



PROGRAM FOR THE MANAGEMENT AND DISPOSAL OF RADIOACTIVE WASTE

1. GENERAL CONSIDERATIONS

(For the purpose of this policy the Radiation Safety Department will be here and throughout this document referred to as RSD and Authorized Radiation User is referred to as ARU/PI.)

West Virginia University developed these procedures to ensure the safe and proper handling, labeling and packaging of radioactive waste and to continually be in compliance with all federal, state and local regulatory requirements and the Radiation Safety Manual (RSM).

- ✦ Appropriate waste disposal records **MUST** be maintained at all times.
- ✦ Radioactive waste **MUST** be stored in appropriate containers.
- ✦ Radioactive waste **MUST** be appropriately labeled.
- ✦ Integrity of the waste containers **MUST** be assured.
- ✦ Radioactive waste **MUST** be secured against unauthorized access or removal.

The disposition of all forms of radioactive waste is the responsibility of the Radiation Safety Department office. All radioactive waste is picked up by the Radiation Safety Department and processed for final disposition. Radioactive waste must never be disposed of in regular trash. Properly labeled radioactive waste container should be readily available in labs utilizing radioactive materials. The Radiation Safety Department provides both liquid and solid waste containers to use in the work area for radioactive waste disposal. Radiation users should complete a “**RSD Radioactive Waste Removal Request**” form to request containers or waste removal from their lab.

It is important that this Program be strictly adhered to by all radiation users. Not only for regulatory compliance and safety, but to effectively minimize the volume of waste generated to reduce the financial burden emanating from waste disposal.

Changes in regulatory guidelines and escalating decommissioning costs have forced West Virginia University administration to adopt a new criterion that would amend the financial assurance requirements in the areas of decontamination, decommissioning and radioactive material waste disposal under the institutions’ radioactive materials broad scope license (WVU 47-23035-01 Exp. 1-31-2012) and WVRHP materials license. Current authorized radiation users (ARU/PI), and new applicants requesting non-human use of radiation and radionuclides materials authorization, are required to provide a written commitment to WVU that ascertains funding is available for all elements of radioactive material final disposition under their Radiation Safety Committee application approval. The ARU/PI’s department head must also ratify this commitment whereby indicating any costs not covered by the ARU/PI’s research grant will be the financial responsibility of the stated department. This is a straight forward way to ensure adequate funding is available for timely radioactive waste removal and decommissioning.

In addition, all radioactive waste disposal costs are to be considered and added as a direct charge on grants and contracts when financial support is sought for the purchase of radioactive materials.

The fee schedule for waste processing and disposal will be reviewed annually by RSD. Fees are derived using a number of variables that includes a fee schedule provided by the contracted vendor for radioactive waste removal.

Each ARU/PI is financially responsible for the procurement and disposition of all radioactive materials they obtain under their Non-Human Use of Radiation & Radionuclide Committee authorization. All waste processing, supplies and disposal costs will be direct billed to the ARU/PI quarterly and payment must be submitted to the Radiation Safety Department within 30 days of invoice receipt.

II. IMPORTANT RULES TO REMEMBER

1. Do not allow waste containers to overflow. If you will be conducting an experiment on a particular date that will generate an abundance of waste, notify RSD in advance so that arrangements can be made for immediate removal by completing a “RSD Radioactive Waste Removal Request” form (see appendices).
2. Radioactive waste should **not** be held for decay purposes in any laboratory.
3. All radioactive waste must be properly labeled with activity, isotope, compound, pH level; date, ARU/PI and clearly visible label bearing the appropriate radiation symbol (see appendices).
4. The exterior of all containers must be free of removable contamination.
5. RSD will not remove waste from a laboratory that has not been properly processed and prepared for pickup.
6. RSD does not permit laboratories to dispose of radioactive materials through sanitary sewer.
7. Fax a copy of the “Radioactive Material Inventory and Waste Disposal Record” form (see appendices) and “RSD Radioactive Waste Removal Request” to RSD for a waste pickup.
8. The “Radioactive Material Inventory and Waste Disposal Record” form should always include a written record of each time radioactive solution is removed from the vial and used or transferred to a designated radioactive waste container.
9. Maintain an accurate account of all waste placed in waste containers. The completed “Radioactive Waste Composition Record” (see appendices) should always be attached to the outside of the waste container in clear view.
10. All contaminated materials must be discarded as radioactive waste if it cannot be adequately decontaminated.
11. Prior to removal or disposal of empty contamination free containers to unrestricted areas or regular trash, deface the radioactive material label or clearly indicate on the container that it no longer contains radioactive materials.
12. Radioactive waste should be properly secured at all times.
13. Waste barrels should not contain any detectable free standing liquids.
14. Radioactive waste may not contain pyrophoric materials or materials that react violently with water.
15. The physical form of all waste must be specified, e.g., compressed paper, glass, etc.
16. Biological (excluding animal carcasses), pathogenic or infectious material or equipment (e.g., syringes, test tubes, capillary tubes) used to handle such material shall be treated so that the material, if not radioactive, can be disposed of as infectious waste.
17. The radionuclide and activity must be specified in microcuries or millicuries. The radionuclide and activity must coincide with the barrel sheet.

