

# University of Mississippi

## Health and Safety Department

### 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 Health and Safety 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 Health and Safety 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 Health and Safety. 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 Health and Safety for assistance. No exceptions.
16. Only the Radiological Safety Coordinator 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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## Health and Safety Department

### Radiation Materials Laboratory Safety Information

#### 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, 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, 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 Health and Safety for hazardous materials disposal services, to ask questions, to raise concerns, to review your protocols, to ship your hazardous materials.....

# **University of Mississippi**

## **Health and Safety Department**

### **Radiation Materials Laboratory Safety Information**

#### **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.

Health and Safety 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.

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

The federal government is quite serious about this regulation because of the amount of damage, and because of the number of lives that can be lost, by what seems like a small error. The crash of the ValuJet plane in Florida (110 lives lost, \$2.25 Million in fines) is an extreme example of what can go wrong if hazardous materials are not properly transported.

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### Radiation Materials Laboratory Safety Information

#### Radioactive Waste in your lab

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

#### 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 Health & Safety (915) 5433 to have waste materials removed.

#### **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.**

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

# **University of Mississippi**

## **Health and Safety Department**

### **Radiation Materials Laboratory Safety Information**

#### **HOW TO PURCHASE RADIOACTIVE MATERIALS**

**Radioactive Materials can only be ordered by and shipped to Health & Safety**

Training and Authorization is **REQUIRED** Before Health & Safety 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 Health & Safety Department; and,
3. The PI must submit an Application for Radioisotope use in a Location.

The Radiation Safety Officer (RSO) will review the applications with the PI and may grant preliminary approval or indicate that the application will require approval by the Radiation Safety Sub-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 Health & Safety 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 Health & Safety 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 Sub-Committee (RSSC).
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 Health & Safety Department, the order will be checked for leakage and the material will be added to the University Inventory. Health and Safety will call to inform you that you may pick up the material and the associated paperwork at the Health & Safety Department Main Office.

**University of Mississippi**  
**Health and Safety Department**  
**Radiation Materials Laboratory Safety Information**

**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 G-M survey meter or perform a wipe test.
5. Report: Report incident to the Radiation Safety Officer (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 Safety Officer (915-5433) immediately.
6. Personnel Decontamination: Contaminated clothing should be removed and stored for further evaluation by the Radiation Safety Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

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**Excerpts from the University of Mississippi Radiological Safety Manual**  
**Refer to the full manual 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 Radiological Safety Coordinator of the Department of Health and Safety.** 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 Health and Safety Committee. The Radiation Safety Subcommittee will advise and make specific recommendations to the Health and Safety Committee on all matters pertaining to radiological safety. Subcommittee approval of health and safety 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 **Radiological Safety Coordinator 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.

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

## **Excerpts from the University of Mississippi Radiological Safety Manual** **Refer to the full manual for the complete text of the regulations**

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 Radiological Safety Coordinator.

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.

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 the Department of Health and Safety. 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. Persons assigned dosimetry are not to wear dosimeters assigned by the Department of Health and Safety 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.

## **Excerpts from the University of Mississippi Radiological Safety Manual**

### **Refer to the full manual for the complete text of the regulations**

**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 Health and Safety. Health and Safety 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 Radiological Safety Coordinator.

All **x-ray generating devices will be inspected annually for radiation hazards** by the Radiological Safety Coordinator.

