# Module 3
# Radioisotope Acquisition and Disposition

Radiation Control Office, March 2022

ENVIRONMENTAL HEALTH SERVICES
COLORADO STATE UNIVERSITY

# What we are trying to Avoid

# What we are trying to Avoid


# Outline of Module 3

1. Radioactive Material Usage Process
2. Ordering Radioactive Material
3. EHSA Database Introduction
4. Radioactive Material Package Check-in
   a) How to Perform an Interior Package Wipe
   b) Principles of the LSC
   c) How to Enter the Interior Package Wipe in EHSA
5. Tracking and Separating Radioactive Material and Waste
6. Submitting for a Radioactive Waste pickup

# Radioactive Material Usage Process

Principal and Qualified Users Responsibilities

## 1 – Ordering RAM

- Radioactive material (RAM) is ordered through Kuali by the Principal User (PU), Qualified User, or accountant
- RCO approves all RAM that arrives on campus
- RAM Packages are delivered to the RCO
- RCO surveys the exterior package, inventories, and delivers RAM to laboratory

## 2 – In lab RAM Usage

- Qualified User or PU completes an internal package survey and enters survey results in EHSA database upon delivery
- Qualified User or PU accounts for and tracks inventory usage.
- Qualified User or PU oversees RAM in lab waste and accounts for all rad inventory

## 3 – RAM Waste Disposal

- Qualified User or PU enters inventory usage into the EHSA database
- Qualified User or PU submits RAM waste containers for a pickup in the EHSA database
- RCO picks up RAM waste containers and processes them for final disposal

# Ordering Radioactive Material through Kuali

Step by step instructions found on the RCO Website:
Kuali Radioactive Orders Tutorial Link

# Ordering Radioactive Material

through Kuali

- Radioactive Material must be purchased through CSU's Kuali financial system
  - There are some exceptions which require the approval by the RCO prior to purchase or transfer

- The RCO approves all RAM orders in Kuali before the order is sent to the vendor by adding object code 6226 to the order

- All Radioactive Material is shipped to the RCO address

- The RCO completes the DOT required exterior package survey and assigns a CSU Inventory number
  - DOT Regulations require that radioactive packages be surveyed for contamination no later than 3 hours after receipt during normal working hours
  - If received outside after normal business hours packages must be surveyed no later than 3 hours after the beginning of the next business day.

- The RCO delivers RAM package(s) to laboratory

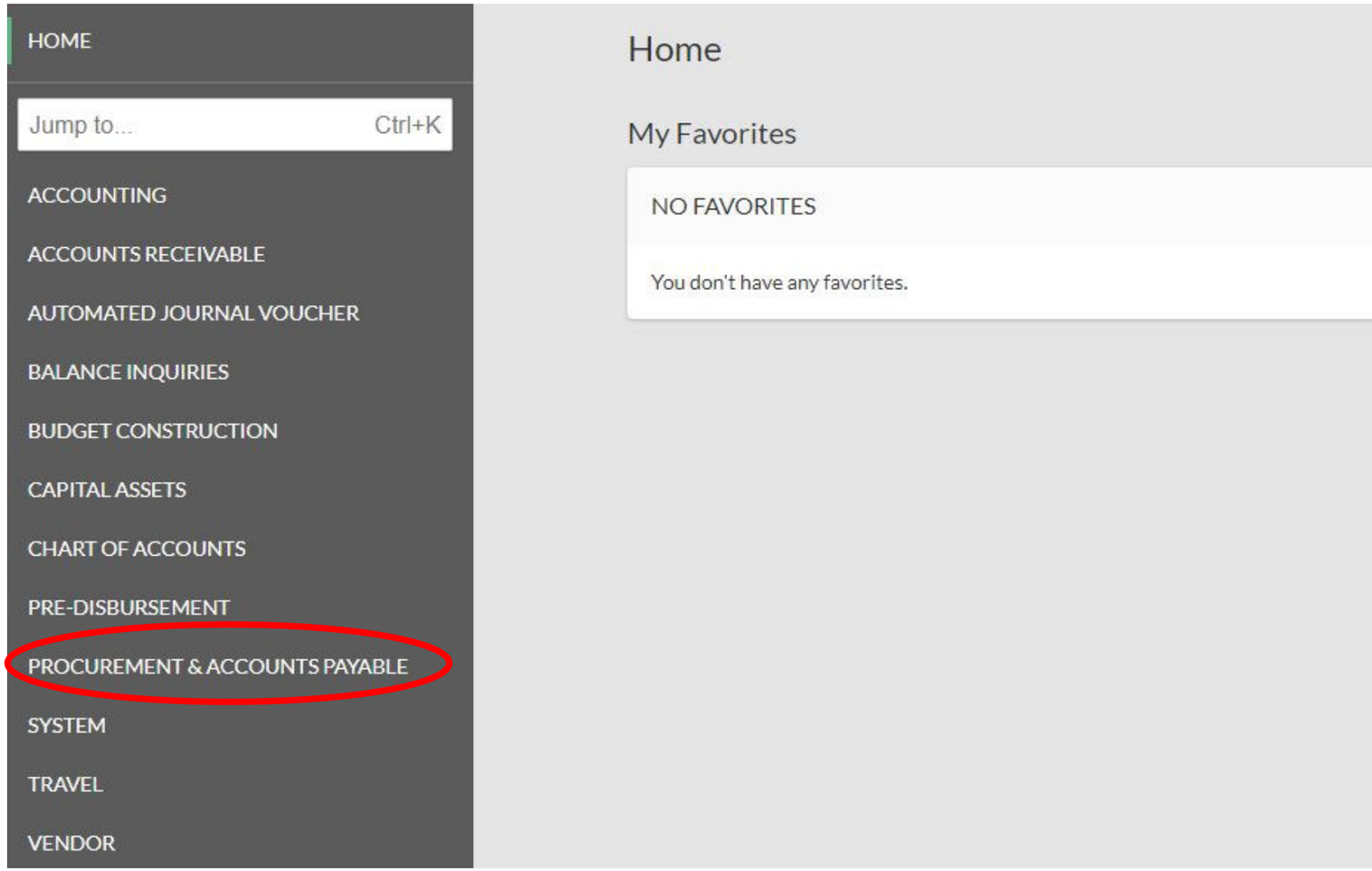
# Ordering Radioactive Material

through Kuali

The Kuali Tutorial is intended to illustrate the required information for ordering radioactive material. It is not intended to provide step by step directions for the general use of the Kuali Financial System.

