cradle to grave use and disposal of RAM amounts. Those records ultimately reside with the LRPO. It is the responsibility of permitted users to keep up with RAM amounts used in assays and disposed of by permitted processes and to inform RSS of said changes to RAM inventory.
- B. In addition to the initial training the RSS requires before granting a use permit, SNARC employees working with radiation or X-ray producing equipment will be provided with Location-specific information and training, so that they are acquainted with the hazards of radioisotopes. This training will be performed as soon after the time of initial assignment as practicable and prior to new assignments. Refresher training will be given annually or as needed.
- C. Training will consist of:
  1. The contents of 10 CFR 20 and 29 CFR 1910.96 as they apply to SNARC operations.
  2. The requirements of the RSS Permit Conditions for the operations conducted by the employees.
  3. The availability, location, and contents of the SNARC written Radiation Protection Plan.

4. The physical and health hazards of radioisotopes in the laboratories.
  5. Signs and symptoms associated with exposure to radioisotopes in the laboratories.
  6. Methods to detect the presence or release of radioisotopes in the laboratories.
  7. Location of reference materials regarding the safe handling of radioisotopes in the laboratories.
  8. Measures to protect employees from radiation hazards, including:
    - a. Standard operating procedures
    - b. Work practices
    - c. Emergency procedures
    - d. Shielding
    - e. Personal protective equipment
- D. The LRPO is responsible for conducting or arranging for the training sessions.
- E. Employee radiation safety training will be documented and maintained by the LRPO.

**X. INSPECTION & REVIEW PROGRAM**

- A. The LRPO will perform an inspection and program review at least annually to determine radiation safety program compliance.
1. The inspection will verify that engineering controls, protective equipment, SOPs, workplace monitoring, and other aspects of the SNARC radiation safety program are effective in preventing employee exposure to radioisotopes.
  2. The review of the written program will determine the adequacy of the current SNARC program and whether changes, updates, or improvements are needed.
- B. A copy of the inspection and review will be given to the Location Coordinator for correction of any discovered inadequacies or noncompliance.

- C. Copies of annual inspections will be kept in the libraries of DB NRRC (the central resource library for the **SPBL**) and SNARC as well as in the office of the LRPO located in the Fish Nutrition Laboratory, Room 112, SNARC.

**XI. RECORD KEEPING AND REPORTING**

- A. Record keeping requirements for radioactive materials/equipment purchase, transfer, disposal, dosimetry, surveys, leak tests, and training are contained in the RSS Permit Conditions that govern the materials/equipment.
- B. In addition to the RSS-required records, the following records will be kept:
  - 1. Program activities and meeting minutes.
  - 2. Annual inspections and program reviews.
- C. Records will be kept by the LRPO in the SNARC Fish Nutrition Lab, Room 112, free for employee review.

---

**Permit Conditions**  
for  
**General Research Using Radioactive Materials**

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**Background**

General research refers to the use of check sources, calibration standards, small sealed sources, and unsealed radioactive materials used in a general laboratory environment. Authority to possess and use radioactive materials is granted to an individual by the Radiation Safety Committee after the individual's application has been reviewed and approved by the USDA Radiation Safety Staff (RSS).

It is the responsibility of the permit holder named on the Radiation Source Permit to comply with all safety and regulatory requirements of the Nuclear Regulatory Commission (NRC) and the USDA Radiation Safety Program.

**In this Document**

This document covers the following topics:

Topic	See Page
General Laboratory Safety	2
Security and control	2
Acquisition of Radioactive Materials	3
Receipt Survey Requirements	4
Transfer and Disposal of Radioactive Materials	5
Laboratory Surveys	5
Radiation Detection Instruments	7
Sealed Source Leak Tests	7
Laboratory Close-out	8
Records	8
Questions	8

*Continued on Next Page*

Approved:  <u>10/11/96</u> Date	By:  <u>/s/</u> John T. Jensen Director, Radiation Safety Staff
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**General  
Laboratory  
Safety**

Eating, drinking, applying cosmetics, and smoking is prohibited in laboratory areas where radioactive materials are used or stored.

Work areas (bench tops, hoods, counters, etc.) shall be covered with absorbent matting or the use of radioisotopes must be conducted within trays to contain spills.

Plexiglas shielding is required to prevent whole body radiation exposure levels from exceeding 5 mR/hr when strong beta emitting radioisotopes such as  $P^{32}$  are used.

Lead bricks, foil, or lead impregnated plastic shielding is required to prevent whole body radiation exposure levels from exceeding 5 mR/hr when gamma emitting radioisotopes such as  $I^{125}$  or  $Zn^{65}$  are used.

Disposable gloves and laboratory coats shall be worn when handling radioactive materials.

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**Security and  
Control**

**Designation of Restricted Areas**

Areas where radioactive materials are either used or stored are designated as restricted areas. This designation is for the purpose of radioactive materials security and for radiation exposure control.

**Posting of Signs and Labels**

Laboratories, rooms, animal facilities, or other approved areas for the use or storage of radioactive materials shall be posted with a "Caution Radioactive

The following information must be posted in a sufficient number of places to allow employees to observe them when entering or leaving a restricted area:

- NRC Form-3 "Notice to Employees",
- Section 206 of the Energy Reorganization Act of 1974;
- The license and any Notice of Violation; and
- Responses to Notices of Violations.

NOTE: If it is impractical to post this information, NRC Form-3 should be posted with a notice that describes these documents and states where they may be examined.

Each container or piece of equipment in which radioactive materials are used and/or stored shall be labeled with a "Caution Radioactive Materials" sign.

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*Continued on Next Page*

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**Security and Control, Con't.**

**Security**

The permit holder shall secure radioactive materials in storage against unauthorized access or removal. This includes stock solutions, compounds, samples, and radioactive waste.

The permit holder shall control and maintain constant surveillance over radioactive material in their inventory that is not in storage.

