M. Disposal of Radioactive Material

1. The majority of radioactive waste generated at NCI-Frederick falls into one of the following categories: solid radioactive dry waste (includes sharps); radioactive biologicals; stocks; radioactive liquids; and scintillation vials (including survey vials, which are background).

2. **Solid radioactive dry waste**: All solid radioactive waste, including sharps, must be segregated and packaged based upon the following isotopic half-lives:

   a. Class 1: Isotopes with a half-life of less than 15 days (32P)
   Class 2: Isotopes with a half-life of 15 to 100 days (33P, 51CR, 35S, 125I,111In)
   Class 3: Isotopes with a half-life greater than 100 days (3H, 14C)

   b. All sharps must be stored in a sharps container or a sturdy cardboard box to prevent any exposures or sticks. Please keep sharps separate from other dry wastes. Follow all other dry radioactive waste labeling requirements.

   c. Each class of waste must be placed into separate, properly labeled and sealed, clear plastic bags. Each properly labeled and sealed plastic bag may contain only “solid waste,” which means no scintillation vials, no liquid, no stock containers, and no sharps. Any “solid waste” that does not meet the above-mentioned criteria will be returned to the generator.

   d. Each sealed bag must be individually labeled with the following information: program number, user name, isotope, and activity. The Drum/Container Log (Radioactive Dry Waste Log Sheet) must also be completed. If the log has not been signed and dated certifying it for pickup, the container will not be removed.

   e. Solid radioactive waste shall not be placed in liquid waste containers.

3. **Radioactive biologicals**: All radioactive biologicals, including items such as bodies, excrement, organs, contaminated bedding, and tissue samples containing radioactivity, should be segregated according to the following isotopic half-lives:

   a. Class 1: Isotopes with a half-life of less than 15 days (32P)
   Class 2: Isotopes with a half-life of 15 to 100 days (33P, 51CR, 35S, 125I, 111In)
   Class 3: Isotopes with a half-life greater than 100 days (3H, 14C)

b. Each class of radioactive biological waste must be placed into separate, properly labeled and sealed, clear plastic bags. If the waste is frozen, keep it frozen and the Waste Management Department will pick it up in that condition. Please contact the Radiation Waste Department if your waste is difficult to package or seal, and they will assist you with packaging.

c. Each sealed bag must be individually labeled with the following information: program number, user name, isotope, and activity. If there are multiple bags inside a storage container or box, please use a Drum/Container Log (Radioactive Dry Waste Log Sheet) to track each sealed bag, following the same procedure that is used for radioactive dry waste.

d. Biologicals do not include items such as paper, needles, blood-soiled lab coats, etc.

4. **Stocks**: All stocks are picked up on Tuesday with the radioactive dry waste. Please keep all stocks separate from the other items for pick up.

   a. If there are multiple stocks, please consolidate them by isotope in a clear, sealed bag.

   b. Each stock or sealed bag must be individually labeled with the following information: program number, user name, isotope, and activity.

5. **Radioactive liquids**: Carboys are used to collect the bulk aqueous radioactive liquid. This generally consists of buffers, salts, and water. No hazardous compounds should be placed into these containers. The pH of each carboy should be between 5 and 9, and the carboy must not exhibit any characteristic hazards such as flammability, toxicity, or corrosivitity.

   a. The Waste Management Office recommends that each carboy remain isotopic specific, but in certain situations isotopes may be mixed within the storage container. The following activity limits apply to the 5-gallon carboy containers.

14C	2 millicuries
3H	3 millicuries
35S	4 millicuries
125I	1 millicurie
51Cr	1 millicurie

33P	1 millicurie
32P	1 millicurie
111In	1 millicurie

b. Reagents are generally low-volume, high-activity solutions that do not meet the activity requirements for bulk radioactive liquid waste. No hazardous compounds should be placed into these containers. The pH of each reagent should be between 5 and 9, and the reagent must not exhibit any characteristic hazards such as flammability, toxicity, or corrosivitity. Please contact the Waste Management Department at **X1384**, before generating any reagents.

c. All radioactive liquid waste must be stored and transported in sealed containers. Preferably, all containers used to store radioactive liquids should have some form of secondary containment. The only time that a container should be opened is when adding waste to it.

d. Each time an entry is made to the storage container, the Radioactive Waste Log (Liquid Radioactive Waste Disposal Sheet) must be filled out and signed. The Radioactive Waste Log contains the following information: program number, user name, isotope, and activity. The Radioactive Waste Log may be used for both carboys and reagents.

e. The Liquid Decay Storage Facility (LDSF) is a pilot program designed to reduce disposal costs and limit the liability associated with the disposal of liquid low-level radioactive waste. The LDSF focuses specifically on the storage and decay of 32P. Isotope-specific carboys, funnels, and equipment are provided to participating radiological programs. If you have any questions, please call **X1384** for more information.

f. Do not place liquid radioactive waste into dry waste containers.

6. **Scintillation vials**: The Waste Management Department will pick up all scintillation vials, whether or not they contain any radioactivity. If radioactivity is used, please try to use a nonhazardous scintillation cocktail to avoid generating mixed waste. The warehouse stocks nonhazardous scintillation fluids, and if one of these does not suit your needs, please contact the Radiation Waste Department for assistance.

a. Return used vials to the compartmentalized cardboard containers or double-bag the vials after separating them into the following categories:

   i. Scintillation vials containing 3H and 14C with an average of less than or equal to 0.05 microcurie per gram or 3 x 104 cpm/mL for each vial may be grouped together for disposal purposes. Scintillation vials that do not meet this activity requirement should be grouped separately.

   ii. All other vials containing isotopes with half-lives of less than 100 days, such as 32P, 35S, 33P, etc., should be segregated by isotope and stored together. The Waste Management Department suggests that scintillation vials with half-lives of less than 100 days be stored for decay in the laboratory.

   iii. Please keep together all scintillation vials that are "background" or radiation free, such as survey swipes.

b. All scintillation vials except for background vials must be clearly labeled as radioactive waste and contain the following information: program number, user name, isotope, and activity. Each individual container or bag must be labeled.

c. An NCI-Frederick Hazardous Waste Tag should accompany the scintillation vials, including background vials, identifying the scintillation fluid and amount that is contained within the vials.

7. For more radiation waste disposal information, click on the following address:

   http://home.ncifcrf.gov/ehs/ehs.asp?id=92