What is Radioactive Waste?

There are a few definitions you must know before we cover the proper handling and packing of radioactive waste.

Term	Definition	Examples
Solid radioactive waste (SOL)	Any dry waste, except lead or metals, including empty liquid scintillation vials	Paper, plastic, glassware, gloves, bench paper, and animal bedding
Liquid radioactive waste (LIQ)	Any liquid waste except that which is contained in Liquid Scintillation Vials (LSV) Liquid waste **must not include** any solid waste (no more than 0.5% by weight of free standing liquids)	
Liquid Scintillation Vials (LSV)	Vials containing liquid radioactive materials	
Animal tissue radioactive waste (AT)	All contaminated animal tissues and body fluids Animal waste products are **not** deemed animal tissue.	

Animals and radioactive materials are **not covered** in this course. There is a separate course for Using Radioactive Materials with Animals in Research at UAB. Please check with the IACUC for more information.

Who is Responsible?

Anyone who works with or around radioactive materials is required to complete the Radiation Safety Initial Training Sessions course, have a baseline bioassay on file, and complete the hands-on Radiation Safety Practicum. Both staff and the Licensee/Alternate must be listed on an approved UAB Radioactive Materials License.

While the Licensee/Alternate are ultimately responsible for radiation safety related work in the area, the staff and everyone working in the area is also responsible for the proper handling of materials to ensure the health and safety of:

- Those in the area working with the materials, including yourself
- Anyone outside of the area, including the UAB Support Facility staff
- Family and friends

Improper handling of radioactive materials could expose those in the lab as well as family and friends that you come in contact with outside of the work area. Always handle radioactive materials responsibly.

The OH&S Support Facility

Final disposal of radioactive waste is authorized and handled by the OH&S Support Facility staff. Exceptions may be granted by the Radiation Safety Officer. This will require prior review and approval.

Procedures for Radioactive Waste Disposal

There are strict procedures for the disposal of radioactive waste material.

1. Accurately inventory or account for the activity or amount of radioactive material in the waste.
2. Separate the waste. Waste segregation is extremely important because the method and time of disposal depends upon the half-life, and physical form and composition of the wastes.
3. Pack the waste correctly. Pack according to the type – liquid, solid, liquid scintillation vials (or LSV), or animal tissue (or AT). Do not mix types.
4. Properly seal all waste. The waste packages must not leak while you are holding them for pickup nor during the transport of the waste.
5. Label the waste. All waste must be labeled properly or the OH&S Support Facility staff could refuse pickup.

A PDF file on handling and packing radioactive waste can be found on the OH&S website. Make sure that you read and follow the instructions when preparing radioactive materials for disposal.

Accurately Inventory/Account

Before you began to separate the waste, accurately account for the activity or the amount of radioactive material in the waste.

Separating for Waste Disposal

1. Pack radioisotopes separately when possible. If you cannot separate the isotopes, you **must** have prior approval from the Radiation Safety Officer.
2. Segregate radioactive waste should be separated by its physical form. Physical forms should **never** be mixed (i.e., do not mix liquids with solids). Ensure that liquid waste **must not include** any solid waste (no more than 0.5% by weight of free standing liquids)
    - Solid radioactive waste (SOL)
    - Liquid radioactive waste (LIQ)
    - Liquid Scintillation Counter Vials (LSC or LSV)
        i. Aspirate (remove the liquid) for LSV containers into acceptable containers. Review the Radiation Safety Manual for a list of appropriate containers.

Biodegradable cocktails do not need to be aspirated.

    - Animal tissue wastes (AT)
3. Separate the radioactive waste by type**.** Do not mix beta emitters with gamma emitters.
4. Segregate the waste according to its half-life.
    - Less than 19 days
    - Equal to or greater than 19 days, but less than 37 days
    - Equal to or greater than 37 days, but less than 72 days

- Equal to or greater than 72 days, but less than 91 days
- Equal to or greater than 91days

Mixed

Ensure that special approval has been obtained prior to mixing hazardous waste streams and is appropriately listed on the license. Experimental protocols that provide for dual or multiple labeling procedures must be well documented and approved by the OH&S Radiation Safety Program.

Other Hazardous Agents in the Waste

Kill all of the biological hazards or inactivate them as described in the OH&S Biosafety Manual if the waste is contaminated with infectious materials.

Identify compounds that are present at levels greater than 0.5% by weight on the manifest and adjust solutions for a pH in the range 5 to 9 before pickup.

Solid Radioactive Waste (SOL)

1. Bag and box in fiberboard boxes lined with a plastic liner of at least two (2) mil thickness. (A mil is a thousandth of an inch — .001 inch, a typical manufacturing dimension.)
2. Seal the liner to prevent leaks.
3. Use a box that is no larger than 24" (inches) high.
4. Pack sharps in an approved sharps container and then place in a fiberboard box.