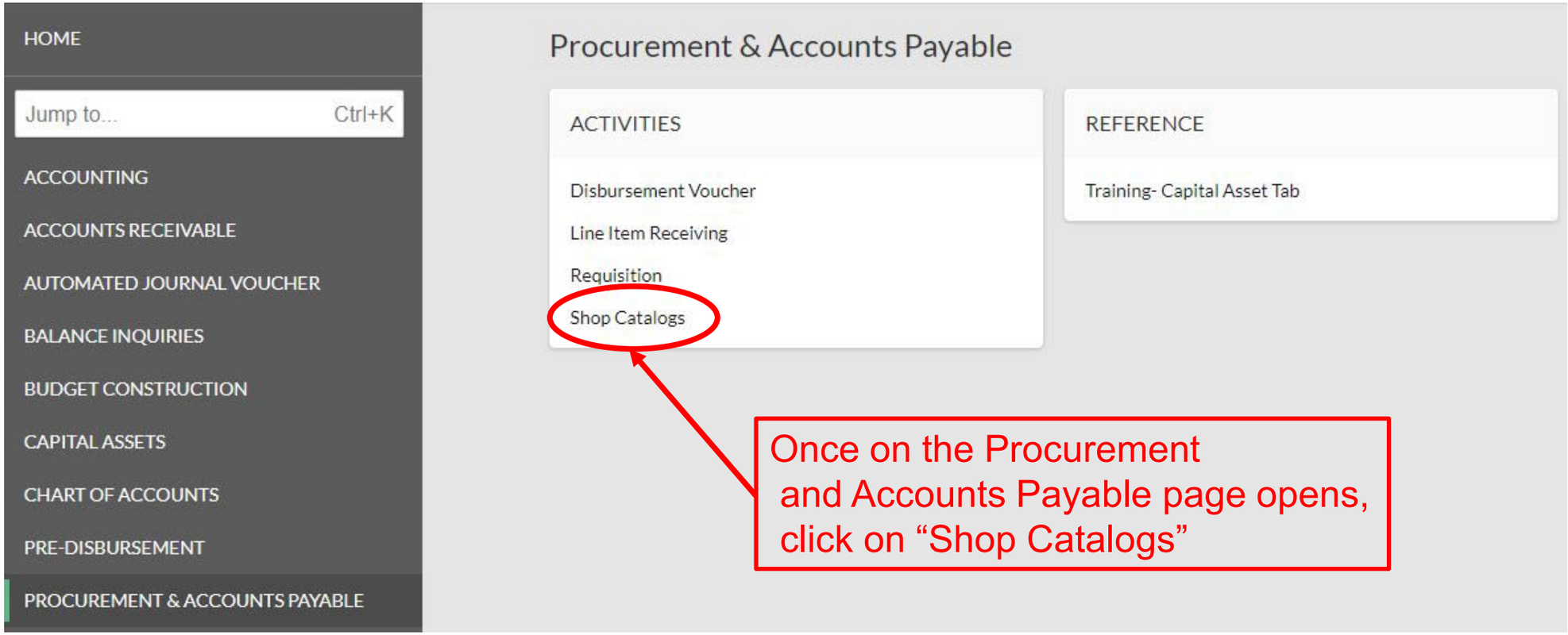
If you need generalized Kuali training, please refer to the various sections from CSU Procurement Services.

Access the Kuali website by using your eID and password and click on "Procurement and Accounts Payable"



