

**THE UNIVERSITY OF MISSISSIPPI
LABORATORY SERVICES**

Phone (662) 915-5433 FAX (662) 915-5480

RADIATION MATERIALS LABORATORY SAFETY INFORMATION

Information you must always remember, No exceptions:

1. You must always immediately report every injury to your supervisor. No exceptions.
2. Call 4911 from campus phones to report fires, to report medical emergencies or request assistance from the campus police. No exceptions.
3. Pay attention to the building fire alarms. Always evacuate the building when the alarm goes off. No exceptions.
4. Always know the location of the nearest emergency shower and eyewash. No exceptions.
5. If you work around hazardous materials, always use proper eye protection (Safety Glasses, Goggles or Shields). Safety glasses should be worn at all times while in the laboratory. Goggles must be worn when working with corrosive materials (acids/bases). No exceptions.
6. Gloves are your first line of defense to prevent contact with radioactive materials or chemicals. Always wear the proper type of gloves for the materials you are using. No exceptions.
7. Rubber aprons should be used for protection against strong acids and bases. Laboratory coats are intended to protect clothing, not you. Never bring lab coats or aprons home. No exceptions.
8. Chemical fume hoods are used to control exposures to toxic substances. Learn how to use a fume hood, and know how to adjust air flow. No exceptions.
9. Safety concerns can be addressed by your supervisor. If you have any questions, either consult your supervisor or contact Laboratory Services directly. No exceptions.
10. Before you use any chemical you must be familiar with the characteristics of the particular chemical. No exceptions.
11. Never use a standard household refrigerator or freezer for storage of flammable or reactive chemicals. No exceptions.
12. Never eat, drink or smoke in areas that use or handle hazardous materials. No exceptions.
13. Never transport hazardous, biological or radioactive materials or chemicals in personal vehicles. Shipping of hazardous materials is strictly regulated by federal and international laws. You must contact Laboratory Services and they will help you prepare and ship your hazardous materials. No exceptions.
14. All chemical, biohazardous, medical and radiological wastes must be disposed of through Laboratory Services. No exceptions.
15. Never clean up a chemical or radioactive spill unless you are familiar with the materials. If you do not know the hazards involved, or if you do not have the necessary supplies or protective equipment. Always call Laboratory Services for assistance. No exceptions.
16. Only the Radiation Protection Specialist can order radioactive materials. No Exceptions.
17. Never store you badges, dosimeters or monitoring equipment with radioactive materials or waste. No exceptions.
18. Laboratory door **MUST** be closed and locked when personnel leave the laboratory - even if they are going across the hallway. No exceptions.
19. Gloves are for laboratory work. Never wear gloves outside the laboratory.

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Handling Radioactive Materials

Minimize your exposure time....

Increase your distance to the material...

Make Plans to Control Contamination....

Use Shielding....

Keep your exposure **As Low as Reasonably Achievable (ALARA)**.

You should fully understand the hazardous characteristics of the specific materials and chemicals that you use. A manufacturer's MSDS can be a good source of information on the hazards associated with a specific material, and it will give personal protective equipment information. Always be aware of any warning signs on containers.

At a minimum, you should know:

1. The minimum quantity of material that is toxic or hazardous;
2. The specific routes of entry that can cause injury - through the skin or eye, by ingestion, by inhalation, through injection;
3. The type(s) of hazard(s) - corrosive, explosive, flammable, reactive, sensitizer, toxic.
4. The types of injury the material can cause - acute toxicity, chronic toxicity, carcinogen, mutagen, and teratogen;
5. The symptoms of over-exposure as well as the target organs that may be involved;
6. The physical characteristics of the material - physical state (solid, liquid, and gas), vapor density, vapor pressure, flammability;
7. Chemical compatibility and incompatibilities;
8. What personal protective equipment (PPE) is recommended to safely work with the material- including Fume Hoods.