When pouring liquid radioactive waste into jugs, do not fill them to the top. Leave a small amount of space, tape the jug caps shut, and place the jugs in a plastic liner. Tape the liner shut.

Liquid Radioactive Waste (LIQ)

1. Collect liquid radioactive wastes that are aqueous and contain 2.5% or fewer chemicals in regular polyethylene and polypropylene containers.

2. Collect other radioactive liquid wastes, especially those containing organic solvents, in the following types of containers:
    a. Durable glass
    b. Acetal plastic
    c. High-density polyethylene fluorocarbon treated plastic (similar to Nalgene)
3. Tighten the caps on jugs or bottles securely.
4. Place absorbent material between bottles to prevent breaking and to absorb any material that might leak.

Liquid Scintillation Vials (LSV)

1. When packing LSV use:
    a. The original shipping trays if possible
    b. A plastic liner of at least four (4) mil thickness **or** two (2) plastic liners of at least two (2) mil minimum thickness each
2. Place the trays or bags of vials in fiberboard boxes for disposal and transport to the OH&S Support Facility.

The outside of the box **MUST** contain five (5) pieces of information for the OH&S Support Facility staff.

1. Radioactive Materials (Label or Writing)

Each box must be labeled or clearly marked as containing radioactive materials with a label (available on the OH&S website) **or** written in large letters so it is highly visible.

2. Isotope Name

1. Each box must have the name of the isotope written in large, legible letters so it is highly visible.
    a. If the waste is liquid, the isotope name must be be on each jug or bottle.

3. Category Name

The box must have the category name written in large legible letters to identify the contents.

- **SOL** for solids
- **LIQ** for liquids
- **LSV** for liquid scintillation vials

All toluene based or solvent based scintillation liquid must be aspirated.

- **SHARPS** if sharps are inside the box

Write the word **"SHARPS"** in several different places as a precaution to those opening the box. All sharps must be placed in the proper sharps container.

4. Radiation Waste Manifest

A copy of the Radioactive Waste Manifest must be securely attached to the box. The manifest must contain a list of the contents inside the box.

5. Licensee Name and Location

The licensee's name, building, and room number must be clearly visible on the outside of each box of radioactive waste.

Boxes/containers exceeding fifty (50) pounds will not be picked up by the OH&S Support Facility. Please ensure that your containers are less than 50 lbs. **Do not exceed 10 boxes per pick up.**

The Radiation Safety Waste Manifest

The instructions on how to correctly complete the manifest are listed on the first two (2) pages of the manifest located on the OH&S website. **Please read these carefully!** If you have questions, please contact OH&S at 205-394-2487.

Things You Must Know About the Manifest

Licensed, authorized users only

Only those who have successfully completed this course and are listed on the license will be allowed to manifest radioactive waste materials. Manifests completed by unauthorized users will be returned.

Trained licensed, authorized users only

Training (i.e., this course) must be up-to-date. It is required once every 365 days (one year, annually). No manifest will be accepted unless this training is up-to-date.

Abbreviations

Manifests with abbreviations will not be accepted and will be sent back for correction. Only abbreviations for the scientific names of radioisotopes will be accepted.

Incompleted Manifests

These will be returned for correction/completion.

Incorrect/unsuitable containers

OH&S Support Facility staff will not pick up any boxes and/or containers that are:

- Marked incorrectly (lacking the correct markings)
- Incomplete or incorrect (without correct markings, manifest, etc.)
- Unapproved (not approved by OH&S Support Facility)

- Leaking
- Have unsecured manifests (loose, missing, or not highly visible)

Copies

Keep copies of the manifest.

- One copy for the files in your area.
- One copy to tape or attach to the outside of each box. Always make sure that the manifest matches the contents of the box.
- One copy sent to radwastemanifest@uab.edu.

Paper copies are no longer accepted.

Pick Up Times

Please allow ten (10) business days for pickup of the radioactive waste.

Security and Safety

For your safety and the safety of those around you and the security of your radioactive materials, you should remember to:

- Avoid accumulating more than 10 packages of radioactive waste at a time.
- Destroy all radioactive labels and markings on packages that will be placed in the regular trash and make sure that the packages are free of radioactive contamination.
- Never put packages with radioactive marks and labels near non-radioactive trash containers.
- Keep all radioactive wastes well-secured from unauthorized removal.
- Store all radioactive wastes in least traveled areas.
- Store all liquids on absorbent and leak-proof padding and place in secondary containers.
- Survey your storage area to ensure that exposure levels are less than 0.5 mR/Hr at 1 foot.

Conclusion

This concludes Radiation Safety Waste Handling and Packing. Return to the home page of this course and take the assessment. **You must score 85% or higher to pass.**