III. SUGGESTIONS ON HOW TO MINIMIZE WASTE

1. Use radioisotopes with a half-life of less than 90 days whenever possible.
2. Order only the quantity of radionuclides required for the experiment.
3. Do not discard non-contaminated trash into radioactive waste containers.
4. Survey potentially contaminated items (e.g. disposable gloves, trays, absorbent papers) in the work areas. If there is no contamination, they can be disposed of in regular trash after completely removing any radiation warning symbols and/or markings. Prior to discarding, double check to ensure that all radiation labels are properly defaced.

IV. WASTE DISPOSAL

For disposal purposes, radioactive wastes should be segregated into 5 categories:

- A. Dry Solid Radioactive Waste
- B. Solid Biological Radioactive Waste
- C. Liquid Radioactive Waste
- D. Liquid Scintillation Vials
- E. Radioactive/Hazardous Mixed Waste

(After radioactive waste is categorized you should segregate waste according to the half-life of the radionuclide and then by isotope.)

Note: Short half-life waste is not to be mixed with long half-life waste.
When **short** half-life waste is mixed with **long** half-life waste the entire container of waste must be processed as **long half-life** and shipped accordingly. (**Short half-life waste is radionuclides with a half-life of 60 days or less including Sulfur-35.**)

DISPOSAL OF DRY SOLID RADIOACTIVE WASTE (NON-BIOLOGICAL)

1. Obtain a 5 gallon pail containing a yellow plastic bag liner from RSD. (Note: 55 gallon drums are available to users who anticipate generating large amounts of waste in short periods of time.)
2. Fold the top of yellow bag down over the side of the pail.
3. Needles and other sharp objects should be placed in a puncture proof container prior to being placed in the yellow plastic bag or pail.
4. Wrap broken glassware in paper towels to prevent the plastic bag from being punctured and to avoid a potential safety hazard.
5. Place only radioactive materials in the waste pail, carboy, drum, etc. Non-radioactive materials will increase the volume and thus increase waste disposal costs.
6. Waste containers surveyed for contamination with a reading greater than 2 mR/hr, at a distance of one meter from the container, should be sealed accordingly with tape whether the bag is full or not. Always seal bag according to “**Bagging & Sealing**” instructions (**Section VII**).
7. When the waste container and/or yellow plastic bag are approximately 90% full, close the bag, seal the top with masking tape and fax a completed “**RSD Radioactive Waste Removal Request**” form to RSD.
8. RSD will arrange to pickup the waste within 2 working days.

DISPOSAL OF SECONDARY CONTAINERS/LEAD FROM STOCK VIAL SHIELDING

1. The plastic outer secondary containers utilized by manufacturers to hold the stock vial during shipment must be processed separately. If the pig contains no lead, the pig and stock vial can be disposed in solid waste.
2. The lead liner used for added shielding (lead pig) cannot be placed in either radioactive or regular waste for disposal.
3. The container and lead pig will be processed for disposal separate from other solid waste.
4. Lead is an ingestion hazard and disposable gloves are recommended during handling.
5. Survey the container and lead to confirm there is no contamination.
6. When contamination is found, decontaminate accordingly.
7. Place empty, contamination free containers and lead in separate container. No radioactive waste label is required.
8. When the waste container and/or yellow plastic bag are approximately 90% full, close the bag, seal the top with masking tape and fax a completed “RSD Radioactive Waste Removal Request” form to RSD.
9. RSD will arrange to pickup the waste within 2 working days.