**Loss or Theft**

The permit holder or Location Radiation Protection Officer (LRPO) shall immediately contact the RSS in case of actual or suspected loss or theft of any quantity of radioactive material.

The RSS will notify the NRC as required by Federal regulation.

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**Acquisition of Radioactive Materials**

**Acquisition**

Requests for radioactive materials must be approved by the RSS prior to the order being transmitted to the vendor. These requests can be transmitted to RSS by mail, E-mail, or by fax.

After a purchase order is prepared and approved by the facility purchasing agent, the order is to be transmitted to RSS. RSS personnel will review the information, compare the isotope and activity against the permit holder's approved inventory, and transmit the document to the vendor.

Blanket purchase orders may be used to obligate funds. However, each shipment must be requested individually through RSS.

Gratis shipments, replacements for defective orders, transfers from other permit holders, or any other kind of receipt of radioactive material that is not necessarily a purchase, must also be reviewed by the RSS and entered into the computer system for inventory control.

The RSS will transmit a Radioactive Materials Receipt form (RSS-80) and a Radioactive Materials Disposal form (RSS-82) to the facility LRPO, permit holder, or other designated individual to verify the inventory amount.

The permit holder must maintain an accurate and up-to-date inventory of the radioactive materials in their possession. This includes the materials on the RSS inventory and any other sources in the permit holder's possession.

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*Continued on Next Page*

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**Receipt Survey Requirements****Packages Exempt from Survey**

Packages containing radioactive materials that are shipped as limited quantity are exempt from receipt surveys. These packages do not have a diamond label.

**Packages Requiring Survey**

Packages containing radioactive materials that are shipped with a White-I, Yellow-II, or Yellow-III diamond shaped label on the outside of the package must be surveyed upon receipt at the facility. Examples of these labels are shown below.

**Time Allowed After Receipt for Survey**

Packages containing radioactive materials must be surveyed within three hours of receipt if delivered during normal working hours or within three hours from the beginning of the next working day if received after normal working hours.

**Package Contamination Surveys**

The exterior surface of a package requiring a survey must be monitored for removable contamination by a wipe test. The interior packaging should also be monitored before being discarded.

**Package Radiation Level Surveys**

The exterior surface of a package requiring a survey must be monitored for external radiation levels with an appropriate portable survey meter.

*Continued on Next Page*

**Receipt Survey Requirements, Con't.**

**Survey Limits**

The following table lists the limits for package receipt surveys. If the package survey exceeds these limits, call the RSS for guidance.

**Table 1: Package Receipt Survey Limits**

Survey Type	Limit
Removable Contamination	2,200 DPM
Radiation Level	
White-I	0.5 mR/hr
Yellow-II	10
Yellow-III	100

**Transfer and Disposal of Radioactive Materials**

A permit holder must receive the prior approval from the RSS before radioactive materials are transferred to or from another licensed or permitted individual.

Disposal of radioactive materials must be performed in accordance with the RSS Technical Bulletin on Radioactive Waste Management. This document is available in the USDA Radiation Safety Handbook.

**Laboratory Surveys**

Laboratory areas shall be monitored for contamination with an appropriate portable survey meter at the end of each day when radioisotopes are used.

Radiation level and removable contamination surveys shall be conducted either weekly or monthly depending on the amount of radioactive materials used in the area. The following table indicates the frequency of required surveys:

**Table 2: Frequency of Required Surveys**

Frequency	Amount of Radioisotope Use
Monthly	< 200 $\mu$ Ci per experiment, or < 1 mCi per week
Weekly	$\geq$ 200 $\mu$ Ci per experiment, or $\geq$ 1 mCi per week

*Continued on Next Page*

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**Laboratory  
Surveys, Con't.**

A sufficient number of radiation measurements and swipe samples will be taken to assure that contamination has not spread to unrestricted areas of the facility. The survey will include a labeled diagram of the surveyed rooms keyed to counting results and the results of decontamination efforts, if required.

Surveys of radioisotope storage areas shall be performed monthly.

When radioisotope use experiments are not performed in a given month, no survey of the general laboratory is required. Documentation that no survey was performed is required to avoid a gap in the survey records.

Survey results shall be reported in units of activity [disintegrations per minute (DPM) or  $\mu\text{Ci}$ ].

Users of unsealed radioisotopes are required to submit a copy of a typical laboratory survey performed during the prior three months to RSS for review each calendar quarter. RSS will maintain a copy of these reports.

The allowable removable contamination limits for laboratory surveys are specified in the following table.

**Table 3: Maximum Removable Contamination Limits (DPM / 100 cm<sup>2</sup>)**

Type of Area	Low-Risk Beta or Gamma-ray Emitters	Beta or Gamma-ray Emitters	Alpha Emitters
Radioisotope Use Laboratories, Restricted Areas, and Protective Clothing Worn only in a Restricted Area	22,000	2,200	220
Unrestricted Areas, and Personal Clothing Worn Outside a Restricted Area	2,200	220	22

Note: Low risk radioisotopes include H-3, C-14, S-35, and others whose beta energies are less than 0.2 MeV maximum, or whose gamma-ray emission is less than 0.1 R/hr at 1 meter per Curie of activity, e.g. I-125.

Fixed contamination limits are five times the limits specified in this table.

*Continued on Next Page*

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**Radiation  
Detection  
Instruments**

With the exception of  $H^3$ , users of unsealed radioactive materials must have a portable survey meter available to monitor for fixed contamination and for radiation levels. Commonly used radioisotopes and appropriate detectors are listed in Table 4. The meter must also have the sensitivity to detect contamination below the levels specified in Table 3.