# Ordering Radioactive Material

through Kuali

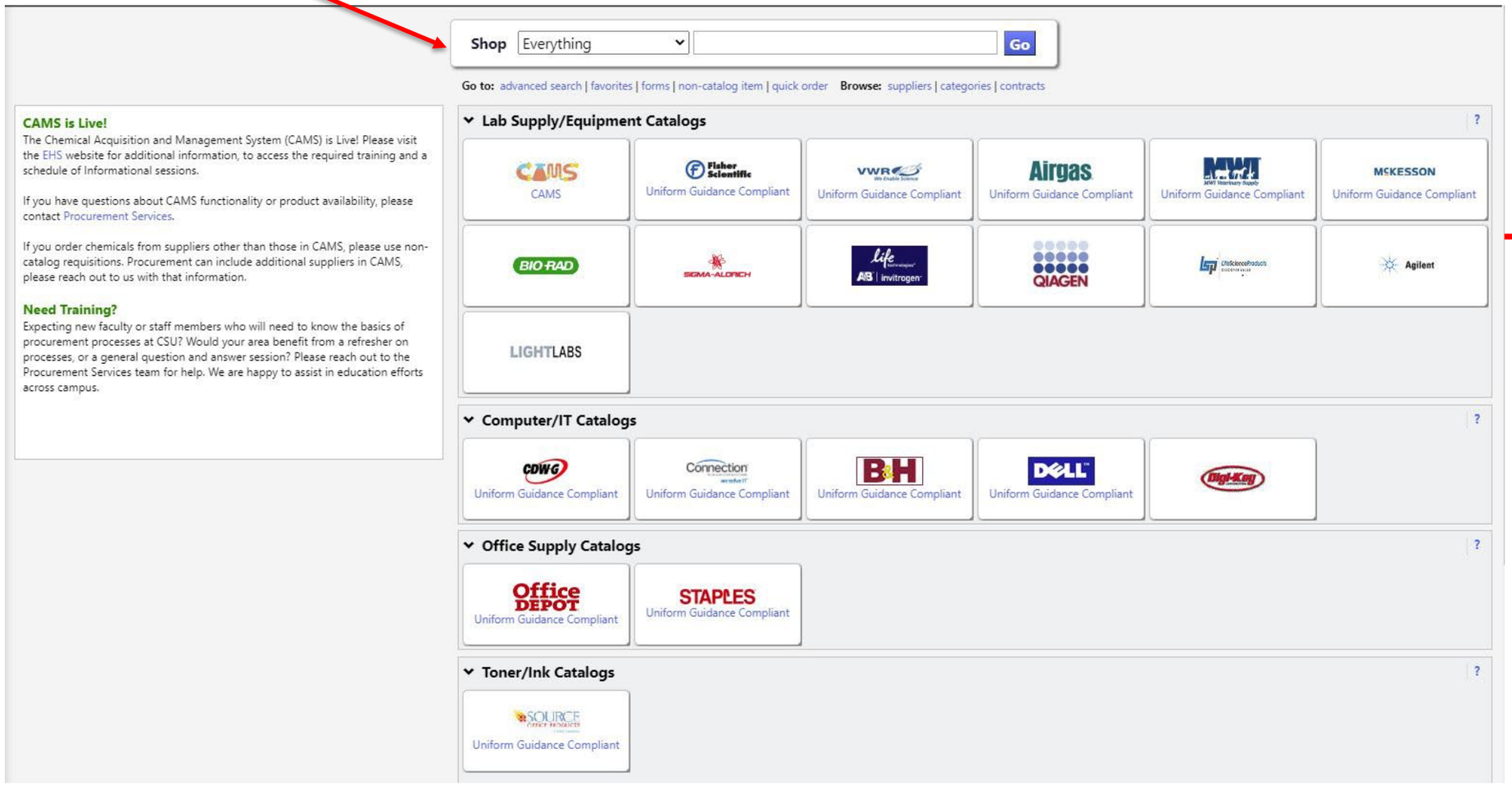



Once on the Procurement and Accounts Payable page opens, click on “Shop Catalogs”

# Ordering Radioactive Material

through Kuali

Users will have access to hosted catalogs and can search for products




Users will also have access to Punchout catalogs and can click on the supplier logo to access their website

# Ordering Radioactive Material

through Kuali

Requisition

Doc Nbr : 23025453
Initiator :
Requisition # : 613334

Status : FINAL
Created : 01:53 PM 07/13/2020
Requisition Doc Status : Closed

Copied from Document Id : 22170257

EXPAND ALL | COLLAPSE ALL

DOCUMENT OVERVIEW

OVERVIEW

* Description : Eckert & Ziegler radioactives

Organization Document Number :

Explanation : Principal User: Marie Curie
Isotope: Eu-152
Activity: 370.00 kBq (10.00 uCi)

Under "Explanation" please include the following information:
1) Principal User
2) Isotope
3) Activity

FINANCIAL DOCUMENT DETAIL

* Year : 2021

Total Amount : 2,120.00

REQUISITION DETAIL

* Chart/Org : CO / 1681
Receiving Required : No
Account Distribution Method : Proportional

* Funding Source : INSTITUTION ACCOUNT
Payment Request Positive Approval Required : No

# Ordering Radioactive Material

through Kuali

DELIVERY

Delivery To: Radiation Control Office/ Principal User's name

FINAL DELIVERY

* Delivery Campus : MC - CSU Main Campus
Building : General Services Building
* Address 1 : 1251 S. MASON ST.
Address 2 : 6021 Campus Delivery
* Room : 133
* City : FORT COLLINS
State : CO
Postal Code : 80523
* Country : United States

Make sure the final delivery address is for the Radiation Control Office:

General Services Building
6021 Campus Delivery
1251 S. Mason St
Room 133

* Delivery To : Radiation Control Office/Marie Curie
Phone Number :
Email :

Delivery Instructions :

RECEIVING ADDRESS

Receiving Address : 6021-2
Radiation Control Office
133 GSB
Fort Collins , CO 80523-6021
United States

