

RADIATION CONTROL TECHNIQUE #2

INSTRUCTIONS FOR PREPARATION OF RADIOACTIVE WASTE FOR DISPOSAL

I. PURPOSE:

To establish a standard procedure for preparing Radioactive Waste and Radioactive Mixed Waste (RMW) to ensure it's efficient pick-up and disposal by Waste Management.

II. PREREQUISITES:

- A. Properly labeled containers with lids, covers, caps or seals.
- B. Labels, tape, clear plastic bags, HDPE plastic jugs or suitable liquid containers, corrugated cardboard boxes, waste pickup request forms.
- C. Note: Waste Management provides HDPE Liquid Waste containers, labels, and pickup forms.

III. PURPOSE:

- A. The goals of the radioactive waste program are to;
 - Minimize the amount of waste generated and thereby reduce the disposal cost,
 - Minimize the time spent by researchers preparing, processing, disposing of waste, and
 - Insure compliance with state and federal regulations.
- B. The success of the programs requires the researcher's support in;
 - Segregating the waste streams,
 - Packaging the waste for collection,
 - Labeling the waste containers.

IV. WASTE REDUCTION:

- A. Mixed Waste: Mixed waste is the combination of radioactive waste and hazardous chemicals such as methanol, acetone, trichloro-acetic acid, and chloroform. Treatment options for mixed waste, where they exist, are limited and expensive. The University's storage capacity for this waste is also limited. Therefore generation of mixed waste must be minimized. Carefully review the attached list of chemicals, which create radioactive mixed waste when combined with radioactive waste. Avoid using the listed chemicals with radioactive material when possible. The generation of radioactive mixed waste can be minimized in several ways such as; by not needlessly mixing hazardous chemicals with radioactive waste, by not combining mixed waste with other radioactive waste; by using non-hazardous (and therefore non-regulated) chemicals. **AVOID GENERATING MIXED WASTE.**

The most common sources of mixed waste are;

- mercury in RIA kits,
- chloroform produced by bleach used as a disinfectant,
- flammable liquid scintillation fluid.

Avoid or reduce these sources when possible.

- B. Minimize radioactive waste by preventing unnecessary contamination of non-radioactive chemicals and lab-ware. Have an appropriate number of waste containers on hand to minimize the inclination to combine waste streams. **MINIMIZE.**
- C. Decontaminate and reuse lab equipment when feasible. **RECYCLE.**

- D. Only materials that are actually contaminated should be disposed as radioactive waste. For example; packing materials, boxes, and bench top covers which have not been in contact with radioactive material should be disposed of in regular trash after radioactive warning labels have been removed, or if a spill occurs on mat paper, only the contaminated area should be placed with radioactive waste. **KEEP RADIOACTIVE WASTE SEPARATE FROM NON-RADIOACTIVE WASTE.**
- E. Review your procedures and determine what processes contaminate clean material. Develop techniques that minimize amount of contamination, e.g., unnecessary transfer between pieces of lab ware. **PRE-PLAN.**
- F. Your commitment is absolutely essential to achieve volume reduction. Ensure ongoing employee training that stresses good housekeeping. **TRAIN**

V. ACCUMULATION POINT GUIDELINES:

- A. Keep all waste containers closed unless you are in the act of filling the container.
- B. All containers must be labeled. Containers of mixed waste should also be marked with the words “Hazardous Waste” in addition to the words “Radioactive Material” and the list of chemical constituents.
- C. The Waste Management department provides labels. Dial 392-8400 and use the form number or description to order labels.

<u>Label</u>	<u>Form Number</u>
Caution Radioactive Material	None
Hazardous Waste	EHS-CWLBLS
Constituent List	None

NOTE: The identity (chemical name only) and amount of each constituent in percent must be listed on each container.