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

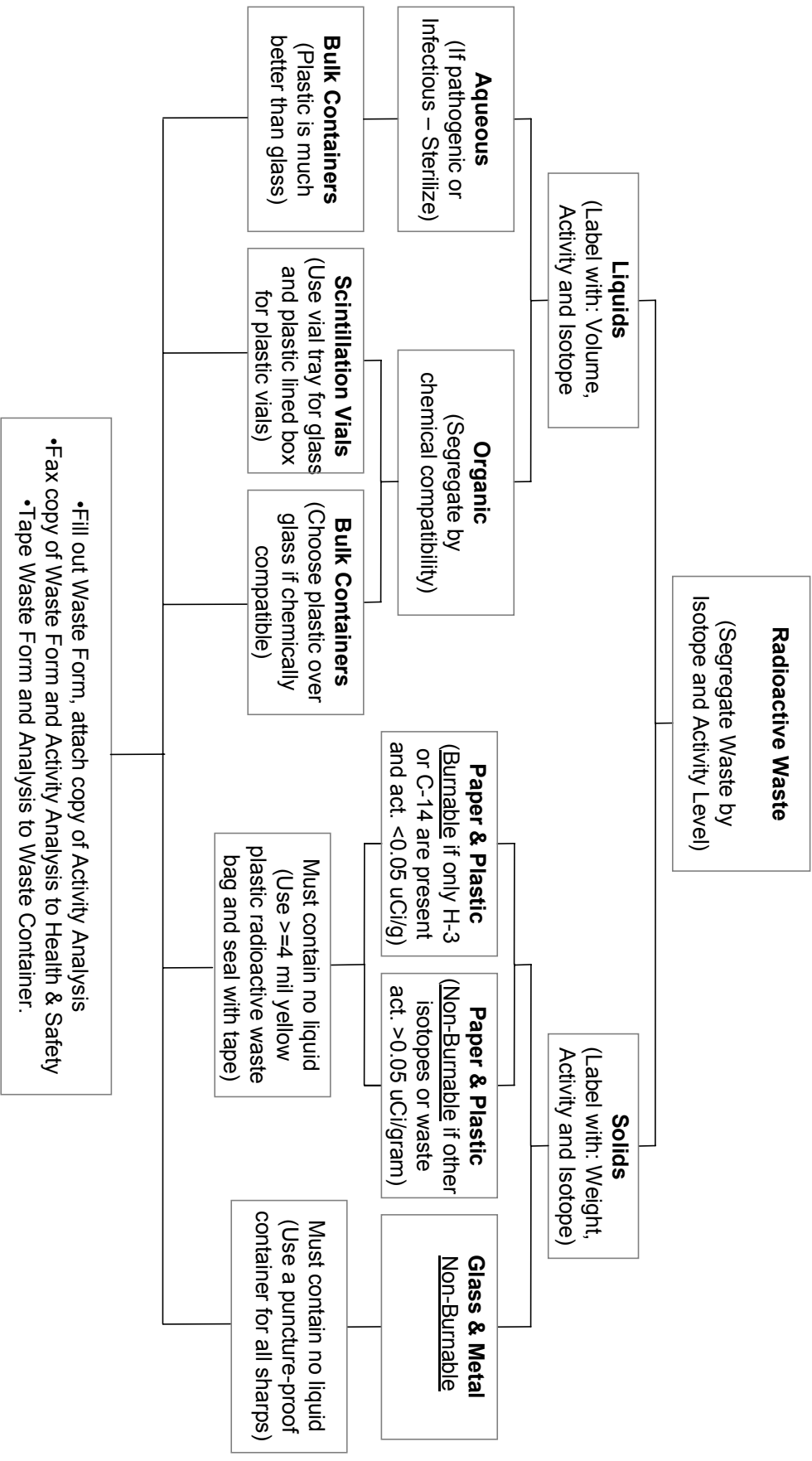
**Eating, drinking, smoking, or use of cosmetics**, food preparation or storage of items for these purposes will not be permitted in laboratories where radioactive materials or radiation generating devices are used or stored. Empty cups, food wrappers, containers or any waste associated with food will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

Any person who **suspects overexposure**, 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 Radiological Safety Coordinator 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 Radiological Safety Coordinator 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.

**Radioactive Waste Disposal Procedures**  
**University of MS, Department of Health & Safety**  
**Phone 915-5433, Fax 915-5480**



Please remember: if your waste is improperly sorted or packed, it will be returned to you for resorting and repacking.  
 For any questions, please call the Department of Health & Safety.