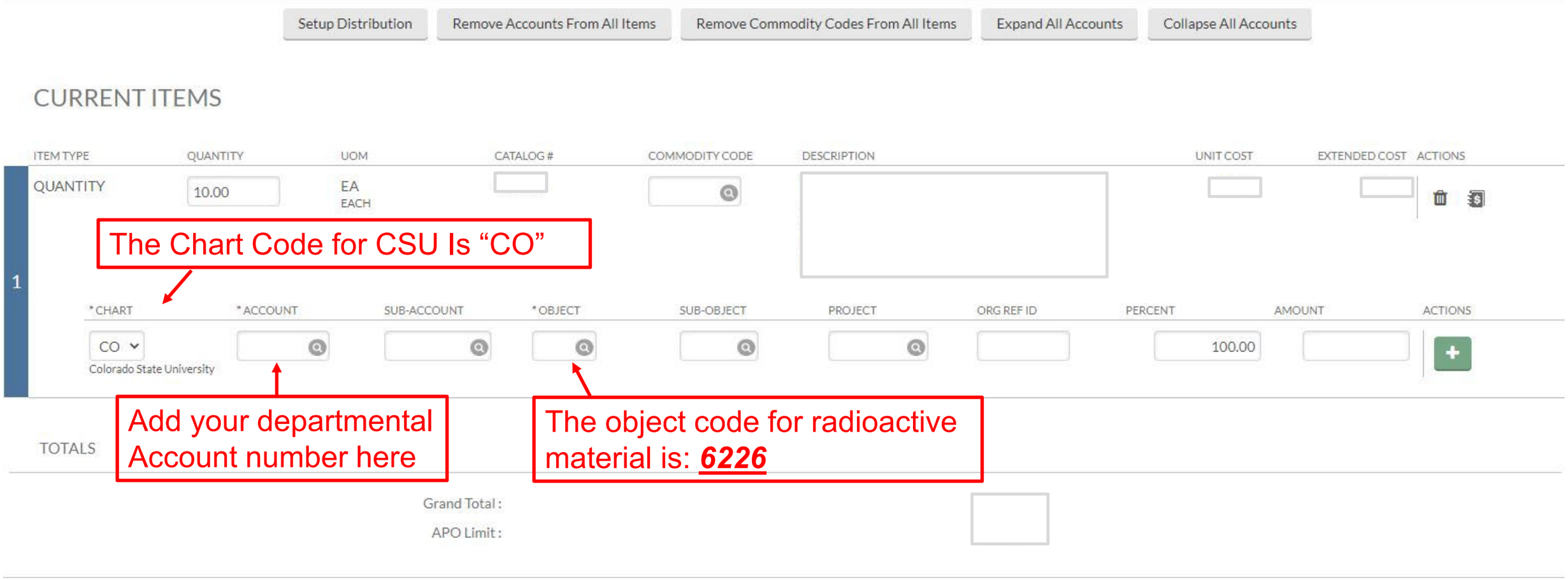
ADDRESS TO VENDOR

Use Receiving Address as Shipping Address Presented to Vendor? Yes

# Ordering Radioactive Material

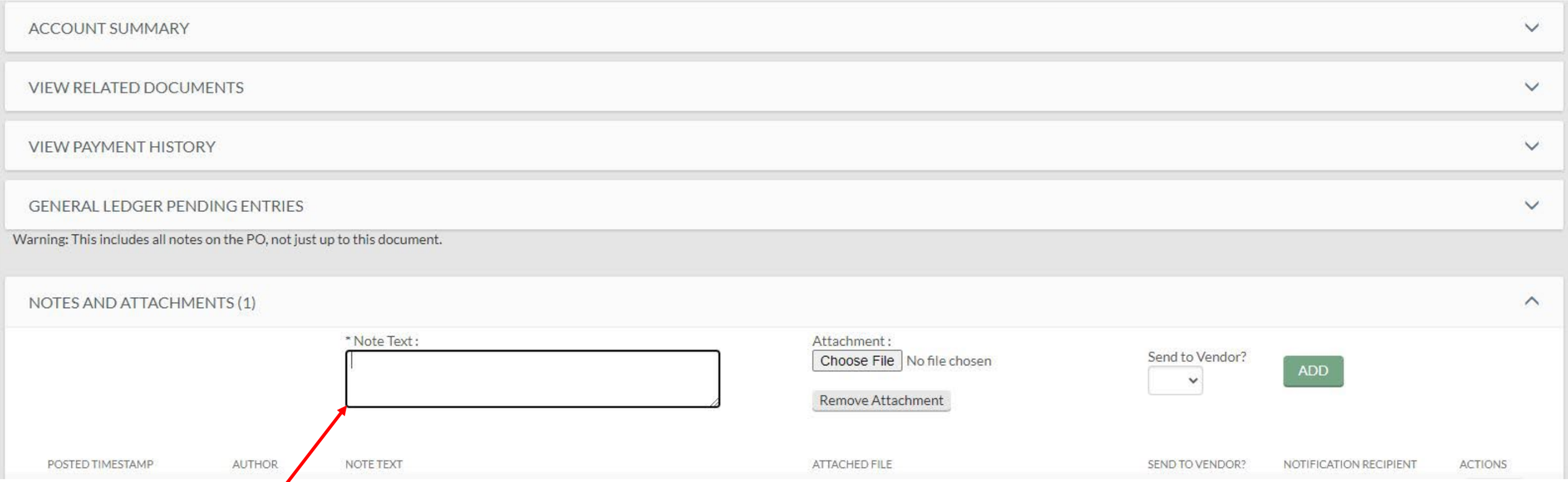
through Kuali

Accounting distribution should be set up for radioactive orders according to the steps below



# Ordering Radioactive Material

through Kuali




After all the necessary information is completed, you will need to attach any notes and order documents to the “Notes and Attachments” section.

