 <p>Carnegie Mellon University Environmental Health & Safety FIRE LAB WORK</p>	<p>Environmental Health and Safety Research with Radioactive Materials - Guideline</p>
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1. Purpose

This guide is designed to supplement training materials and the Radiation Safety Plan and is intended to provide practical information to users of unsealed radioactive materials. **This document does not replace the need for Radioactive Materials User's Training!** Since the majority of research at Carnegie Mellon University involves beta-emitting radionuclides, this guide focuses on beta emitters. Please consult the appropriate reference sheet for technical information of the radionuclide(s) you will be working with. Reference sheets are available for ^{32}P , ^3H , and ^{35}S .

2. SCOPE

This guide will describe the following as they relate to working with unsealed radioactive materials:

- a. Training requirements
- b. Ordering radioactive materials
- c. Preparing for work with radioactive materials
- d. Using radioactive materials
- e. Terminating work with radioactive materials
- f. Emergency response procedures

Questions relating to the use of radioactive materials should be directed to the Radiation Safety Officer at 412-268-8405.

3. Training

Prior to working with radioactive materials, you must complete the necessary training requirements. Please visit the [EHS training website](#) for more information.

4. Ordering Radioactive Materials

Radiation Safety Staff are the only persons authorized to order licensed materials for use by Carnegie Mellon faculty or staff. The only exception to this rule is when material is purchased with a purchase order. Purchase orders will require approval through the University's Oracle purchasing system.

5. Preparing for Work with Radioactive Materials

Preparation is key for practicing sound science and conducting research safely. From a safety standpoint the following steps should be taken prior to working with radioactive materials:

- a. Don dosimetry, lab coat and gloves (preferably nitrile).
- b. Place radiation monitoring equipment in work area and turn equipment to the “on” position.
- c. Check areas for preexisting radioactive material contamination prior to beginning work and clean up as necessary.
- d. Place shielding materials in the appropriate locations.
- e. Place solid and liquid waste containers within arm’s reach.

6. Using Radioactive Materials

Prior to using radioactive materials for the first time, you should consider practicing with a “dry-run.” A “dry-run” will allow you to become familiar with handling vials, pipetting and other activities. From a compliance and safety standpoint the following steps should be taken when working with radioactive materials:

- a. Remember the concepts of time, distance, and shielding.
- b. Log use of radioactive materials using “Radioactive Materials Use Log”.
- c. Check hands, lab coat and work areas frequently for radioactive contamination using radiation monitoring equipment.
- d. Place waste materials in the appropriate container and track waste disposal using “Radioactive Materials Use Log”.

7. Terminating Work with Radioactive Materials

From a compliance and safety standpoint the following steps should be taken when you are finished working with radioactive materials:

- a. Secure stock vials by closing containers and placing into locked storage location
- b. Dispose of any remaining waste materials in the appropriate container.
- c. Check extremities, lab coat, and work areas for radioactive contamination using radiation monitoring equipment and document findings on Radioactive Materials Use log. If contamination is found, contact the Radiation Safety Office **IMMEDIATELY**.
- d. Perform a weekly “wipe test survey” if needed (see “Procedures for Performing a Weekly Wipe Test Survey”).

8. Emergency Response Procedures

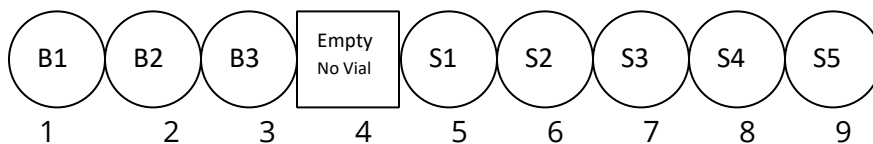
- a. In case of a spill or dispersal of radioactive material, the following steps should be taken.
The four steps can be remembered easily by the acronym S*W*I*M:
 - i. **S**top the spill, if possible. This may include placing containers of liquids upright, shutting down or isolating a leaking system, etc.
 - ii. **W**arn others in the area; affected area personnel should evacuate to a nearby unaffected area and remain there until monitored by Radiation Safety. Be aware of the potential for spreading contaminants.

- iii. **I**solate the affected area; shut down area air conditioners, fans and close windows and doors.
- iv. **M**inimize the exposure to yourself and others; no reentry to the affected area is permitted until emergency response personnel arrive.
- b. Consult posted guidelines in areas containing radiation equipment or radioactive sources for specific instructions.
- c. Any questions or problems related to radioactive material or radiation, please direct to the Radiation Safety Office or the Chairperson of the Radiation Safety Committee.
- d. If personal contamination should occur on the RAM user's attire, skin, hair or accessories, the RAM user must:
 - i. Alert someone in the lab that they have become contaminated and to contact Radiation Safety immediately. If no one is nearby to assist, the RAM user should contact Radiation Safety themselves. *If the contaminated person must leave the area to seek assistance, every care must be taken not to spread contamination.
 - ii. Remove any contaminated articles and place in a yellow RAM waste bag.
 - iii. Contaminated skin should be gently washed with soap and warm water and a gloved hand until someone from Radiation Safety arrives.

9. Procedures for Performing a Weekly Wipe Test Survey

Within seven days from withdrawing your radionuclide from the stock vial, a wipe test contamination survey must be performed. To perform a wipe test contamination survey the following steps must be taken:

- a. Don dosimetry, lab coat and gloves (preferably nitrile).
- b. Obtain survey form for your laboratory.
- c. Identify 5-7 locations that are likely to be contaminated and record these locations on survey form.
- d. Obtain 5-7 one inch X one inch square wipes.
- e. Obtain liquid scintillation rack and liquid scintillation vials and arrange as shown below:



B=Blanks
S=Samples

- f. Wipe a 100 cm² area for the location identified above and place wipe into the appropriate vial (For location 1, the wipe will go into S1 and so forth).
- g. After all samples have been taken, place 4 ml of liquid scintillation cocktail into each vial, then:
 - i. Place caps on each vial.

- ii. Take rack to MI 231 and locate liquid scintillation counter.
- iii. Find user card No. 5 and place in rear of rack with the writing of the card facing away from the rack.
- h. Place rack in scintillation counter as well as rack with "halt" card into liquid. scintillation counter so that the sample rack is closes to the rear of the liquid scintillation counter and close door.
- i. Highlight "Automatic Counting" on the liquid scintillation counter screen and press "start" on the liquid scintillation counter keyboard.
- j. Obtain printout from liquid scintillation counter printer after the samples have processed.
- k. Examine results in the "Wide DPM" column on the printout from liquid scintillation counter printer.
- l. Determine if results exceed 200 DPM.
 - i. If results do not exceed 200 DPM, attach printout to survey form, complete survey form, and place in binder.
 - ii. If results do exceed 200 DPM, contact the Radiation Safety Office.
- m. Dispose of vials in proper waste receptacles.

10. Revisions

Date	Documented Changes	Initials
1/28/2020		
8/2020	Updated format	MAS
2/11/2021	Updated Format and Accessibility Update	MAS