DISPOSAL OF SHARPS

1. Includes all hypodermic needles, syringes, glass pasteur pipettes, scalpel blades, razor blades, broken glass, blood vials, etc.
2. Sharps should be placed in containers that are rigid, leak proof, puncture resistant and distinctly labeled “radioactive” and “biohazardous”.
3. Ensure that container is sealed to prevent loss of contents.
4. When the waste container and/or yellow plastic bag are approximately 90% full, close the bag, seal the top with masking tape and fax a completed “RSD Radioactive Waste Removal Request” form to RSD.
5. RSD will arrange to pickup the waste within 2 working days.

DISPOSAL OF SOLID BIOLOGICAL RADIOACTIVE WASTE

1. Radioactive biological waste is defined as radioactive contaminated:
 - ⊕ animal carcasses
 - ⊕ feces
 - ⊕ radioactive plants
 - ⊕ animal bedding
 - ⊕ tissue samples
2. Materials must be properly prepared to prevent the plastic bag from being torn and/or punctured. This may entail padding parts of the biological waste with gauze pads or other materials.
3. Radiation Safety will provide plastic bags upon receipt of a “RSD Radioactive Waste Removal Request” form.
4. When the waste container and/or yellow plastic bag are approximately 90% full, close the bag, seal the top with masking tape and fax a completed “RSD Radioactive Waste Removal Request” form to RSD.
5. RSD will arrange to pickup the waste within 2 working days.

DISPOSAL OF LIQUID WASTE

- Liquid waste intended for disposal must be segregated according to the chemical composition of the liquid:
 - ⊕ Aqueous liquids with no organic solvents
 - ⊕ Liquid scintillation fluids
 - ⊕ Radioactive/hazardous mixed liquid waste
- Radiation Safety provides sturdy Nalgene carboys upon receipt of a “RSD Radioactive Waste Removal Request” form.
- Fill the carboy to the fill line mark, indicated by a black line, on the container.
- A carboy that is overfull is a hazardous during transport and will not be picked up by Radiation Safety.
- Each carboy must be labeled "Caution, Radioactive Material."
- The use of glass waste containers is prohibited.** If you have any old materials stored in glass containers, place it in a secondary break-resistant container in a location where it will not be dropped or knocked over.
- Prior to pick up, complete both sides of the yellow “Radioactivity Precautions” materials tag attached to the carboy. All information must be provided before RSD can pickup the carboy.
 - ⊕ Radionuclide
 - ⊕ Activity
 - ⊕ Date
 - ⊕ Chemical Form
 - ⊕ pH
 - ⊕ Solvent
 - ⊕ Department
 - ⊕ Authorized Radiation User/Investigator
 - ⊕ Volume
- A carboy is provided for one time use only and will not be returned to the laboratory (Smaller carboys can be made available to the lab upon request).
- When the content of the carboy reaches the fill line, seal the top and fax a completed “RSD Radioactive Waste Removal Request” form to RSS.
- RSD will arrange to pickup the waste within 2 working days.

DISPOSAL OF WASH WATER

- Wash water is not required to be disposed of as liquid radioactive waste. This is the only instance that disposal can occur via the sewage system and the following guidelines must be followed:
 - ⊕ Designate a sink in the laboratory as a “Radioactive Waste Sink” and request RSD to post it accordingly.
 - ⊕ Do not use an unmarked sink for washing contaminated glassware and disposing of wash water.
 - ⊕ Rinse the sink with plenty of water after washing contaminated items.
 - ⊕ This will reduce the contamination in the sink and also further dilute the small amount of radionuclide released into the sewage system.

DISPOSAL OF LIQUID SCINTILLATION VIALS

- Liquid scintillation vials are available in glass or plastic, have a capacity of 20 ml or less for use in scintillation counting.
- Plastic** scintillation vials are **recommended** by RSD to reduce waste disposal costs.
- Glass and plastic vials can be placed in the same waste container.
- Liquid scintillation vials are required to be packed separately from other items such as gloves, etc.**
- Do not put any other waste except LS vials into a designated LS vial waste container.

6. In most instances, "cocktails" are utilized to produce scintillations that are counted.
7. Liquid scintillation fluid containing **non-hazardous solvents** should be utilized at all times.
8. Only under special written authorization from the RSO, can cocktails that contain solvents such as xylene or toluene be used and will be classified as hazardous material waste during disposal processing.
9. Liquid scintillation fluid containing hazardous and radioactive materials will require special processing and transportation that will result in supplemental disposal costs.
10. Pails containing hazardous scintillation fluid should be opened in a hood and, if feasible, stored in a hood.
11. Place used vials into LS vial pail and record current activity.
12. When the waste container and/or yellow plastic bag are approximately 90% full, close the bag, seal the top with masking tape and fax a completed "RSD Radioactive Waste Removal Request" form to RSD.
13. RSD will arrange to pickup the waste within 2 working days.