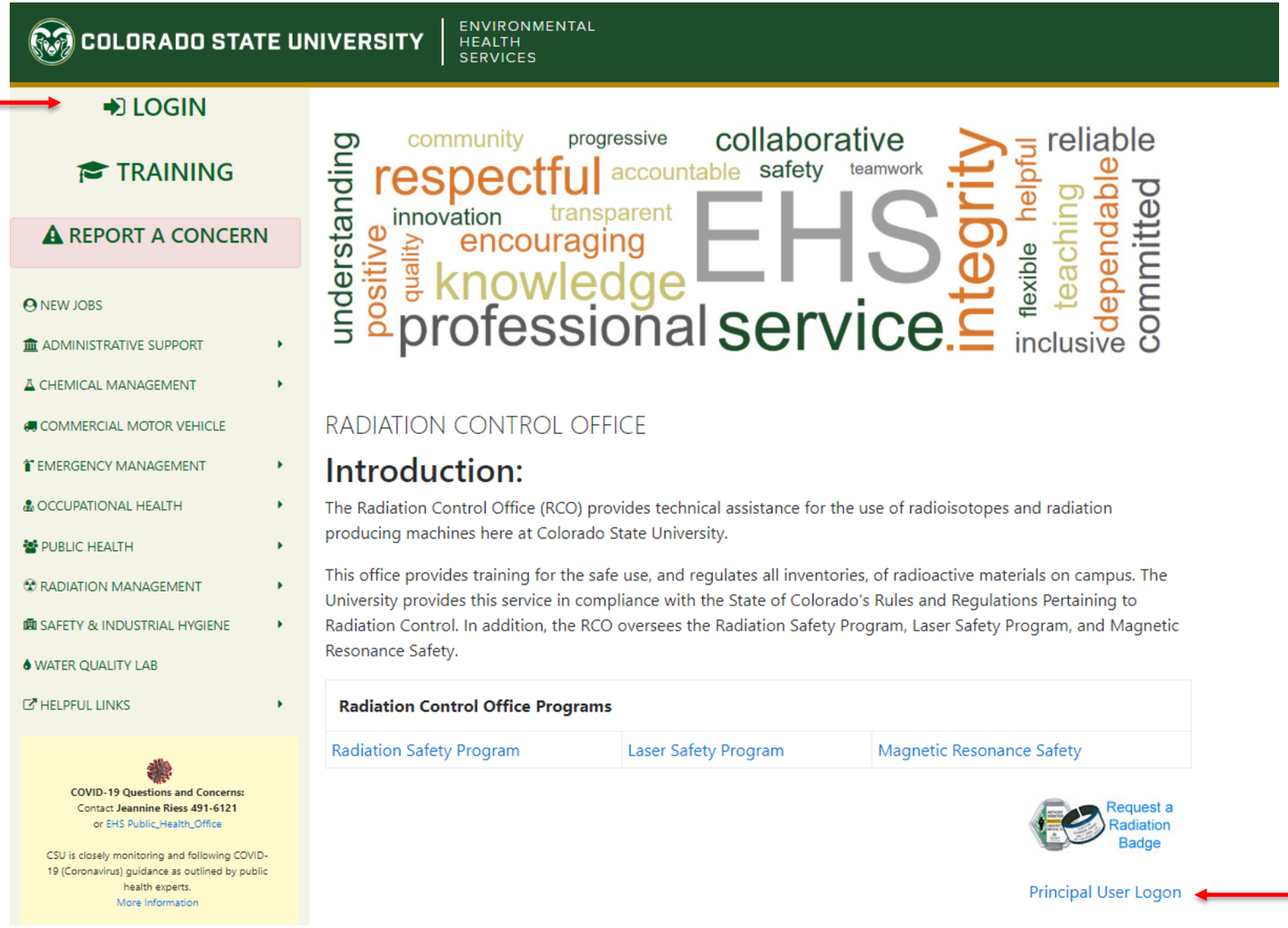
You will then click “Submit” at the bottom of the page to complete the order.

