

# Radiation Safety Manual

## ORGANIZATION

The authorization, structure, personnel, and responsibilities of individuals for the radiation safety program for Southeastern Louisiana University at Hammond are described in this section. The names and telephone numbers of individuals currently involved in the program are listed at the front of this manual.

### Authorization

Authorization for Southeastern Louisiana University to possess, store, and use radioactive materials is stipulated in an educational radioactive materials license issued by the Louisiana Radiation Protection Division of the Department of Environmental Quality, which has vested responsibility from the United States Nuclear Regulatory Commission within the State of Louisiana or a in special nuclear material license issued by the United States Nuclear Regulatory Commission. The educational license allows the University the use of radioactive materials for teaching and research through the operation of an internal radiation safety and control program. Copies of these licenses are available for inspection in Office of mn itiLouisiiian(a)-3.9 (ll-4 (s)- )TJ 4 (tu)-4 ( of)-7-8 (a)z(t)-14 (l)-6 ( )TJ 0 Tc\* [(r) ofo (d)

## **Responsibilities and Authority**

**All persons involved with the handling, use, and storage of radioactive materials and radiation sources have the general responsibilities to:**

- 1) Assure that University personnel, students, and visitors are not subject to undue radiation exposure;**
- 2) Assure that all federal and state regulations have full compliance;**
- 3) Assure that all University regulations and policies pertaining to radiation safety have full compliance;**
- 4) Assure that special project restrictions have full compliance;**
- 5) Assure that University insurance restrictions are met;**
- 6) Assure that local and state codes and ordinances have full compliance;**
- 7) Assure that the integrity and usefulness of University facilities are not compromised;**
- 8) Assure that maximum standards of good practice and safe handling are maintained.**

**These general responsibilities apply to all individual users, technicians, students, and operating personnel.**

**Each person who handles radioactive materials or radiation sources must recognize that the ultimate success of a radiation safety program lies in responsible actions by individuals in their daily work.**

**The Radiation Safety Committee is charged with the responsibility and authority to control the use of radioactive materials and radiation sources on a local basis. The Radiation Safety Committee can expedite action on radiation safety matters because of its intimate knowledge of local situations, and because of its ability to convene quickly. An executive committee, consisting of the Radiation Safety Committee Chairman, the Radiation Safety Officer, and one other member chosen by the Committee, is empowered by the full Committee to act in emergency situations. The Radiation Safety Committee has advisory responsibilities for:**

- 1) Assuring that user projects comply with license restrictions, University policies and**



# ALARA PROGRAM

**The date submitted, project title, user's department, and college and user's social security number must be completed. The user must supply information relative to training and work experience in the handling of radiation sources and radioactive materials of all personnel involved with the project. User qualifications must be commensurate with the planned use. If the application is from a user who has received prior approval on another project, the phrase "Qualifications on file in the Radiation Safety Office" may be inserted for convenience.**

**User-Project approvals are issued only to principal investigators (faculty) and group leaders. It is their responsibility to provide proof to the Radiation Safety Officer of radiation safety training for all persons involved with radiation related activities under their control.**

**The radionuclides or radiation sources required for the project must be specified in sufficient detail for radiological safety review. This listing includes radiation-producing equipment which requires separate registration by the Radiation Protection Division. For radionuclides, the total activity of each radionuclide that the user anticipates ordering at any one time and the total of each radionuclide the user expects to have on hand at any one time must be indicated.**

**Specific information must be supplied on all locations where radioactive materials or radiation sources are to be employed and/or stored during the course of the project. This information is required so that the Radiation Safety Officer can establish that the sites conform to the University's radioactive materials license. The Radiation Safety Officer is also required to inspect the specified locations to ascertain that the proposed use is consistent with license restrictions, federal and state regulations, and University rules and policies.**

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## **Training**

The radiation safety officer will maintain a listing of all persons who have certified as trained in radiation safety commensurate with their exposure potential. Certification of training shall be one of the following:

- 1) Faculty by credentials submitted with the user project application.
- 2) By certifying in writing from the principal investigator that the person is trained in radiation safety.
- 3) By successful completion of a Nuclear Science course.
- 4) By attending a short course approved by the Radiation Safety Office and passing a test at the end of the course.

## **Radionuclide Orders**

**Radio**



## **Radionuclide Disbursement**

Upon notification of the arrival of radioactive material, the user who originated the order may pick it up from the Radiation Safety Office or may send a trained member of his staff. At the time of transfer, the individual who receives the radionuclide must sign for receipt of the material.