To protect yourself from unnecessary exposures, you should adopt the following safe work practices:

1. Always try to work in a fume hood whenever possible;
2. Never work alone when handling hazardous materials;
3. Always keep your work area clean;
4. Always wear eye protection;
5. Always wear a clean laboratory coat;
6. Always wear the proper type of gloves for the materials you are handling;
7. Always wash your hands before leaving your work area, and before eating, drinking, or using the bathroom;
8. Always label every container that holds hazardous materials;
9. Always keep storage containers closed, and the lids tightly secured, when they are not in use.
10. Always segregate hazardous materials and keep incompatible materials apart;
11. Always contact Laboratory Services for hazardous materials disposal services, to ask questions, to raise concerns, to review your protocols, to ship your hazardous materials.....

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Shipping Hazardous Materials

Shipping packages containing hazardous materials or dangerous goods will always be an important part of the freight business. Likewise, the use of hazardous materials will always be an important part of scientific research. On occasion, it becomes necessary to ship hazardous materials to another researcher, to another university, to another research facility, or even to a manufacturer. These hazardous materials can include compressed gasses, flammable liquids and solids, oxidizers, poisons, corrosive materials, radioactive and biological materials and even dry ice.

Federal hazardous materials regulations (49 CFR parts 171-180) have outlined specific shipping requirements for these hazardous materials. If these materials are offered for transport by a commercial carrier (FedEx, Airborne, UPS), the shipment becomes regulated by the Department of Transportation (DOT) and sometimes by international agencies. When materials are shipped out of the country, items that may not be considered hazardous in the United States may be classified as hazardous in other countries. To comply with shipping regulations, these hazardous materials must be properly classified, documented, packaged, and handled. For shipments of biological and radioactive materials, transport or export permits and/or authorization may be required prior to shipment.

Failure to meet these regulatory requirements may result in citations, fines and/or imprisonment. Fines to the University can range from \$250 to \$500,000 per violation. In addition, individual researchers and shippers may be subject to criminal penalties of up to \$500,000 and five years imprisonment. Federal law also requires that anyone who is involved in or responsible for preparing or transporting a hazardous material must have DOT training and certification. No one is exempt from these federal transportation requirements.

Laboratory Services personnel (5433) will provide assistance with package selection, material classification and documentation. Please fill out and FAX a Hazardous Materials Transportation and Information Form, then call for an appointment to have a package prepared for transport.

Laboratory Services should be contacted the day before you want to ship hazardous materials. You must contact Laboratory Services no later than 9:30 AM on the day that you want to ship hazardous material. The material and appropriate packaging must be at Laboratory Services no later than 11:00 on the shipping day.

Most materials intended for domestic delivery are ready for shipment in 30 minutes or less. Additional time may be required for overseas packages. Also, even if we can have a package ready for shipment, prior arrangements must be made with most carriers to have these materials picked up. For example, if you call us at 1:45pm needing assistance in getting a package ready, there is only a small chance that Federal Express will arrange for a pick up of the materials that afternoon. Hazardous materials cannot be picked up at drop-off locations. They must be received from an individual.

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Radioactive Waste in your lab

All radioactive waste should be stored in containers supplied by, or approved by, the Radiation Protection Specialist.

Storage Requirements

1. Post a sign to designate your accumulation area.
2. The waste must be placed in containers that are in good condition,
3. The waste must be compatible with the containers,
4. The containers are closed or covered when the generator is not adding or removing waste, and,
5. The accumulation area **MUST** be at or near any point of generation.

Label Requirements

1. The containers must be marked with the words "Radioactive Wastes" and other words that identify the contents, and,
2. Each container must be labeled with the full name of the chemical components, the isotope and the activity. No abbreviations of the chemical component is acceptable.

What else you need to know...

- Segregate waste chemicals by compatibility
- Designate a single location for the storage of radioactive waste.
- Find a location out of the way of normal lab traffic, but still accessible to employees.
- Whenever possible, keep waste in secondary containers (trays, buckets, etc.)
- Fully Label the containers.
- Fume hoods should not be used as designated waste storage areas.
- Call Laboratory Services (915) 5433 to have waste materials removed.

Dispose of Radioactive Wastes to minimize quantities of hazardous materials in your lab.