VI. ACCUMULATION PROCEDURES:

- A. Accumulating liquid scintillation fluid in vials (LSV's).**
 - 1. LSV's shall be segregated by radioisotope. Only Carbon-14 and tritium may be combined in the same container.
 - 2. LSV's may be accumulated in the original shipping containers (flats) or in cardboard boxes, which are double lined with heavy plastic bags. Boxes may not exceed 3.0 cubic feet in size.
 - 3. Prevent scintillation fluid from contaminating the container by ensuring the caps are tight.
 - 4. Containers must be labeled indicating radioisotope, activity, Principal Investigator, date, lab location, and what scintillation fluid was used.
 - 5. The outer container of LSV's containing hazardous LS cocktail must also be labeled with the words “Hazardous Waste” if the cocktail is flammable.
 - 6. Use non-hazardous (non-flammable) scintillation fluids to reduce mixed wastes and lower disposal costs.

B. Accumulating of liquid scintillation fluid in larger containers.

1. It is not necessary or recommended that you remove scintillation fluid from the vials for disposal. This is impractical from both cost and safety standpoints. However, if it is necessary to accumulate scintillation fluid in containers other than vials the following guidelines must be used.
 - a. Accumulate scintillation fluid in chemically compatible containers only.
 - b. Segregate the scintillation fluid according to radioisotope. With the exception of H-3 and C-14, accumulate only one isotope per container. H-3 and C-14 may be accumulated in the same container.
 - c. Keep all waste containers closed unless you are in the act of filling the container.
2. Keep all containers labeled. Containers should also be marked with the words "Hazardous Waste" in addition to the words "Radioactive Material" if the scintillation fluid is flammable. Also write the name of the cocktail used on the outside of the package.
3. Use non-hazardous (non-flammable scintillations cocktails to reduce mixed waste and lower disposal costs.

C. Accumulating liquid radioactive waste.

1. Liquid wastes shall be segregated by radioisotope into the High Density Polyethylene one (1) gallon containers provided by Waste Management. Containers such as milk jugs may not be used. Glass containers may be used, with prior approval, only if the waste material is not compatible with HDPE. Contact the Waste Management Facility (2-8400) if you have a question regarding a materials compatibility with HDPE.
 - a. Only H-3 (tritium) and Carbon-14 may be combined into the same container; all other radioisotopes must be accumulated separately.
 - b. Do not combine radioactive waste and Mixed Waste.

NOTE: MIXED WASTE IS ANY RADIOACTIVE WASTE THAT ALSO CONTAINS A HAZARDOUS CHEMICAL CONSTITUENT (S) SUCH AS METHANOL, ACETONE, CHLOROFORM, ETC. SEE ATTACHMENT

2. Do not pour concentrated stock solution vials into your liquid waste containers. Stock solutions should be accumulated separately from other materials.
3. Waste containers shall have labels identifying the radioisotope, activity, chemical constituents, and the amount of each chemical constituent in the container recorded in percent solution, principal investigator name, the date closed or filled, and lab location.
4. Containers of mixed waste also require a label indicating that the material is also "Hazardous Waste". This label may be hand-written.
5. Labels are available from Environmental Health and Safety's Hazardous Materials Department at 392-8400.
6. Liquid waste from Radioimmunoassay kits should be accumulated separately from other radioactive wastes.

D. Accumulating dry/solid radioactive waste.

1. All dry/solid waste must be accumulated and packaged according to the following guidelines. Please read this information carefully.
 - a. Tritium and Carbon-14 solids may be placed in the same container; other radioisotopes must be accumulated separately in their own containers.
 - b. Tritium and Carbon-14 solid waste must also be segregated as TYPE A or TYPE B as follows:
 - I. Type A materials are incinerable and include;

Cotton	Polyethylene
Cotton/polyester blends	Polypropylene
HDPE	Polystyrene
Latex	Polyurethane
Leather	Natural Rubber
Nitrile or Nitrile Rubber	Spun Bonded Polyolefin
Nylon	Transparent Thermoplastic
Paper	Ultra Hi Molecular Polyethylene
Polycarbonate	Urethane
Polyester	Wood

and other materials upon specific approval
 - II. Type B materials are not incinerable and include;