## **Waste Handling Procedures**

State and federal regulations and the University's radioactive materials license impose severe restrictions on waste-disposal methods.

For this reason, waste disposal is centralized through the Radiation Safety Office. Exceptions to this policy are specifically and individually considered.

- 1) Waste materials can be generally classified as:
- 2) Miscellaneous solid waste (glassware, paper towels, dissecting instruments, gloves, etc.);
- 3) Major aqueous-solution waste (reaction solutions, primary dilutions of stock solutions, residual stock solutions, etc.);
- 4) Minor aqueous waste solutions (third rinses from glassware, radioactively decayed solutions containing less than microcurie amounts of activity, etc.);
- 5) Majo



**laboratories on a routine basis. By prior arrangement waste may be brought to the Radiation Safety Office. So that radioactive waste can be handled in a safe and efficient**

## **Transfer and Shipment of Radioactive Materials**

Federal and state regulations restrict the transfer of radioactive materials, except in certain carefully specified situations, to persons holding valid radioactive materials licenses. A copy of the receiver's license must be provided to the Campus Radiation Safety Officer before the shipment or transfer can be authorized.

The Radiation Safety Office will assist in the transfer, including providing specific information on packaging and labeling packages for shipment, and advice on acceptable shipment methods and applicable regulations and restrictions. The department from which the shipment originates is expected to incur the cost of the transfer. Records of transfers are maintained in the Radiation Safety Office. When particularly hazardous shipments are received or sent, records of personnel exposures, shipping-cask smears, and other pertinent information are maintained in the Radiation Safety Office.

## **Storage of Radioactive Materials**

Individual users are expected to keep on hand in their laboratories only those radioactive materials which they are actively using, or those which they feel must receive personal attention. The intent of this policy is to reduce as far as possible the number of places on the campus where the security of radiological materials might be jeopardized in emergencies such as fires or explosions.

All storage locations must be posted with approved radiation warning signs.



**persons who are monitored, but who do not meet regulatory monitoring requirements will not necessarily be kept.**

**Students who are enrolled in courses involving the handling of radioactive material or use of radiation sources may be assigned to the radiation monitoring program. The decision to assign or not to assign will be a joint decision between the instructor and the Radiation Safety Officer. If a decision cannot be reached, the Radiation Safety Committee will make the determination.**

**When persons are assigned to the monitoring program they will be asked if they know or have been told that they had received an over exposure of radiation. If the answer is affirmative, the person will not be allowed to work with radiation until the past radiation exposure records have been obtained and evaluated. For other persons, prior exposure histories will not be obtained.**

**Good practice dictates, and state and federal laws require, that the University provide information to users that their radiation doses are within regulatory limits, and also that individuals be notified if their radiation doses exceed radiation protection guidelines.**

**The monitoring program includes, where applicable, personal body dosimeters, personal extremity dosimeters, rate sensitive area monitors, portable survey instruments, portable and fixed air sampling instruments, surface smears, and bioassay procedures. Personal dosimetry devices are available for detection of beta, X and gamma, and neutron radiations; supporting techniques allow assessment of alpha inhalation hazards. At the time of approval, the Radiation Safety Officer will determine the type monitoring techniques to be used for that project.**

**Excessive exposure detected on a personal dosimeter requires immediate notification of the wearer, initiation of any appropriate medical assistance, and a determination of the cause of the exposure. When necessary, The Radiation Protection Division and The United**

**exposed to radiation over the allowable limit prior to his coming to the university, then contact will be made with their previous employer to obtain a copy of that person's cumulative exposure history, to be used in closely monitoring that person's cumulative exposure while working here at the university.**

**There are many different types of dosimeters available. Listed below are the most commonly used dosimeters:**

**K1, whole body dosimeter worn on a persons outside clothing for measuring deep and shallow doses for beta, gamma, and x-rays.**

**U3, ring dosimeter which can be specified for low fsp bed 12 (h)-8 (i)-6 avsrliy dLit5 ( f)-11 4 (s)-12w**

**determine whether or not any control dose levels have occurred. Whole body dose that is found to be greater than or equal to 100 mrem, or if a ring dosimeter dose level is found to be greater than or equal to 1000 mrem within the time of one calendar quarter, it will be investigated. The results of the investigation along with any corrective actions will be documented.**

**Any person needing to be dropped from the dosimeter program must notify the Radiation Safety Office, and provide a letter requesting to be removed from the program for our files.**

**Currently, Southeastern Louisiana University has no dosimeters in use.**

### **Site Monitoring**

**The Generator has the responsibility for monitoring all locations where radioactive materials and radiation sources are used or stored.**

**Site-monitoring checks include smears to establish removable contamination levels and**

- 5) **Certain sources will be leak tested either more or less frequently at the stipulation of the Louisiana Radiation Protection Division (LARPD).**
- 6) **Analysis of leak tests will be by procedures and instrumentation documented to have a limit of detection of less than 0.005 uCi.**
- 7) **Records of sealed-source leak tests ar(e)4 (ak)-a**





denoting the magnitude of the hazard at the bottom.