**Table 4: Appropriate Survey Meters for Various Radioisotopes**

Radioisotope	Survey meter / Detector
$C^{14}$ , $S^{35}$ , $P^{32}$ , $P^{33}$	Thin end-window, pancake Geiger-Muller (GM)
$I^{125}$	Thin end-window Sodium Iodide (NaI)
$Cs^{137}$ , $Cr^{51}$ , $Zn^{65}$	Sodium Iodide (NaI)

Portable survey instruments shall be calibrated at intervals not to exceed one year by commercial firms or other qualified individuals. Detection efficiencies for radioisotopes used in the laboratory should also be determined. Portable survey instruments should be tested before each use with a small check source to verify proper instrument operation. Instruments shall be recalibrated when failing to respond to a check source or when serviced.

Laboratory counting equipment should be calibrated on an annual basis by counting standards of known activity. The calibration should consist of an efficiency determination and a determination of the Minimum Detectable Activity for commonly used isotopes.

**Sealed Source  
Leak Tests**

Sealed sources containing 100  $\mu Ci$  or more of radioactive materials must be leak tested at intervals not to exceed six months. Sources containing 10  $\mu Ci$  or more of alpha emitting radioisotopes must be leak tested at three month intervals. Sources containing hydrogen-3 ( $H^3$ ) or krypton-85 ( $Kr^{85}$ ) are exempt from testing.

The RSS will supply leak test kits, perform the required analysis, and report the results back to the permit holder. The permit holder can use other companies to perform and analyze the leak test provided they are properly licensed to perform that service. It is the responsibility of the permit holder to provide the RSS with a copy of the company's license for verification.

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**Sealed Source  
Leak Tests,  
Con't.**

If the test exceeds 0.005  $\mu\text{Ci}$  (11,100 DPM), RSS must be notified immediately in order to notify the permit holder, the NRC, and to contact the manufacturer to determine if special shipping requirements are necessary. Devices exceeding this level are to be removed from service and returned to the manufacturer for repair, replacement, or disposal.

The USDA Radiation Safety Program uses a limit of 1,110 DPM as a notification level. Users of devices exceeding this level will be notified of the test results to make them aware of the potential for source leakage in the future.

**Laboratory  
Close-out**

Before releasing a radioisotope laboratory or other work area for unrestricted use, all radioactive materials shall be removed. The laboratory or work area shall then be surveyed and, if necessary, decontaminated. Specific guidance can be found in the RSS Technical Bulletin "Performing Close-out Surveys in

Written authorization must be received from the RSS before a laboratory can be released for unrestricted use.

**Records**

The following table lists the period of time that records must be retained.

Record Type	Retention Period (Years)	
	Permit Holder	RSS
Purchase or Transfer of Radioisotopes	3	Indefinite
Disposal of Radioisotopes	Indefinite	Indefinite
Radioactive Waste Manifests	Indefinite	Indefinite
Instrument Calibration	3	3
Leak Test Results	3	3
Laboratory Survey Results	3	3

**Questions**

If there are any questions regarding the information in this document, contact:

USDA Radiation Safety Staff  
4700 River Road, Unit 91  
Riverdale, MD 20737

Phone: (301) 734-4945  
Fax: (301) 734-5050

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United States Department of Agriculture  
Radiation Safety Staff, 5601 Sunnyside Ave, Beltsville, MD 20705-5510

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May 8, 2003

To: Steven Rawles

From: Daniel R Sharp, Radiation Safety Staff Health Physicist

The other attachment to this email contains your corrected Radioactive Material Use Permit. The change appears on Sheet A, in which errors in the room listings were corrected.

The attached permit file has been named rev2A, to indicate that it is a correction to revision 2 of the permit (see Sheet-B which tracks the total permit revisions).

Permit Use Conditions can be found on the RSS web page: [www.rss.usda.gov](http://www.rss.usda.gov)

Compliance with the conditions of the permit will be verified during routine inspections conducted by our office.

Contact: Dan Sharp: 301-504-2447  
Katina Jones: 301- 504-2444  
main office number: 301-504-2440

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Radiation Safety Staff Form RSS-30 (October 1993)

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United States Department of Agriculture

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**"RADIATION SOURCE" USE PERMIT**

THIS IS A FRAMABLE CERTIFICATE OF A MULTI-PAGE PERMIT

Permit expires June 30, 2006

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This certifies that

*Steven D Rawles (Permit number 5592)*

is recognized by the U.S. Department of Agriculture's Radiation Safety Committee (RSC) as a Responsible User of "radiation sources" which may be in the form of unsealed radioactive material, contained or sealed radioactive sources, or x-ray producing equipment, with subsequent approval to acquire and maintain "radiation sources," in locations and for purposes as described and agreed upon elsewhere in this permit.

*(Original signed by Dan Sharp) 5/8/2003*

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Dan Sharp, Health Physicist

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**Appendix B, Page 2 of 7**

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**"Radiation Source" Use Permit Supplemental Sheet A: LOCATION**

---

Steven Rawles (Permit number 5592) permit expires June 30, 2006 Revision 2, RSS Director Initials

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Location ARS/Stuttgart, AR

Organization

Address 2955 Hwy 130 East  
Box 860  
Stuttgart, AR 72160

---

Approved Location and Storage Areas For

---

Isotopes HKDSNARC Room 126  
HKDSNARC Room 112  
HKDSNARC Room Storage Bldg, Bunker B

---

ECD DBNRRRC, Room L-4  
HKDSNARC Room 128

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**Appendix B, Page 3 of 7**

**"Radiation Source" Use Permit Supplemental Sheet B: RESPONSIBLE USER AGREEMENT**

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Steven Rawles (Permit number 5592) permit expires June 30, 2006 Revision 2, RSS Director Initials

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The Responsible User named in this permit agrees to use "Radiation Sources"

in accordance with the requirements of the U.S. Nuclear Regulatory Commission License No.19-00915-03,

and in accordance with the requirements of Title 10 of the Code of Federal Regulations,

and in accordance with the statements, representations, and procedures contained in the documents listed below, including any enclosure not listed:

application received, dated 3/9/2001  
document received, dated 9/13/2001  
document received, dated 4/30/2002  
document received, dated 6/19/2002  
document received, dated 3/7/2003