DISPOSAL OF RADIOACTIVE/HAZARDOUS MIXED WASTE

1. Radioactive waste that contains additional hazards, (e.g., biohazard or chemical hazard) is considered "mixed waste."
2. Storage and disposal must also comply with all applicable Federal, state, and local regulatory requirements.
3. The charges for "mixed waste" are determined on a case-by case basis dependent upon the chemical and radioisotope.
4. The disposal of mixed waste is very costly. Specialized processing and transportation is required.
5. When the waste container and/or yellow plastic bag are approximately 90% full, close the bag, seal the top with masking tape and fax a completed "RSD Radioactive Waste Removal Request" form to RSD.
6. RSD will arrange to pickup the waste within 2 working days.

DISPOSAL OF SEALED SOURCES AND RADIATION PRODUCING DEVICES

1. The ARU/PI must provide RSD written notification of the decision to dispose of a sealed source or radiation producing device.
2. RSD will make arrangements for a site visit, contamination surveys, decommissioning, and disposal.
3. RSD will investigate disposal options and costs and forward those results back to the ARU/PI.
4. The decommissioning and disposal project would then be scheduled.

VII. BAGGING & SEALING INSTRUCTIONS

1. Place all radioactive materials and biological waste in YELLOW plastic bags
2. Properly pack materials to ensure contents will not puncture or tear the bag.
3. Additional bags may be required around the original bag to prevent leakage or puncture and then seal accordingly.
4. Non-radioactive biological waste **should not** be placed in yellow plastic bags.
5. Seal the bag by twisting the top of the bag tightly.
6. Wrap tape tightly two or three times around the twisted section.
7. Fold twisted section in half and wrap the tape two or three more turns.
8. Always re-bag contents, if a tear should occur, prior to transferring materials to the waste storage container.

VIII. ANIMAL WASTE INVENTORY CONTROL

1. Waste inventory control and identification will be recorded using a pre-numbered yellow 4-ply, Radionuclide Identification Form provided by RSD to the user (see appendices).
2. Complete one form for each animal or small group of animals when they are ready for disposal and pickup.
3. Using a permanent marker, transfer the pre-printed number on top of the form to the outside surface of the corresponding bag.
4. Attach one copy of the pre-numbered yellow form to the outside of the bag.
5. Always store biological waste in a freezer properly posted for biological and radioactive waste.
- 6. Freezing is required.**
7. To request a waste pickup, complete and fax the “RSD Radioactive Waste Removal Request” form to RSD.
8. RSD will arrange to pickup the waste within 2 working days.
9. At pickup, provide RSD with the 1st and 3rd copy of the Radionuclide Identification Form for the bag labeled with the identical number to be removed and the 4th copy should be retained by the lab.

IX. SUPPLIES & MATERIALS REQUIRED

1. RSD provides the ARU/PI with the required waste maintenance forms, pails, carboys, drums yellow plastic bags for a nominal fee.
2. Waste and other pertinent departmental forms can be downloaded from the RSD web site www.hsc.wvu.edu/rsafety.
3. All waste and related paperwork should be readily available when RSD arrives to process and remove waste.
4. It is just good practice to have all waste ready for pickup prior to faxing your request to RSD.
5. Additional radiation tags, stickers and containers are available upon request.

X. WASTE STORAGE IN LABS

1. Radioactive waste should be stored away from other personnel located in the lab and counting instruments.
2. Do not store liquid waste containers on the floor unless a secondary container is used in the event of a leak or spill.
3. Do not stack waste containers.
4. Adequately secure waste at all times from unauthorized removal or access.
5. Depending on your lab setup, locked cabinets may be required to adequately secure waste materials in disposal containers.
6. Good housekeeping practices should be maintained at all times.
7. The waste storage area should be wipe tested and area surveyed monthly to eliminate the possibility of contamination.

Appendices:

Radioactive Waste Disposal Request
Waste Composition Record (30-55 gal)
Waste Composition Record (5 gal)
Yellow Radioactivity Precautions String Tag
Record Usage Form
Prenumbered Animal Biological Waste Form