MODULE # 3
RADIOACTIVE WASTE DISPOSAL
What We Are Trying to Avoid
What We Are Trying to Avoid
Where Long Half-Life Waste Goes.....
• Receiving Radioactive Material
  • Ordering
    • Kuali System
  • Package Receipt & Verification
    • State Requirements for Package Survey & Testing

• Inventory Records
  • Online Disposal Form
  • Transfers

• Waste Disposal
  • Waste Containers
  • Segregation
  • Mixed Waste
  • Pick up by RCO
Kuali Ordering Process

1. Request Submittal
2. Accounting Approval
3. RCO Approval
4. Creation of P.O.
5. Material Ordered
1) Access the Kuali website with your e-name: [www.kuali.colostate.edu](http://www.kuali.colostate.edu) and click on “Shop Catalogs”.

On the KuShop website, click on “Shop Catalogs”.
START BY LOGGING ON TO THE RCO WEBSITE

Introduction:
The Radiation Control Office (RCO) provides technical assistance for the use of radiisotopes and radiation producing machines here at Colorado State University.

This office traditionally provides training for the safe use, and regulates all inventories of radioactive materials on campus. The University provides this service in compliance with the State of Colorado's Rules and Regulations Pertaining to Radiation Control. In addition the RCO oversees the Radiation Safety Program, Laser Safety Program, and Magnetic Resonance Safety.

RADIATION CONTROL OFFICE PROGRAMS
- Radiation Safety Program
- Laser Safety Program
- Magnetic Resonance Safety

Principal User Logon

Contacts
Publications/RCO Newsletter
For more information on Kuali Radioactive ordering go to the CSU Radiation Control Office web page Tutorial
Use object code 6226
State Procedures for Receiving and Opening Packages

• Required to Monitor the External Surface of the Package for:
  • Contamination (wipe test)
  • External Radiation Levels (instrument survey)

• Monitoring shall be performed:
  • As soon as practicable.
  • Not later than 3 hours after receipt during normal working hours.
  • Not later than 3 hours beginning the next work day if received after normal working hours.
RF-13A RADIOISOTOPE PACKAGE ARRIVAL REPORT
(Please type or print legibly)

<table>
<thead>
<tr>
<th>Inv #:</th>
<th>Principal User:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dept.:</td>
<td>Location:</td>
</tr>
<tr>
<td>PO/DPO #:</td>
<td>Nuclide:</td>
</tr>
<tr>
<td>Assay Date:</td>
<td>Compound:</td>
</tr>
</tbody>
</table>

**Exposure Rate Survey Results:**

- <0.5 mR/hr at surface
- >50 mR/hr at surface
- >500 mR/hr at 1 meter

**Contamination Survey Results:**

- <20 net dpm/cm² direct or on wipe
- >20 net dpm/cm² on wipe

"RADIOACTIVE" vehicle placards required to transport packages with YELLOW III labels.

<table>
<thead>
<tr>
<th>INSTRUMENTS</th>
<th>EXPOSURE RATE SURVEY</th>
<th>CONTAMINATION SURVEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model (Instrument/Probe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial Number (Instrument/Probe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calibration Date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency or Calibration Factor</td>
<td>CF=</td>
<td>EFF=</td>
</tr>
<tr>
<td>Count Time (min.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Count Rate</td>
<td>cpm</td>
<td>cpm</td>
</tr>
<tr>
<td>Background</td>
<td>cpm</td>
<td>cpm</td>
</tr>
<tr>
<td>Net Count Rate</td>
<td>cpm</td>
<td>cpm</td>
</tr>
<tr>
<td>Area of Wipe (cm²)</td>
<td>N/A</td>
<td>cm²</td>
</tr>
<tr>
<td>Contamination Level (dpm cm⁻²) or Exposure or Dose Rate (mR hr⁻¹, mrem hr⁻¹)</td>
<td></td>
<td>dpm cm⁻²</td>
</tr>
</tbody>
</table>

**If incorrect labeling is suspected, or if any contamination is found on the package, notify the recipient promptly. If personal or vehicle contamination is suspected, notify the RCO immediately. Any required notifications to the carrier or regulatory agencies is to be made by the RCO.**

Package surveyed by: ___________________________ Date: ____________

Package Received by: ___________________________ Date: ____________

Original - Initiated and retained by RCO
Copies to send with the package(s): RECEIPT & VERIFICATION form (RF-13B) for each package and/or item.
DISPOSITION form (RF-13C) for each item number.
Go To: “Principal User Logon” to enter your username and password
Login with your Qualified User/Principal User ID and Password. If you do not have one, please contact the RCO to obtain one.
Online package check in

Once logged in, your Principal User will display here

To check a package in use the “Inventory/Disposals” menu
Online package check in

The menu is sortable. If your lab has a large inventory, you may find it helpful to sort by isotope or receipt date.