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and in accordance with the following USDA Radiation Safety Staff publications and memoranda which are issued in conjunction with, and constitute the conditions, of this permit:

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- a. Use Conditions for Unsealed Radioactive Material
- b. Use Conditions for Electron Capture Detectors
- c. Conditions for Personnel Dosimetry

**Appendix B, Page 4 of 7**

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"Radiation Source" Use Permit Supplemental Sheet C: **MATERIAL**

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Steven Rawles (Permit number 5592) permit expires June 30, 2006 Revision 0, RSS Director Initials

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Under this permit, "Radiation Source" use is limited to the following items:

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- |          |  |
|----------|--|
| isotopes | a. C-14 (amino acids, glucose) in liquid form, not to exceed 10 mci<br>b. H-3 (amino acids, glucose) in liquid form, not to exceed 10 mci;<br>c. I-125 (steroids) in liquid, solid form, not to exceed 1 mci |
| ECD(s)   | d. Varian model 02-001972 ECD containing 15 mci Ni-63 plated foil, not to exceed 2 items.  |
- 

**Appendix B, Page 5 of 7**

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"Radiation Source" Use Permit Supplemental Sheet D: **USES OF MATERIAL**

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Steven Rawles (Permit number 5592) permit expires June 30, 2006 Revision 0, RSS Director Initials

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Approved Uses for items listed on previous page

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isotopes      For laboratory use.

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ECD            For sample analysis.

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**"Radiation Source" Use Permit Supplemental Sheet E: Associates Users**

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Steven Rawles (Permit number 5592) permit expires June 30, 2006 Revision 0, RSS Director Initials

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Approved Users for items listed on previous page

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Kenneth B Davis  
Rolfe J Bryant  
Matthew McEntire

Melisse S Hobbs  
Thomas G Gaylord

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**Appendix B, Page 7 of 7**

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**Permit Conditions  
for  
Electron Capture Detectors**

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**Background** Authority to possess and operate an Electron Capture Detector (ECD) containing a radioactive source is granted to an individual by the Radiation Safety Committee after the user's application has been reviewed and approved by the USDA Radiation Safety Staff (RSS).

It is the responsibility of the permit holder named on the Radiation Source Permit to comply with all safety and regulatory requirements of the Nuclear Regulatory Commission and the USDA Radiation Safety Program.

**In this Document** This document covers the following topics:

Topic	See Page
Acquisition	2
Authorized Users	2
Leak Tests	2
Leak Test Limits	3
Routine Operation and Maintenance	3
Signs and Labels	3
Special Requirements for ECDs Containing Hydrogen-3	3
Storage of Unused ECDs	4
Transfer of ECDs	4
Disposal of Unused ECDs	4
Records Retention	5
Questions	5

*Continued on Next Page*

Approved:  3/11/96 Date	By:  /s/ John T. Jensen Director, Radiation Safety Staff
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**Acquisition**

Purchase orders for electron capture detectors or for gas chromatographs containing an ECD must be approved by the Radiation Safety Staff prior to the order being placed by a purchasing agent.

A permit holder must receive the prior approval from the RSS before an ECD is transferred from another licensed or permitted individual.

Upon receipt of any ECD, the following information must be submitted to the RSS:

- Sealed Source Inventory Record (RSS-28);
- A copy of the manufacturer's initial leak test results (if available); and
- A copy of the manufacturer's information and specifications.

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**Authorized Users**

Only the permit holder and the associate users listed in the Radiation Source Permit are authorized to install, remove, or leak test the ECD.

Other individuals in the laboratory may operate a gas chromatograph with an ECD installed after they have received appropriate training from the permit holder.

---

**Leak Tests**

A leak test of an ECD containing nickel-63 ( $\text{Ni}^{63}$ ) must be performed at intervals not to exceed six months.

The test must be performed in accordance with the manufacturer's instructions, or by wiping the gas intake and outlet surfaces.

**NOTE:** Never attempt to directly wipe the inner surface of the component containing the radioactive material. This might cause the ECD to fail and will contaminate the ECD, the gas chromatograph and the surrounding area.

Never open the detector cell for any reason.

The RSS will supply leak test kits, perform the required analysis, and report the results back to the permit holder. The permit holder can use other companies to perform and analyze the leak test provided they are properly licensed to perform that service. It is the responsibility of the permit holder to provide a copy of the vendor's license for RSS to verify.

*Continued on Next Page*

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**Leak Test Limits**

A sealed source has failed the leak test when the contamination on the filter paper used for the test exceeds 0.005  $\mu\text{Ci}$  (11,100 DPM). Devices exceeding this level are to be removed from service, and returned to the manufacturer for repair, replacement, or disposal. The RSS must be notified immediately if the leak test limit is exceeded in order to notify the NRC and to contact the manufacturer to determine if special shipping requirements are necessary.

The USDA ALARA program uses one other limit to monitor the performance of these tests.

- 1,110 DPM (10% of the limit) is a notification level. Users of devices exceeding this level will be notified of the test results to make them aware of the potential for source failure in the future.

---

**Routine Operation and Maintenance**

All servicing or cleaning of an ECD must be performed by the manufacturer or by an authorized representative of the manufacturer.

Transfers of ECDs to companies for cleaning or maintenance must receive the prior approval of the RSS since this is a transfer of possession. Also, the company often supplies a different ECD in return, requiring the user to update their inventory record with RSS.

---

**Posting of Signs and Labels**

Any room or area containing an ECD must be posted with a sign having the words "Caution - Radioactive Materials". These signs are available from the Radiation Safety Staff.

The room containing the ECDs must be posted with an NRC Form-3 "Notice to

Each ECD must have a tag or a label securely attached having the words "Caution - Radioactive Materials" clearly visible. The radioisotope, activity, and measurement date must also be listed.

