

SOP-6 RADIOACTIVE LIQUID WASTE

- The Radiation Protection Specialist (RPS) is responsible for the collection and disposal of all radioactive waste and associated materials.
- Separate procedures must be followed for the disposal of bulk fluids, liquids contained in scintillation vials, sharps and other materials that pose a puncture hazard to personnel, and samples with visible residues.
- Wastes which are not correctly identified by the user/generator will be returned.
- Only Non-Flammable Scintillation Fluid may be used in laboratories.
- Any sewer/sink disposal of Radioactive Waste by laboratory personnel is strictly prohibited.

Procedures for Generators of Liquid Radioactive Waste:

1. Liquid waste must be collected in the plastic containers provided by Laboratory Services (LS). The “Radioactive Materials” tag attached to the container must be completed, including:
 - Material I.D. (Radioisotope),
 - Principal investigator (PI) or an appointed designee, and,
 - Current Date
2. Form DHS-014, “Request for Disposal of Radioactive Materials” must be completed, submitted to the RPS (Campus mail, hand delivered, fax 5480), and approved prior to waste collection.
3. The radioactive liquid waste description must include the following information:
 - Chemical components of the waste,
 - Relative amounts of any chemicals present in the waste, identified +/- 1% of the total volume.
4. Liquid radioactive waste must be segregated by radionuclide
5. Use separate waste containers for Organic Waste and Aqueous waste.

Procedures for Generators of Liquid Waste with Scintillation Vials:

Liquid Scintillation Vials (LSV) are to be placed in a sturdy receptacle with 2 liners provided by LS.

1. The following criteria must be followed for the collection of LSVs:
 - The average specific activity of waste generated must be less than 0.05 $\mu\text{Ci/ml}$ (1.85 MBq/ml).
 - The vials are to be tightly capped and there should be no leaking vials within the lot.
 - There must be no visible solids or residues (tissue parts, animal parts, etc.) contained in the vials.

2. Liquid radioactive wastes which do not meet the criteria above are to be packaged as follows:
 - The contents of any vials or similar glass or plastic containers are to be emptied into an appropriately marked liquid container which has a leak proof, screw-on cap.
 - Do not mix nuclides without prior approval from the RPS.
 - Each container should be labeled with a tag showing the isotope, activity and volume with the completed waste form and activity analysis attached.
 - Empty vials and other empty glass or plastic containers are to be tightly capped and discarded into a double polyethylene bagged step-pedal type waste container.
 - When the bag is approximately 75% full, seal the bags with tape and label the outer bag with the radioisotope, activity and weight with the completed waste form attached.
 - Puncture hazards such as broken glass, aluminum crimp seals, syringes, syringe needles, pipettes, pipette tips, and other sharp objects contaminated with radioactive material are to be segregated by nuclide and chemical compatibility and discarded into appropriately labeled puncture and leak proof containers.
 - When the container is full, the sealed puncture and leak proof containers are to be labeled with the radioisotope, activity and weight with the completed waste form attached.
 - After properly packaging the material for disposal, contact LS to arrange for pickup.

Procedures to be followed by the RPS:

Wastes which are not properly identified by the user/generator will not be collected for disposal.

1. Inspect the packaging of the liquid waste offered for disposal in accordance with the criteria and packaging requirements listed above. Ensure that each package is dated and labeled with the radioisotope and the PI's name. Add the waste Control # to the package and form.
2. Review the completed Form DHS-014, "Request for Disposal of Radioactive Materials". Ensure the form is signed and complete, with all necessary information provided.
3. During the transfer of waste that can contaminate any nearby materials, especially gamma emitters or high energy beta emitters, use a properly shielded waste transport container.
4. Transport the collected wastes to the Radioactive Waste Facility while awaiting analysis and/or disposal.

5. All "Request for Disposal of Radioactive Materials" forms are maintained in LS.
6. Notify the Laboratory Safety Specialist whenever any collected Radioactive Waste meets the EPA criteria of a Mixed Low Level Radioactive Waste.
7. Every bulk liquid waste container must be sampled prior to disposal, as required by the current regulations and vendor requirements.

Procedures for Sampling Liquid Radioactive Waste

Aqueous and Non-Aqueous Liquid Waste Containing Beta emitters, with $E_{max} \leq 2.0$ MeV:

1. Obtain a 1.0 ml graduated pipette, pipette control, a scintillation vial.
2. Pipette 1.0 ml of the radioactive liquid to be assayed into the scintillation vial using the pipette control. Add an appropriate amount of scintillation fluid to the vial (typically enough to fill the vial to 50 to 100% of its rated capacity), cap and label the vial.
3. Count the sample with a suitable LSC program for the radionuclides to be assayed.
4. Collect the data as the information becomes available.

Aqueous and Non-Aqueous Liquid Wastes Containing Beta Emitters, with $E_{max} \geq 2.0$ MeV:

1. Obtain a 100 lambda λ (100 μ L) micropipette and control, a 1-inch planchet, a scintillation vial containing 1 to 10ml of the sample to be assayed.
2. Measure 100 lambda (100 μ L) of the assay liquid onto the center of the planchet. Evaporate the liquid under a heat lamp in the hood of an approved Radioisotope Lab.
3. The uncovered planchet, background, and an appropriate standard are to be counted in an appropriate proportional counter at the center of the alpha-beta plateau for approximately five to ten minutes each.
4. Collect the data as the information becomes available.

Aqueous and Non-Aqueous Liquid Wastes Containing Gamma Emitters that cannot be counted by LSC:

1. Obtain a 1.0 ml graduated pipette, pipette control, a scintillation vial.
2. Pipette 1.0 ml of the radioactive liquid to be assayed into the scintillation vial using the pipette control. Add an appropriate amount of scintillation fluid to the vial (typically enough to fill the vial to 50 to 100% of its rated capacity), cap and label the vial.
3. The uncovered planchet, background standard, and an appropriate standard are to be counted with a three inch Na (TI) I Scintillation Detector for a period long enough to give good statistics (about 4 minutes) each at the appropriate gamma plateau and discriminator setting for the nuclide of interest.
4. Collect the data as the information becomes available.



Aqueous and Non-Aqueous Liquid Waste Containing Alpha Emitters:

Note: Alpha emitters can be counted using a LSC as shown in the procedure given in SOP-4, if the radioisotope meets the requirements given in that section. If the radioisotope cannot be counted in a LSC, the following procedure can be used.

1. Obtain a 1.0 ml graduated pipette, pipette control, a scintillation vial.
2. Pipette 1.0 ml of the radioactive liquid to be assayed into the scintillation vial using the pipette control. Add an appropriate amount of scintillation fluid to the vial (typically enough to fill the vial to 50 to 100% of its rated capacity), cap and label the vial.
3. The uncovered planchet, background standard, and an appropriate standard are to be counted in a proportional counter at the center of the alpha plateau, for a period long enough to give good statistics (about five minutes each).
4. Collect the data as the information becomes available.