Select the Current inventory button.

Select the inventory number you wish to check in.
Online package check in

Select “Package Check in”
1. Adjust Assay Date according to information on the vial

2. Insert your calculations for the Package Wipe Interior here

3. Type your name and date here

4. SAVE!
What is Considered Contamination?

- If >20 dpm/cm$^2$ of loose contamination is found the RCO must be contacted
Waste Containers

- Are You Familiar with the Color Coding?
Radiation Control Office
Waste Pail Color Codes

<table>
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<tbody>
<tr>
<td>Liquid</td>
<td>Solid</td>
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<td>Solid</td>
</tr>
<tr>
<td>Non-Hazardous</td>
<td>Non-Hazardous</td>
<td>Mixed (Hazardous)</td>
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Storage of Dry Waste Pails

- Do not store pails with the liner exposed
  - tears
  - may spread contamination
Sharps

- Any sharps that may potentially puncture the skin (Broken pipettes, Pasteur pipettes, razors)
  - cardboard boxes
  - coffee cans
Dry Waste Disposal

• Seal the liner with adhesive tape (as shown)
• No freestanding liquid within the liner (Apply absorbent to soak up residual liquid)
Liquid Waste Disposal

- **2 types of liquid waste**
  - Vials (< 40 ml, Centrifuge tubes, test tubes with lids, scintillation vials, Source vials)
  - Bulk (> 40 ml)

Disposal companies will not pick up bulk liquids mixed with vials
Bulk Liquid Disposal

• Use newspaper or styrofoam to secure the bottles inside the container
Carboy Storage

- Never remove from secondary container (like shown)
- Leave head space in carboy.
- Partially full long-half life & mixed waste carboys will not be accepted (You will be required to transfer the material to another container before pickup)
Carboy Disposal

• Storage
  – remove funnels when waste is not being added
  – screw the cap on tightly
  – closing the secondary container
Proper Sealing and Tagging

- 30 or 55 gallon drum
  - remember to tighten the nut and bolt in the orientation shown
- Fill out every line of information on the yellow tag
- *The yellow tag must be on all waste containers to be picked up by the RCO*
Transferring Radioactive Material to Another Institution or Laboratory

• Must be approved by the RCO

• RCO will complete the paperwork and ensure that the package is DOT approved

• Must have copy of recipient’s license

• Must be properly packaged and labeled

• This may take several days to several weeks depending on the requirements of the recipient
Removing Waste from Lab
3 Step Process

1. Add All Inventory to Containers

2. Request a Waste Pick-Up

3. Add Waste Containers to the Waste Pick-Up
Go To: “Principal User Logon” to enter your username and password
ENTERING CONTENTS (inventory numbers) INTO A CONTAINER

Once logged in, your Principal User will display here:

To enter contents into a bucket, drum or carboy use the “Inventory/Disposals” menu.
The menu is sortable. If your lab has a large inventory, you may find it helpful to sort by isotope or receipt date.

Select the inventory number you wish to make a disposal for.
“Add Disposal” to enter the inventory number into a container.
Activity in millicuries is entered into one of two fields: solid or liquid. Enter percent to automatically calculate activity.

If this disposal closes out the inventory number then check the totally disposed box. Once the inventory number is closed out it will no longer appear under “current inventory.”

Next, you must select a container. You will not be able to save/credit the disposal unless you designate a container. 

SAVE- will credit the disposal to the container.
Select the appropriate container from the list. You will not be allowed to select a previously sealed container.
The disposal you just made is now listed for future reference.

“BACK” will return you to the list of inventory numbers.
Clicking on “Main Menu” will exit the Inventory / Disposals screen.
Use the waste pick-up menu to request a waste pick-up and to add containers.
ADD THE WASTE REQUEST

This is a single request that can include multiple containers. You will only create one pickup request for the date you want waste picked up. You will later add the specific containers to the pickup request.

Click “Add Request”
COMPLETE WASTE PICK-UP REQUEST

Complete the information for all fields

[Image of a web page with fields for PI, Request Date, Lab/Location, Contact, and Comments, with one field labeled 'Lab not found.']
Once the Waste Pick-Up request is made, you will need to add all containers you want picked up.
ADD THE CONTAINER DETAILS

Complete the information for all fields

If you are disposing of mixed waste make sure to check the box

Selecting a container will permanently seal it.
Once the mixed waste box has been checked, the “Add” button will appear. Click on it to add the details of the mixed waste.

All fields must be completed for mixed waste.
PRINT THE REPORT FOR LABORATORY RECORDS

The “Reports” button will print a pdf file of your waste container.
The RCO picks up waste every Wednesday morning.

To ensure that your waste is picked up, please submit waste pick-up requests by Monday at 5:00 pm.