

**THE UNIVERSITY OF MISSISSIPPI
LABORATORY SERVICES**

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

**Radiation Generating Devices
Authorization Training**

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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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 in 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 Committee** will advise and make specific recommendations to Laboratory Services on all matters pertaining to radiological safety. Committee approval of safety measures and procedures 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 will be provided to monitored personnel upon request, or when any portion of a fiscal year's dose recorded exceeds 1mSv (100mrem) TEDE or 1 mSv (100 mrem) to any individual organ or tissue. Terminated personnel, monitored during the calendar year of their termination, will receive 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 No. 935, "**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 Department of Health and Safety (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.