# EHSA Database Introduction

EHS Website

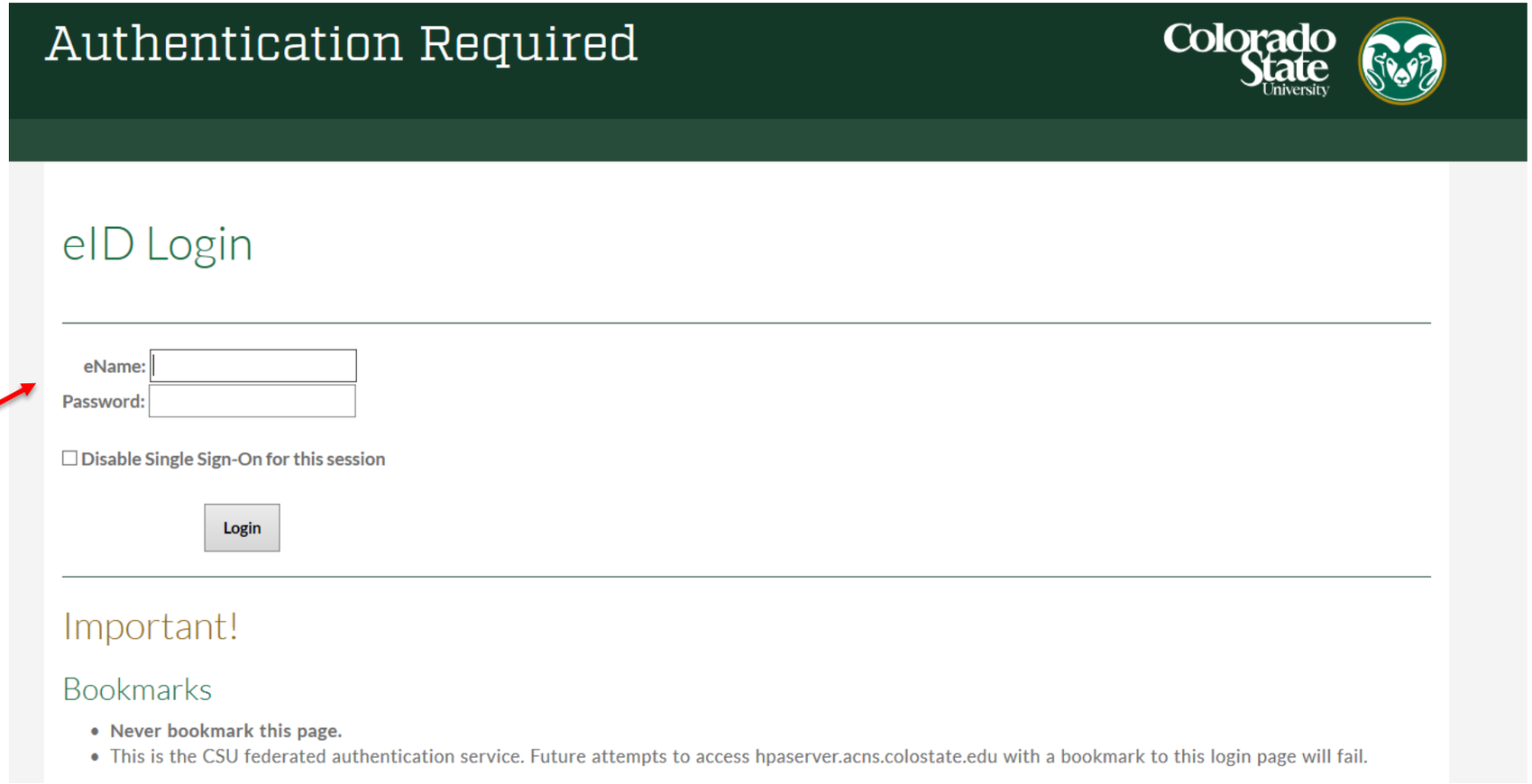
# EHSA Database Introduction

Login to HPA on the EHS Website




Or select to Login Here

# EHSA Database Introduction



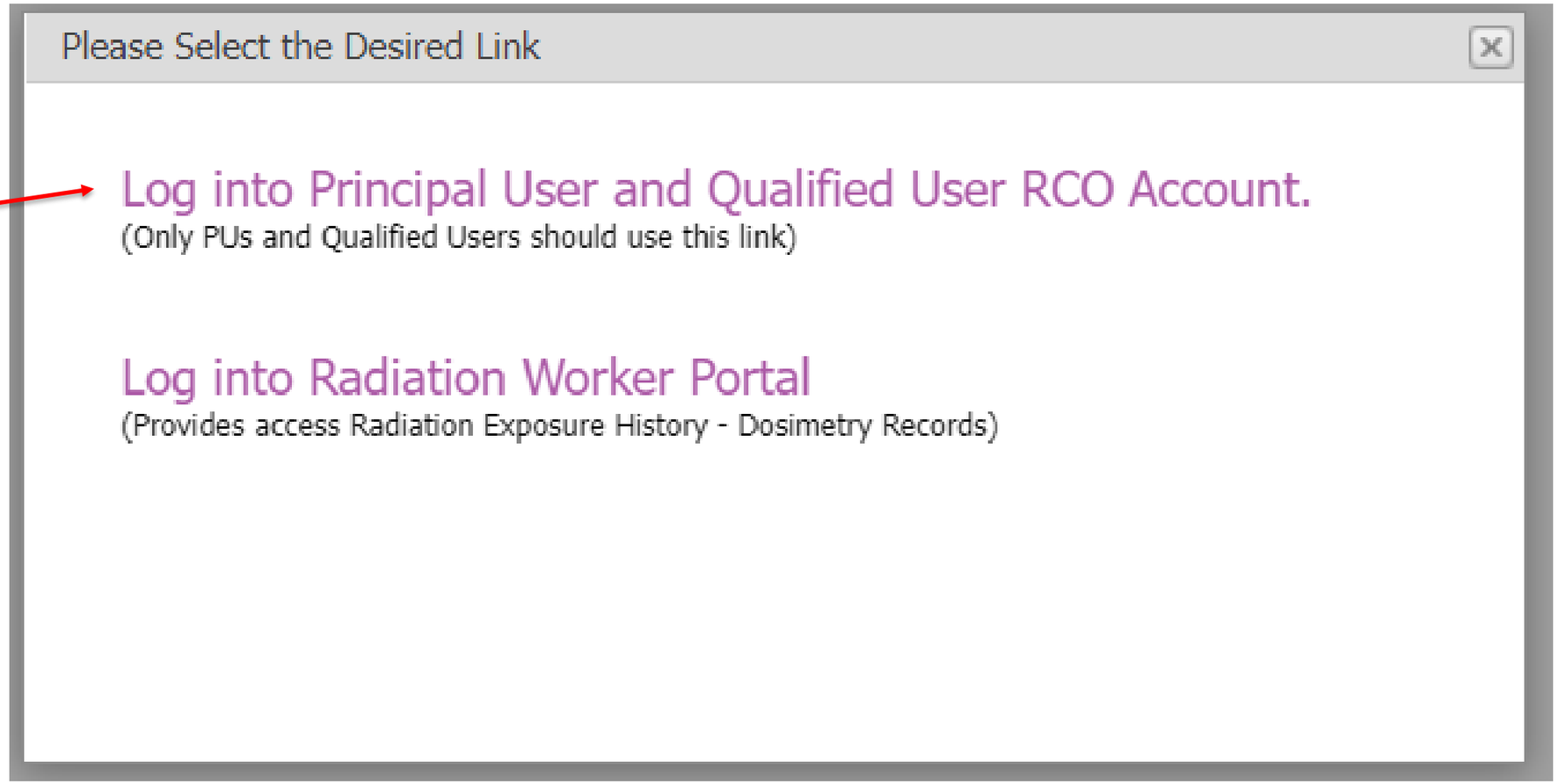

**Enter your CSU username and password**

# EHSA Database Introduction


Select “Radiation Control”

# EHSA Database Introduction

Select “Log into Principal User and Qualified User RCO Account”



# EHSA Database Introduction

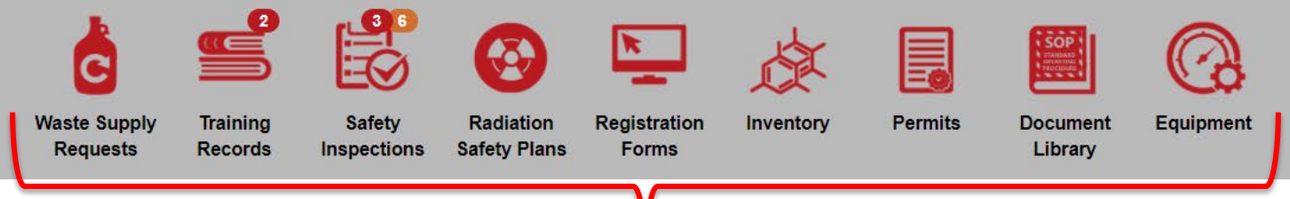
Welcome to the EHS database. Please contact EHS at 491-6745 if you have questions or concerns.