---

**Special Requirements for ECDs Containing Hydrogen-3**

Detector cells containing hydrogen-3 ( $\text{H}^3$ ) must be vented:

- Directly to the outside of the building, or
- To a continuously operating chemical fume hood.

Detector cells containing titanium tritide or scandium tritide foils must only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperature from exceeding its design specifications.

Leak tests are not required for ECDs containing hydrogen-3.

*Continued on Next Page*

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**Storage of  
Unused ECDs**

A detector cell that has been removed from a gas chromatograph must be stored in a locked cabinet or drawer. The drawer front must be labeled with a "Caution - Radioactive Materials" label or sign.

Flammable materials must not be stored in the same area as ECDs.

The room containing the ECDs must be posted with a "Caution - Radioactive Materials" label or sign and a NRC Form-3 "Notice to Employees".

---

**Transfer of  
ECDs**

The RSS must be notified in writing of a user's intent to transfer an ECD to another USDA permit holder, to a licensed individual covered by a different NRC or Agreement State license, or to return the ECD to the manufacturer for cleaning or service.

The transfer can be accomplished only after the written approval of the RSS is received by the permit holder.

---

**Disposal of  
Unused ECDs**

The disposal of ECDs is recommended when the research or program requirements no longer require its use.

The proper disposal of unused ECDs is required. In most cases, the original manufacturer of the ECD will accept the return of the device.

Prior to disposing of any ECD, the Radiation Safety Staff must be notified. This allows the RSS to:

- Perform a records check;
- Verify that a current leak test is available for the device prior to shipping;
- Determine if the manufacturer has any special shipping or packaging requirements; and
- Amend the user's radioactive materials permit.

The disposal can be accomplished only after the written approval of the RSS is received by the permit holder.

Copies of all shipping documents must be sent to the RSS for placement in the archive file maintained for all sealed radioactive sources.

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*Continued on Next Page*

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**Records  
Retention**

All documents relating to the purchase, transfer, or disposal of an ECD must be retained by the permit holder for as long as their permit is active.

The Radiation Safety Staff maintains records of the purchase, transfer, and disposal of ECDs as long as the Department's radioactive materials license is active.

Records of leak tests must be retained for three years. Both the permit holder and the Radiation Safety Staff must retain these records.

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**Questions**

If there are any questions regarding the information in this document, contact:

USDA Radiation Safety Staff  
4700 River Road, Unit 91  
Riverdale, MD 20737

Phone: (301) 734-4945  
Fax: (301) 734-5050

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United States Department of Agriculture

Office of Human Resources Management - Safety and Health Management Division

**Radiation Safety Staff  
Permit Conditions**

for

**Iodine-125 Bioassay and Effluent Monitoring**

**Background** Permit Holders requesting the use of milliCurie quantities of iodine-125 must take special care to prevent the release of radioiodine to the environment.

This document describes the additional procedures involving thyroid bioassay and effluent monitoring that must be accomplished for certain operations involving I-125.

**In this Document** This document covers the following topics:

	<b>Topic</b>	<b>See Page</b>
Policy		2
Bioassay Limits		2
Effluent Limits to Unrestricted Areas		2
General Precautions		3
Storage of iodine-125		3
Instrument Calibration		3
Records Retention		4
Using Program Forms and Worksheets		4
Questions		4

*Continued on Next Page*

**Policy** A thyroid bioassay and effluent monitoring is required:

<b>If the operation is conducted in a ...</b>	<b>And the activity of volatile or dispersible I-125 exceeds:</b>	<b>Or the activity of non-volatile or non-dispersible I-125 exceeds:</b>
Open room or on a laboratory benchtop	0.1 mCi	1.0 mCi
	1.0 mCi	10.0 mCi
Fume hood of adequate face velocity		
	10.0 mCi	100.0 mCi
Glove box or mini-hood with charcoal filter		

Individuals who are involved in a series of operations during any five day period whose total activity meets or exceeds these limits are also required to have a bioassay. The results of the bioassay shall be recorded using the Thyroid Bioassay Worksheet (RSS-50).

**Bioassay Limits** This table shows the limits on uptake of iodine-125 in the thyroid.

<b>Criteria</b>	<b>Limit</b>
Weekly Limit for Thyroid Uptake	600 nCi
Permit Holder Investigation Level	120 nCi
Radiation Safety Staff Notification Level	60 nCi

The Permit Holder shall notify the RSS if any bioassay value exceeds 60 nCi.

The Radiation Safety Staff, during its review of the thyroid bioassay forms will contact the facility LRPO and the Permit Holder if any of these limits are exceeded.

**Effluent Limits to Unrestricted Areas**

The concentration of iodine-125 released to unrestricted areas can not exceed an average of  $3 \times 10^{-10}$   $\mu\text{Ci} / \text{ml}$ .

This value can be averaged over a period of time that exceeds the actual time of the operation. It is RSS policy to limit the time to 8 hours. Additional time can be allowed upon approval of the RSS.

The results of effluent monitoring shall be recorded using the Radioactive Iodine Effluent Monitoring Worksheet (RSS-60)

*Continued on Next Page*

**General Precautions**

All procedures involving iodine-125 (where the iodine-125 compound is or could become volatile) must be conducted in an operating chemical fume hood with a minimum air flow rate of 100 linear feet per minute. This includes:

- Opening of packages containing iodine-125 as NaI;
- Dilution of stock solutions; and
- Chemical procedures such as iodinations.

Individuals handling iodine-125 shall wear a lab coat and protective gloves.

Extreme care must be exercised in isolating and cleaning up spills.

**Storage of iodine-125**

All sodium iodide (I-125) solutions shall be stored in a well ventilated area, preferably in a fume hood or glove box.

All waste containing iodine-125 shall be placed in tightly closed containers to prevent leakage and escape of gases and shall be stored in well ventilated areas until disposed or decayed.