In addition to signs indicating the presence of a radiation hazard, each area must be marked with a notice identifying individuals to be called in an emergency, and their current telephone numbers at the University and at home. Individuals to be listed on the notice include:

- 1) Principal user
- 2) Alternate person knowledgeable of the specific area (if possible)
- 3) Radiation Safety Officer Emergency notices will be supplied by the Radiation Safety Office, which should be informed promptly of any changes.

## DECONTAMINATION

### Introduction

Although Radiation Safety Office personnel are available to assist in decontamination operations, it is standard policy of the nuclear industry that the person who is responsible for contamination has the obligation to assume primary responsibility for decontamination. Immediate reaction to a contamination situation frequently can

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## Anti-Contamination Procedures

It is difficult to protect equipment from contamination because of size and use. However, through proper selection and control, this problem can be reduced. Only a minimum of equipment should be used. The equipment selected must be clean to reduce contamination pickup and to reduce decontamination problems.

Certain equipment such as beta-gamma meters and probes can be enclosed in plastic bags to reduce the spread of contamination. However, alpha-survey instrument probes must be left uncovered.

The "hot line" is an arbitrarily established control line separating the contaminated area from the contamination-free area and is generally situated upwind from the contaminated area. All personnel and equipment entering and leaving the contaminated area are channeled through the hot line. The requirements for entering should also be posted. In addition, step off pads and containers for disposal of protective clothing and trash should be set up. No individual, materials, or equipment should be allowed to leave the contaminated area until monitored and decontaminated.

The area adjacent to the hot line is designated the stepoff pad (SOP) and serves as a boundary zone between contaminated and uncontaminated areas. It is considered to possibly contain some low-level contamination. Hence, the SOP is often covered with plastic sheeting to facilitate its decontamination.

The procedure for leaving the contaminated area is as follows:

- 1) While in contaminated area:
  - Remove protective clothing except shoe covers and gloves.
  - Discard clothing and trash into appropriate barrels.
  
- 2) Stepping onto SOP:
  - Remove one shoe cover and place foot on SOP.
  - Repeat for other shoe cover. To prevent spraying the SOP with contamination, the bottom of the foot should be pointed toward the contaminated area when removing shoe cover.
  - Discard shoe covers in appropriate barrel.
  - Remove respirator.
  - Remove gloves and discard in appropriate barrels.
  
- 3) While in clean area:
  - Perform personnel contamination survey.
  - Don street clothes.

## Personnel Decontamination

If a person is suspected of being contaminated, remove their clothing and place in a plastic bag. Mark radioactive and do not discard. Shower thoroughly with water and a liberal amount of soap.

**Special instructions for decontamination of various parts of the body are:**

- 1) Skin - Use a soft bristle brush vigorously but lightly so as not to abrade the skin. Particular attention should be paid to cleaning around and under finger nails, between the fingers, at the back of the fingers, and the palms.**
- 2) Hair - Scrub the hair vigorously using a liberal amount of soap. Particular care should be taken to prevent suds and water from entering the eyes, ears, nose, or mouth. Several washes and rinses should be applied before drying the hair.**
- 3) After decontamination, individuals should be monitored again. Repeat decontamination procedures if required. If the person still shows contamination, seek medical advice. The basic ground rule is not to abrade or puncture the skin.**

### **Decontamination of Equipment**

**A key decision must be made to either decontaminate an object or to treat it as radioactive waste. Decontamination might generate a greater volume of radioactive materials (wash water, towels, etc.) than the object itself. Samples of the wash water should be assayed to help determine if it can be released to the environment or if it must be contained for disposal as radioactive waste. Monitoring of the objects determines the extent of decontamination required. Perhaps only limited areas require cleaning. Dry vacuuming may be very effective as an initial step. Care should be taken that wet techniques do not soak contaminants into porous surfaces.**

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