HOW TO PURCHASE RADIOACTIVE MATERIALS

Radioactive Materials can only be ordered by and shipped to Laboratory Services

Training and Authorization is **REQUIRED** Before Laboratory Services Will Order Your Radioactive Materials.

Before Radioactive Materials can be purchased for a Principle Investigator (PI), each PI must obtain an Authorization to use Radioactive Materials by:

1. Completing Radiological Safety Training Materials,
2. Submitting the application for Authorization to Use Radioactive Materials to the Laboratory Services Department; and,
3. The PI must submit an Application for Radioisotope use in a Location.

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The Radiation Protection Specialist will review the applications with the PI and may grant preliminary approval or indicate that the application will require approval by the Radiation Safety Committee before the project can begin. If the PI receives Authorization to use Radioactive Materials and the Laboratory has been “approved” for use of Radioactive Materials, the PI may submit a Radioactive Material Purchase Application.

ORDERING RADIOACTIVE MATERIALS

Only Laboratory Services may order, ship or receive Radioactive Materials.

1. Complete A Radioactive Material Purchase Application - The Principle Investigator should complete, sign & date the form - including the Cost Center Number signed by the Signatory Officer. Return the form to the Laboratory Services for review and approval.
2. Wait for Approval - The RSO, after review of the application, will notify the applicant of preliminary approval. In cases involving unusual or hazardous use of radioactive materials, the applicant is notified of final approval after review of the application by the Radiation Safety Committee (RSC).
3. Purchase and Receipt of Radioactive Material - When the application is approved, the material will be ordered. Most Radioactive Material is received within two working days of the order.
4. Delivery of Radioactive Material - When the Radioactive Material is received by the Laboratory Services Department, the order will be checked for leakage and the material will be added to the University Inventory. Laboratory Services will call to inform you that you may pick up the material and the associated paperwork at the Laboratory Services Department Main Office.

Security Issues:

Make sure all Radioactive Material Labs are locked when unattended.

Question the presence of any unknown or unauthorized person.

Secure all Radioactive Materials when not being used.

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EMERGENCY PROCEDURES FOR RADIOACTIVE MATERIAL SPILLS

Minor Spills

1. Notify: Notify persons in the area that a spill has occurred.
2. Prevent the Spread: Cover the spill with absorbent paper or matting.
3. Clean Up: Use disposable gloves and if necessary, remote handling tongs. Carefully fold the absorbent paper or matting. Insert into a plastic bag and dispose of in the radioactive waste container. Also insert all other contaminated materials, such as disposable gloves, into the plastic bag.
4. Survey: Survey the area around the spill, hands and clothing for contamination. Use either a low range, thin window GM survey meter or perform a wipe test.
5. Report: Report incident to the Radiation Protection Specialist (915-5433).

Major Spills

1. Clear the Area: Notify all persons not involved in the spill to vacate the room.
2. Prevent the Spread: Cover the spill with an absorbent, but do not attempt to clean it up. Confine the movement of all personnel potentially contaminated to prevent the spread.
3. Shield the Source: If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.
4. Close the Room: Leave the room and lock the door(s) to prevent entry.
5. Call for Help: Notify the Radiation Protection Specialist (915-5433) immediately.
6. Personnel Decontamination: Contaminated clothing should be removed and stored for further evaluation by the Radiation Protection Specialist. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

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RADIATION MATERIALS LABORATORY SAFETY INFORMATION

Excerpts from the University of Mississippi Radiological Safety Manual

Refer to the full manual or University Policy for the complete text of the regulations

The Radiological Safety **regulations and procedures apply** to all persons, who receive, possess, use, or seek to dispose of radioactive materials or radiation producing devices or sealed sources on the University of Mississippi's Oxford campus, with the exception of the persons working for the University Student Health Services.

At no time are radioactive materials or Radiation Generating Devices (X-ray generating units, Electron Capture Units, X-ray Fluorescence Units, etc.) to be acquired, used, transferred, sold, purchased, or disposed of, without prior written authorization from the Radiation Protection Specialist of the Laboratory Services. Failure to adhere to this regulation is in direct violation of the University's Broad License and published state and local regulations.