Solutions must not be made acidic. Chlorine bleach must not be added for any reason. These actions will release the bound iodine.

**Instrument Calibration**

A portable survey instrument having a sodium-iodide (NaI) detector and a thin end window are preferred to survey for iodine-125 contamination. These instruments are also adequate for thyroid bioassay.

A properly calibrated laboratory gamma counter or a portable scaler is adequate for counting contamination wipes or for counting charcoal filters used for effluent monitoring.

Any instrument used to monitor an individual's thyroid as part of a program to assess iodine-125 uptake, must be calibrated on an annual basis. In addition, the counting efficiency using a thyroid phantom must be determined every two years.

Instruments used to analyze effluent monitoring must be calibrated using known standards on an annual basis.

**NOTE: The RSS has a thyroid phantom and a filter and rod standard available for these determinations.**

*Continued on Next Page*

**Records Retention**

The following worksheets are used in this program:

- Thyroid Bioassay Worksheet (RSS-50)
- Radioactive Iodine Effluent Monitoring Worksheet (RSS-60)
- Instrument Efficiency Worksheet for I-129 Standards (RSS-120)
- Thyroid Bioassay Instrument Efficiency Worksheet (RSS-121)

**These forms must be retained by the facility LRPO for three years. Copies of these forms must be submitted to the RSS for review.**

**Using Program Forms and Worksheets**

The forms and worksheets included with this document provide the basis for an individual to document the surveys and assessments performed.

All of the worksheets describe the policy that must be met for radiation safety surveys and include the minimum amount of information needed to provide traceability and repeatability of the measurements, if needed.

The procedures section assures that the proper calculations have been performed.

Upon receipt of the forms by the RSS, the calculations are entered into a spreadsheet to verify the calculations.

**Questions**

If there are any questions regarding the information in this document, contact:

USDA Radiation Safety Staff  
5601 Sunnyside Avenue  
Mail Stop 5510  
Beltsville, MD 20705-500  
Phone: (301) 504-2440 Fax: (301) 504-2450

Approved:

3/11/96

Date

By:

/s/

John T. Jensen

Director, Radiation Safety Staff

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## Permit Conditions for Personnel Dosimetry

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**Background**

Dosimetry is the measurement of radiation dose. Radiation dosimeters are used by the U.S. Department of Agriculture (USDA) to monitor the exposure of its personnel to ionizing radiation.

Dosimetry for radioactive materials use under the broad scope research and development license issued by the Nuclear Regulatory Commission (NRC) is not a regulatory requirement. This program is voluntary by the USDA.

The use of dosimeters for users of irradiators is required by the specific irradiator license issued by the NRC. The use of dosimeters for users of moisture/density gauges is required by USDA policy.

**In this Document**

This document covers the following topics:

Topic	See Page
Regulatory Requirements	2
USDA Dosimetry Service	2
Proper Handling of Dosimeters	2
Control Badges	3
Starting Dosimetry Service	3
Additions to an Existing Series	3
Deleting Badges or Making Changes	3
Deleting an Existing Series	3
Visitors	4
Declared Pregnant Workers	4
Exposure Reports	4
Records Retention	4
Questions	4

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Approved:  <u>    10/9/96    </u> Date	By:  <u>    /s/    </u> John T. Jensen Director, Radiation Safety Staff
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**Regulatory Requirements**

A personnel dosimetry program is required if radiation exposures are likely to exceed 10 percent of any of the applicable limits set by the NRC. A review of the dosimetry records by Radiation Safety Staff (RSS) demonstrate no occupational exposure to USDA personnel.

Since the USDA has demonstrated through monitoring that no employee receives a significant dose, monitoring is not required to maintain compliance with the broad scope radioactive materials license issued by the NRC, as long as the use of radioactive materials remains the same as in previous years. New uses of radioisotopes may require monitoring until the likelihood of exposure can be determined.

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**USDA Dosimetry Service**

Personnel dosimetry services are supplied to the USDA by a private contractor that furnishes area monitors and thermoluminescent dosimetry (TLD) badges directly to each location.

At the end of each monitoring period all monitors and badges should be returned directly to the contractor.

All correspondence and questions regarding dosimetry issues are to be addressed to the RSS.

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**Proper Handling of Dosimeters**

Dosimeters received from the contractor consists of a TLD badge. Each badge has the individual's name and wearing period printed on it. The badge must be worn only by the individual whose name appears on the badge.

Badges must be changed when the exposure period is completed and new badges are received. Old badges must be returned promptly to the contractor.

Dosimeters shall be worn on the outside of the clothing between the neck and waist.

Dosimeters should not be exposed to extremes of temperature or humidity since this makes exposure readings unreliable. Do not open the badge.

Personnel dosimeters are to be worn only during the course of employment and are not to be worn during medical procedures such as x-rays or for nuclear medicine visits.

If a dosimeter is lost or damaged, contact RSS for assistance.

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<b>Control Badges</b>	<p>Control badges are included in each shipment of personnel dosimeters. These badges measure the background radiation received during shipment and during the wearing period.</p> <p>Control badges are to be placed in a low radiation area and returned when returning the other dosimeters to the contractor for analysis.</p> <p>Do not issue or wear the control badge.</p>
<b>Starting Dosimetry Service</b>	<p>To start dosimetry service, the facility must designate a Consignee and have that individual complete the following forms:</p> <ul style="list-style-type: none"> <li>• Dosimetry Service Request (Form RSS-70); and</li> <li>• Additions to Dosimetry Service (Form RSS-71).</li> </ul> <p>Note: An Additions to Dosimetry Service form must be completed for each individual who will receive a personnel dosimeter.</p> <p>These forms must be transmitted to the Permit Operations Section, RSS for processing.</p>
<b>Additions to an Existing Series</b>	<p>To add an individual or to add area monitors to an existing series, the Consignee must complete an Additions to Dosimetry Service (Form RSS-71) for each individual to be added.</p> <p>This form must be transmitted to the Permit Operations Section, RSS, for processing.</p>
<b>Deleting Badges or Making Changes</b>	<p>To delete area monitors and individuals, or to correct information, the Consignee must complete a Dosimetry Deletion or Change Request (Form RSS-72).</p> <p>This form must be transmitted to the Permit Operations Section, RSS for processing.</p>
<b>Deleting an Existing Series</b>	<p>To stop all dosimetry service, the Consignee must complete the Dosimetry Service Request (Form RSS-70).</p> <p>This form must be transmitted to the Permit Operations Section, RSS, for processing.</p>