Sharps	Asbestos
Metals	Hazardous Wastes
Glass	Explosives
Polyvinyl Chloride	Pyrophorics
 - c. Other radioisotopes shall be sorted as 1) trash, 2) glassware/sharps, and 3) mixed waste.
2. Insure that there is **no** freestanding liquid included with the dry/solid waste. This includes LS vials, centrifuge tubes with liquid inside, liquid source vials, dripping absorbents, etc.
3. Trash (paper, plastic, surgical gloves, etc.) contaminated with radioisotopes other than tritium and carbon-14 shall be placed into a heavy duty, clear, plastic bags of sufficient strength to securely contain the waste and then sealed. Clear bags are available at Health Center stores. Do not use red or orange bags to accumulate radioactive waste.
4. Glassware/sharps - pipettes, syringes, centrifuge tubes, needles, etc., shall be placed into a cardboard box double-lined with heavy duty, clear, plastic bags. The bags must be sealed and the box taped closed. **Each box must not exceed 3.0 cubic feet in size.** Boxes can often be obtained from the Health Center loading dock and other shipping and receiving areas at no charge.
5. Mixed Waste - trash contaminated by liquid scintillation fluid or other hazardous constituents shall be placed into a cardboard box double-lined with heavy-duty clear plastic bags. The bags must be sealed and the box taped closed. Each box shall not exceed 3.0 cubic feet. The container should be marked “ Hazardous Waste”.

6. Wastes must be labeled indicating radioisotope, activity, chemical constituents, principal investigator, date, and lab location as well as waste type.

E. Accumulating radioactive animal carcasses or waste containing biological material.

1. Waste Management must be contacted prior to requesting a pick-up of greater than 1 cubic foot of animal carcasses or biological material. If Waste Management has insufficient storage space, the laboratory may be required to store this waste material. Advance notification is recommended when planning projects involving large or large quantities of animal or biological material.
2. Carcasses less than one cubic foot may be included on a standard waste collection request form.
3. Animal carcasses and biological materials shall be segregated according to radioisotope.
4. Animal carcasses and biological materials shall be: double-bagged in opaque bags, frozen, and held for pick up by Waste Management. Bags are available from Health Center stores.
5. The bags must not be non-combustible or a Type B material.
6. Animals to be picked up by Waste Management must be inside solid colored bags. Animal carcasses should not exceed the strength capability of the bags (e.g. one large animal, 20 Kg in heavy duty bags or several small animals). Bags containing biological tissue must not contain any other waste.
7. Bags shall be accurately marked with the proper label indicating the radioisotope, activity, weight of carcass or tissue, principal investigator, date and lab location.

F. Accumulating Biohazards in Radioactive Waste

1. No Radioactive waste containing Biohazards will be collected. Regulations found in the University of Florida Biological Safety Manual require, that all biohazardous waste must be inactivated prior to disposal. Inactivate biohazardous materials prior to preparing them for radioactive waste pick-up.
2. Methods of disinfection or inactivation can be found at the University's EH&S web page. Click on the Biological Safety web site. To reduce the formation of mixed waste, avoid using bleach or organic disinfectants if possible. If it is necessary to use bleach use the most dilute concentration that is effective.
3. Do **not** use red colored bags and boxes, or bags and boxes with biohazard warning labels for radioactive waste even if the biohazard is deactivated. Waste Management technicians will not collect red or orange bags.

VII. Labeling

- A. All radioactive materials shall bear labels having the words "Caution Radioactive Materials" - with yellow background and magenta color lettering and symbol.

The label shall specify:

- Radioisotope(s) in container(s)
- Activity of each Radioisotope (in uCi or mCi)
- Date
- Name of principal investigator
- Lab location
- Identity of all chemical constituents (see below).

- B. Chemical Constituent Labels

1. Chemical Constituent Labels must be affixed to all liquid radioactive waste containers and those solid radioactive waste containers which contain mixed waste. Preprinted labels or hand-rewritten labels are acceptable.
2. Each label must be completely and legibly filled out with indelible ink.
3. Use the proper chemical name for each constituent.
4. The label should accurately indicate the concentration of each chemical in the container in units of percent.

- C. Hazardous waste labels or equivalent

1. Must be used for mixed waste.
2. Labels must be completed as described in 2 above.

- D. Labels will be provided by Waste Management on request. Call 392-8400.

VIII. Scheduling a waste collection

After the radioactive materials have been prepared for collection, complete a radioactive waste pick up request form (EH&S, RSA-2) and mail it to Box 112725 via campus mail. You will be phoned to arrange a collection appointment. You should plan on a week turnaround, from the date you mail the pickup request, to have your waste collected.