The **Radiation Safety Subcommittee** is a subcommittee of the Laboratory Services Committee. The Radiation Safety Subcommittee will advise and make specific recommendations to the Laboratory Services Committee on all matters pertaining to radiological safety. Subcommittee approval of Laboratory Services measures must be obtained in writing before any project involving radioactivity or radiation producing devices are initiated.

Radioactivity refers to the spontaneous emission of ionizing radiation from any material (solid, liquid, or gas).

Ionizing radiation describes high energy photons (x- ray and gamma) and other high energy particles (alpha, beta, and other nucleons) which are capable of producing ionization in substances they pass through.

Radiological Safety refers to the safe use and handling of radioactivity or ionizing radiation on the University's Oxford campus; including, but not limited to, teaching, research, development and use.

The **Radiation Protection Specialist has the authority** and responsibility to provide overall administrative direction for the radiation safety program of the University.

All personnel (faculty, staff, guests, visiting faculty, and students) working with or handling radioactive materials or operating radiation producing devices are required to be authorized users.

Regular Authorization is only granted to persons who are considered permanent employees of the University and is therefore restricted to full-time faculty and staff. Maintaining Regular Authorization requires that the individual attend the annual Radiological Safety Training Program. Regular Authorization is of indefinite duration, and does not need to be renewed unless revoked under extraordinary circumstances

Temporary Authorization may be granted to an applicant who meets any of the following criteria:

- 1.The applicant is not a permanent employee of the University
- 2.The applicant has not had adequate training, or
- 3.The applicant is a student of the University.

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ALL procurement of radioactive materials, whether by purchase, loan, transfer, or gift, MUST receive authorization from Laboratory Services through the Radiation Protection Specialist. All purchases of Radiation Generating Devices (x-ray machines, electron microscopes, etc.) require prior consultation with and approval from the Radiation Protection Specialist and the State of Mississippi / Division of Radiological Health. The State of Mississippi does not recognize NRC "LICENSE EXEMPT" quantities of radioactive materials.

Radioactive materials and radiation generating **devices will not be transferred** from one department or authorized laboratory to another or off campus without prior approval of the Radiation Protection Specialist.

Radioactive materials may NOT be disposed of by an authorized user or an unauthorized person directly into the sanitary sewage system, into the atmosphere, into laboratory drainage systems, or into regular trash baskets.

Personnel Monitoring - The University and all people covered by this manual shall use procedures or controls that will allow the occupational and public doses to radiation to be **As Low as Reasonably Achievable**.

Thermoluminescent Dosimetry (**TLD**) is the primary form of personnel radiation exposure monitoring used on campus.

Occupational Dose Limits for Adults - An annual limit, which is the more limiting of:

- a. The total effective dose equivalent to being equal to 5 rems (0.05 Sv); or
- b. The sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems (0.5 Sv).

The annual **limits to the lens of the eye**, to the skin, and to the extremities which are:

- a. An eye dose equivalent of 15 rems (0.15 Sv), and
- b. A shallow dose equivalent of 50 rems (0.5 Sv) to the skin or to any extremity.

PERSONS UNDER 18 YEARS OF AGE WILL NOT BE ALLOWED TO ENTER, OR TO WORK IN, AN AREA WHERE RADIOACTIVE MATERIALS OR RADIATION PRODUCING DEVICES ARE USED, STORED OR OPERATED.

Dose to an Embryo/Fetus, Regulations for Control of Radiation in Mississippi, Part 801.D.208 - The [University] shall ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman does not exceed 0.5rem (5 millisieverts). Declared Pregnant Woman- means a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

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Personnel will wear an appropriate **monitoring device (TLD)** when any of the following apply:

1. Any person entering an occupational radiation environment in which he or she is likely to receive in excess of 10% of the Maximum Permissible Dose allowed by regulation of penetrating ionizing radiation will be required to wear a Dosimeter appropriate to the type and energy of the radiation to be encountered.
2. Any person working with Beta emitters of energy greater than 0.25 MeV, which does not include Low Energy Radioisotopes such as H-3, C-14, S-35, C1-36, Ca-45, and Ni-63.
3. Any person working with Neutron sources of any type
4. Any person working with Gamma Emitters of any type
5. Any person working with X-ray producing devices or sources.