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<b>Visitors</b>	<p>For those accounts having spare or visitor badges, a Visitor Dosimetry Assignment Report (Form RSS-73) must be completed prior to the visitor's entry into a restricted area. A spare badge must be worn only by one person.</p> <p>A copy of form RSS-73 must be completed and transmitted to RSS the day the visitor badge is issued. This will allow the personnel information to be entered into the contractor's database prior to the badge being returned. The dosimetry report will then correctly list the visitor on the permanent record.</p>						
<b>Declared Pregnant Workers</b>	<p>The dose limits for an embryo/fetus only apply if the mother declares her pregnancy in writing to her employer. For reasons of privacy, the Department cannot arbitrarily lower the occupational dose limits for a woman who appears pregnant or for a woman who may not wish to have more restrictive limits applied to her work situation. Only the woman can declare her pregnancy.</p> <p>Once a pregnancy is declared, the individual will be counseled on the effects of radiation on the developing embryo using the Technical Bulletin "Radiation Safety Considerations for the Declared Pregnant Woman". Each location should have a copy available for review.</p> <p>The dosimetry contractor has a special dosimeter to be worn at waist level for the duration of the pregnancy.</p>						
<b>Exposure Reports</b>	<p>Reports of exposures are sent by the dosimetry contractor to each facility and to the RSS at the end of each monitoring period.</p>						
<b>Records Retention</b>	<p>All reports relating to personnel radiation exposure are maintained indefinitely.</p>						
<b>Questions</b>	<p>If there are any questions regarding the information in this document, contact:</p> <table border="0" style="margin-left: 40px;"> <tr> <td>USDA Radiation Safety Staff</td> <td>Phone: (301) 734-4945</td> </tr> <tr> <td>4700 River Road, Unit 91</td> <td>Fax: (301) 734-5050</td> </tr> <tr> <td>Riverdale, MD 20737</td> <td></td> </tr> </table>	USDA Radiation Safety Staff	Phone: (301) 734-4945	4700 River Road, Unit 91	Fax: (301) 734-5050	Riverdale, MD 20737	
USDA Radiation Safety Staff	Phone: (301) 734-4945						
4700 River Road, Unit 91	Fax: (301) 734-5050						
Riverdale, MD 20737							

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RSS Approval No.		United States Department of Agriculture <b>Radioactive Material Usage Form (RSS-83)</b>		
This form documents a request, approval, receipt, and disposal of a quantity of radioactive material. Complete this form and e-mail it to RSS (rsspo@rss.usda.gov) or fax the form to RSS at 301-504-2450. For assistance, call (301) 504-2440. Maintain a copy of this form for your records.				
Permit Holder	Permit No.	Location	Permit Holder E-mail Address	
Approved by : Name		Date	Comment:	
REQUEST: Radioisotope:		DATE:	Purchase Order No:	
Quantity (mCi):			Purchase Order Date:	
Chemical Name:			Supplier:	
Chemical Form:			Catalog No.	
RECEIPT: Transportation Label on Package: <input type="checkbox"/> None, exempt <input type="checkbox"/> I-White <input type="checkbox"/> II-Yellow <input type="checkbox"/> III-Yellow Package Condition: <input type="checkbox"/> Damaged or Wet				
Radiation Level Survey (Results must be mR/hr)				
Radiation Level:	Background:	<input type="checkbox"/> Geiger-Muller Detector <input type="checkbox"/> Sodium Iodide Detector		
Removable Contamination Survey (Results must be in DPM)				
Wipe Test Result:	Background:	<input type="checkbox"/> Liquid Scintillation Counter <input type="checkbox"/> Gamma Counter		
Survey completed by: (Print Name, Permit Number, Date)				
DISPOSAL : Transfer Codes : (1A) Transferred to waste holding area for DECAY (1B) Transferred to waste holding area for INCINERATION (1C) Transferred to waste holding area for BROKER (2) Sewered (3A) Transferred for use to another USDA employee (3B) Transferred for use to a non-USDA employee (4) Other disposal method (5) Error Correction				
DATE	AMOUNT TRANSFERRED (mCi)	TRANSFER CODE	AMOUNT ON HAND mCi	INITIALS
Radioactive Waste: Disposal must be conducted by a method previously approved by the Radiation Safety Staff. Transfers within the USDA must be to an RSS approved user and transfers outside the USDA must be to an NRC approved licensee (or a licensee of a NRC agreement state).				
Disposal Completed by: (Print Name, Permit Number, Final Disposal Date)				

**SUBMIT**

This section provides general information on responding to emergencies involving radioactive materials at USDA facilities.

This section contains the following information:

**Topic**

**General Radioactive Materials**

**Moisture/Density Gauges**

**Electron Capture Detectors**

**Self-Shielded Irradiators**

**Location Emergency Response**

Note: This is to be completed by the LRPO

**General Radioactive Materials**

Emergency response programs must be developed by each location that has individuals permitted to use radioactive materials. The extent of the program depends on the categories of Radiation Source Permits issued and the scope of the radioactive materials use at the location. The information and steps below can serve as the basis for the location's emergency response program.

Most emergencies encountered in a research laboratory using unsealed radioactive materials or at a location using sealed sources can be successfully handled by following four principles. These are:

Assist people first;

Monitor all personnel involved;

Control the area; and

Call the LRPO for assistance.

**- Spill of a non-volatile material, no personnel contamination**

Make others in the area aware of the accident to prevent them from walking through the contaminated area and spreading the contamination;

Cover the spill with absorbent paper;

Verify the isotope and estimate the activity involved;

Have an individual not involved in the accident monitor all others in the immediate area to verify that no people were contaminated;

Survey the area to determine the extent of the contamination;

Mark the spill area with tape; and

Begin decontamination efforts, working from the outer edge of the spill in to the center.

**- Spill involving personnel contamination**

Make others in the area aware of the accident;

The contaminated individual should stay in one area. Walking around will likely spread the contamination;

Carefully remove the individual's laboratory coat and gloves and place them in a plastic bag;

Have the individual put on new vinyl gloves in case their hands are contaminated;

Have someone not involved in the accident monitor all others in the immediate area to verify that no others were contaminated;

Survey the area to determine the extent of the contamination; and

Survey the individual involved to determine the extent of their contamination;

Remove all contaminated clothing, placing them in a plastic bag; and

Begin decontamination, if necessary.

**- Minor accident involving skin contamination**

Most skin contamination can be removed by gentle washing with a mild detergent or chelating agent;

Do not scrub in a manner that reddens or abrades the skin. This may allow the contamination to be absorbed into the body; and

Repeat the gentle washing as necessary until the contamination has been removed.

**- Accident involving severe injury to an individual.**

With very few exceptions, radioactive contamination can be ignored when it is more important to treat an injury. The fundamental tenet is **First Aid First**:

Call for help from others in the area;

After the injury is stabilized, then control the area, initiate surveys and decontamination efforts.

If emergency medical personnel have responded to the injury, advise them of the potential for radioactive contamination. If the accident victim must be transported to a hospital, the location's LRPO, or other designated individual should go to the hospital to assist in monitoring and to describe the likely extent of contamination to hospital personnel.

**- Accident involving internal exposure**

Within the USDA research facilities, accidents involving significant internal exposure are extremely rare. A typical internal

exposure would involve either hydrogen-3 or iodine-125, in quantities that would be expected to cause no immediate or long-term harm to the individual.

In the case of this type of accident:

Have someone not involved in the accident monitor all others in the immediate area to verify that no others were contaminated;

Survey the area to determine the extent of the contamination; and

Survey the individual involved to determine the extent of their contamination;

Using a Q-tip, swab the nasal passages. Place the Q-tip in a sealed plastic bag for later analysis.

Have the individual void their bladder. Save in individual containers ALL subsequent urine voids. This will be important in determining the actual amount of radioactive material ingested or inhaled.

Call the Radiation Safety Staff for instruction. A member of the RSS will likely make a trip to the facility to assist in the investigation.

## **- Waste Management**

Radioactive waste resulting from a spill and its clean-up should be managed by the LRPO in accordance with the location's radioactive waste management plan.

### **Moisture/Density Gauges**

Emergencies involving portable nuclear moisture/density gauges typically involve either the theft or loss of the gauge or an accident in which the gauge is crushed at a construction site.

## **- Theft or loss**

As soon as it becomes known that a gauge has been stolen or is misplaced, the Permit Holder, or the individual in possession of the gauge, must immediately call the Radiation Safety Staff for assistance.

## **- Accident**

The following steps must be taken when a gauge is involved in an accident.

Rope off or secure the area within 15 feet around the gauge. Do not allow anyone to enter the area;

If a vehicle is involved, it should be stopped until the extent of contamination, if any, can be determined;

Have an individual maintain constant surveillance of the accident site; and

Send an individual to contact the USDA Radiation Safety Staff and appropriate Agency personnel. The RSS will contact State radiation safety personnel, as necessary, to assist in the accident clean-up.

### **Electron Capture Detectors**

<http://www.rss.usda.gov/sec44.htm>

5/26/04

Electron capture detectors are sealed sources that typically do not pose a hazard in the case of a facility emergency such as a fire. If it appears that the ECD is damaged, the area around the ECD should be wiped and analyzed to determine if the source has become damaged. This should be performed prior to any other cleaning.

If the ECD is leaking, place it in a plastic bag and arrange for its return to the manufacturer, or treat it as radioactive waste for disposal.

#### **Self-Shielded Irradiators**

An emergency is considered to occur when a malfunction of the irradiator causes the operator and other persons in the irradiator room or area to be potentially exposed to excessive radiation or to radioactive contamination.

#### **- In the event of an emergency:**

The operator shall immediately suspend all operations and evacuate all personnel except those investigating the emergency;

The operator shall promptly notify the Permit Holder, the LRPO, the Location Director, and the USDA Radiation Safety Staff;

No further action shall be taken until the cause of the emergency is determined, evaluated and remedial action is prescribed by the RSS; and

A complete report shall be prepared detailing the circumstances of the emergency, identification of the persons involved, observed radiation levels, and duration of exposure as well as results of the area survey and any related details.

#### **- In the Event of Fire:**

In case of fire in the immediate area, operation of the irradiator shall be suspended and the irradiator shall be closed and locked;

Firefighters shall be advised of the potential hazard by the Permit Holder or other individual;

After the fire, the entire area shall be surveyed for contamination and the irradiator surveyed for any loss or change of shielding integrity before the area is opened to reconstruction or returned to service;

The USDA Radiation Safety Officer shall determine a course of action and shall notify the NRC in accordance with Federal regulations; and

A complete report shall be prepared detailing the circumstances of the fire, identification of persons involved, observed radiation levels and duration of exposure as well as results of the area survey and related details.

#### **Location Emergency Response Information**

If the location has developed specific emergency response information for radioactive materials incidents, it should be placed in this section.

Alternately, information stating where the information can be found can be placed in this section.