Persons are to wear only the dosimeters assigned to them by Laboratory Services. Dosimeters are to be *stored away from sources of radiation*, excessive heat, and moisture when not being worn by personnel for monitoring purposes. Dosimeters are to be worn only when engaged in the occupation which requires monitoring; never wear dosimeters assigned by Laboratory Services during diagnostic or therapeutic radiation exposure.

Laboratories in which there are sources capable of delivering whole body exposures in excess of 5 mr/hr (0.05 mSv/hr) must have on hand in the laboratory and in good operating condition, **a calibrated monitoring instrument** capable of measuring the exposure or dose rate for the radiation type to be encountered.

Annual Exposure Reports - All personnel monitored by dosimetry will be notified of the accumulated exposure shortly after the end of the calendar year in which they were monitored. Terminated personnel, who were monitored under the University dosimetry program during the calendar year of their termination, will be provided one final notice of exposure upon request or on the same schedule given for current personnel.

Caution Signs and Labels - Mississippi State Department of Health Form RH-5, "**Notice to Employees**," will be conspicuously displayed near every entrance and exit in each area where radiation generating devices or radioactive materials are used.

RADIATION GENERATING DEVICES - This category of ionizing radiation producing devices will include, but not be limited to, **x-ray** generating units, x-ray diffraction apparatus, electron microscopes, x-ray fluorescence units, and comparable devices. All persons seeking to use, operate, or possess ionizing radiation producing devices will be approved by the Radiation Safety Subcommittee.

All ionizing radiation producing **devices must be registered** with the Mississippi State Department of Health. Individuals employed by, and/or departments of the University obtaining or planning to obtain radiation producing devices will be required to make application for registration of such devices through Laboratory Services. Laboratory Services will be notified in writing within five calendar days of the receipt of ionizing radiation producing devices. Such equipment cannot be used, altered, installed, or energized, without written permission of the Radiation Protection Specialist.

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All x-ray generating devices will be inspected annually for radiation hazards by the Radiation Protection Specialist.

The supervisor of an ionizing radiation producing device will remain solely responsible for the safe use and operation of the device.

Eating, drinking, smoking, or use of cosmetics, food preparation or storage of items for these purposes will not be permitted in laboratories where radioactive materials or radiation generating devices are used or stored. Empty cups, food wrappers, containers or any waste associated with food will not be allowed inside of any laboratory where radioactive materials or Radiation Generating Devices are used or stored.

Any person who suspects over-exposure, which is defined as whole body exposure in excess of 1.25 rem (0.0125 Sv) in 13 calendar weeks, is required to report this fact to the Radiation Protection Specialist immediately. Any person who ingests, absorbs, inhales, or has skin or eye contact with radioactive materials, in the workplace, must immediately report the incident to the Radiation Protection Specialist in person or by messenger.

Radiation Hazards in Fires

1. Attend to injured persons and remove them from harm.
2. Alert all personnel: Notify all people in the immediate area to evacuate, activate the nearest fire alarm, call 9-911
3. Close all doors and windows to confine the fire.
4. Call the Laboratory Services (915 - 5433).
5. Evacuate to a safe area or exit the building. Do not use the elevator.
6. Have a person knowledgeable of the incident and laboratory report to the emergency personnel.

Directions to Laboratory Services

The Department of Laboratory Services is located in the Health and Safety Building indicated by a RED Circle on the map below. The building is located up the hill behind the Indoor Practice Field.

If you are walking from the center of campus, walk behind the Football Field on the Gertrude Ford side, there is a concrete path that will take you to where Hickory Lane meets up with Manning Way. Up the hill is the Electrical Generation Facility. We are located just behind the Generation Building.

If you require special assistance accessing our office, please call Laboratory Services at (915-5433)
If you get lost on the way, call 662-915-5433 and we will guide you or find you.

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