Links to EHS Websites.

*Quick Links*

- *EHS Home Page*
- *Chemical Management*
- *Occupational Health*
- *Radiation Control Office*

Welcome to Colorado State University's Environmental Health Services database. Using your CSU username and password, you can log into your portal that links live to our office database. Get information on your safety plan(s), personnel training progress, and up to the minute inventory by accessing your site. If you do not have access, contact EHS to set up an account.




Home Page Menu Icons

# EHSA Database Introduction

**From the EHSA database you can access:**

- Waste Supply Requests: Request new RAM waste containers
- Training Records: Review lab personnel training records
- Safety Inspections: Review and respond to laboratory evaluations
- Radiation Safety Plans: Review and renew your Radiation Safety Plan
- Inventory: Review RAM inventory, complete a package check-in, and submit for a waste pickup
- Equipment: Review in-lab survey meters and wipe counters and their calibration history

Step by step instructions can be found on the RCO Website for quick reference on how to complete a RAM package check-in, respond to a lab eval, and submit for a waste pick-up.

# Online Radioactive Material Package Check-in

Instructions can be found on the RCO Website for future reference:
RAM Package Check-in Instructions Link

# EHSA Database – Online Package Check-in

## How to perform an Interior Package Wipe

- Wear proper PPE: lab coat, double gloves, safety glasses, dosimetry badge, and ring badge (if applicable).
- QA/QC survey meter and place next to radiation work area.
- Use shielding to reduce your exposure (if applicable).
- Verify you received the correct isotope, compound, and activity with the shipping papers.
- Always assume that the interior of the package is contaminated until determined otherwise.
- Open the outer packaging and check inside for possible damage.
- Peel back the layers of packaging like an onion and survey the inner packaging once it's been removed checking for contamination with your survey meter.
- Check your hands with the survey meter periodically for contamination.
- Wipe the interior packaging, inner package (pig), and primary container (stock vial).
- Run a blank and the interior package wipe in your LSC or package counter instrument, assume the interior of the package is contaminated until verified otherwise.
- Perform a personnel exit survey on yourself before leaving the rad work area.
- Enter your interior wipe test results online in HPA.

# Liquid Scintillation Counting (LSC)

Liquid Scintillation Counting (LSC) measures ionizing radiation

There are many applications for LSCs, one being to test for removable radioactive contamination by completing wipe tests

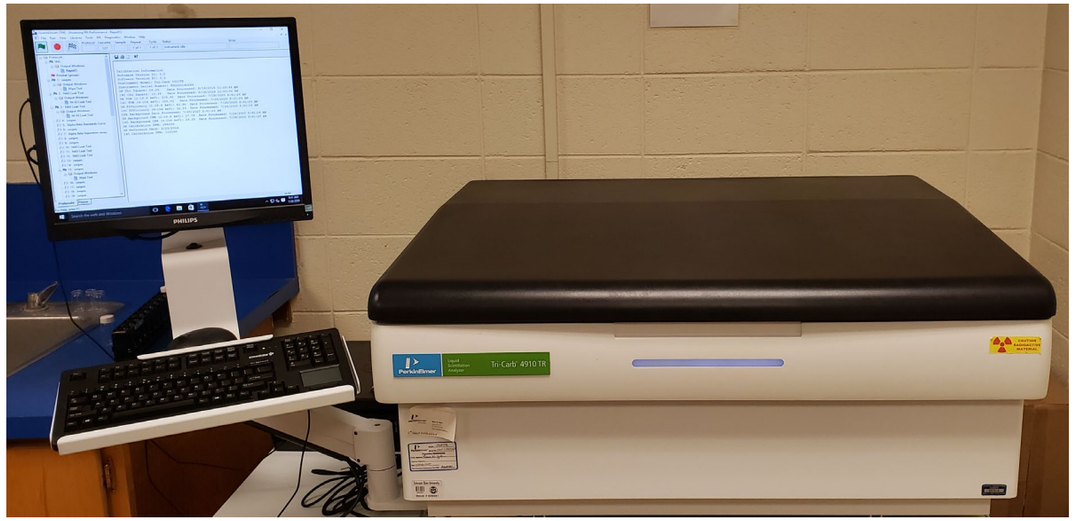
The RCO requires wipe tests for:

- Interior package check-in
- Monthly or weekly laboratory wipe tests (depending on the ALI for the activity used)
- Waste container surveys

It is the responsibility of the PU to train the Qualified User how to operate their specific LSC instrument

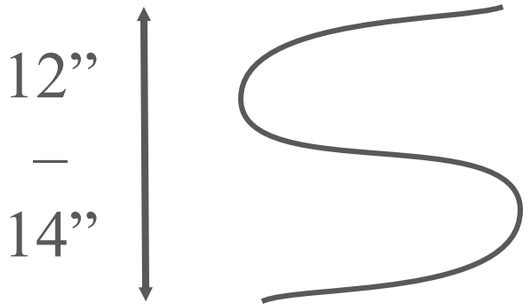
How to perform a wipe test:

- Using a piece of Whatman filter paper wipe the surface in an S pattern roughly 12 inches in height, applying medium pressure
- Using tongs place the filter inside an LSC vial (dirty side facing in) and add LSC cocktail



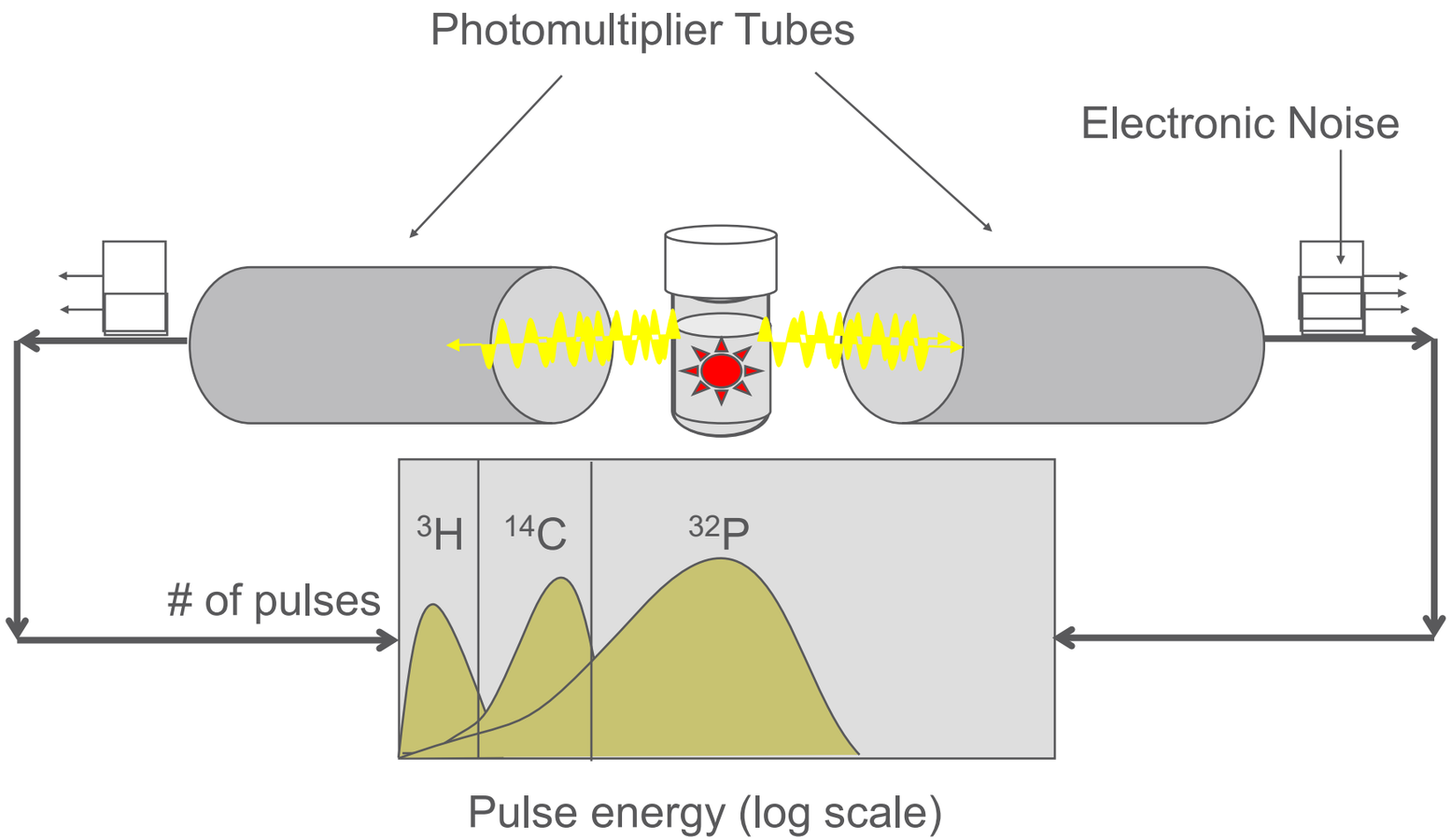

Wipe Tests

Standard industry practice 100 $cm^2$



# Liquid Scintillation Counting

## Theory




LSC have high counting efficiencies for many nuclides

- The LSC cocktail absorbs the energy from a radioactive decay through heat, ionization or excitation and converts it into photons of light
- The intensity of light is proportional to the initial energy
- The photomultiplier tubes inside the liquid scintillation counter detects the light and converts it into an electrical signal in the form of electrons.
- Electrons are ejected producing an electrical pulse which is then amplified
- The electrical pulses are then sorted and counted

# Liquid Scintillation Counting

## Troubleshooting

Light interacts with samples (photoluminescence) which can cause the first sample to appear contaminated ("hot")

- Dark adapt samples – up to 30 minutes before running in the LSC
- You can run your LSC standards before you run your samples or you can program the LSC to run the 1st sample (the blank) for 30 minutes to dark adapt

Chemical interaction or (chemiluminescence) can cause spurious pluses of light

## What is considered contamination?

- Set up a QA/QC chart for the LSC (found under Lab Resources – Helpful Tools on RCO Website)
- Run 20 blank samples or program the LSC to run one blank sample 20 times
- Enter the 20 background counts in the QA/QC chart "Setup Data" tab to determine your upper control limit
- Any wipe samples that are greater than your background upper control limit of **3 standard deviations above your mean background** on the QA/QC chart is then considered contaminated
- All areas wiped that are above your upper control limit must be cleaned and rewiped until they come back clean

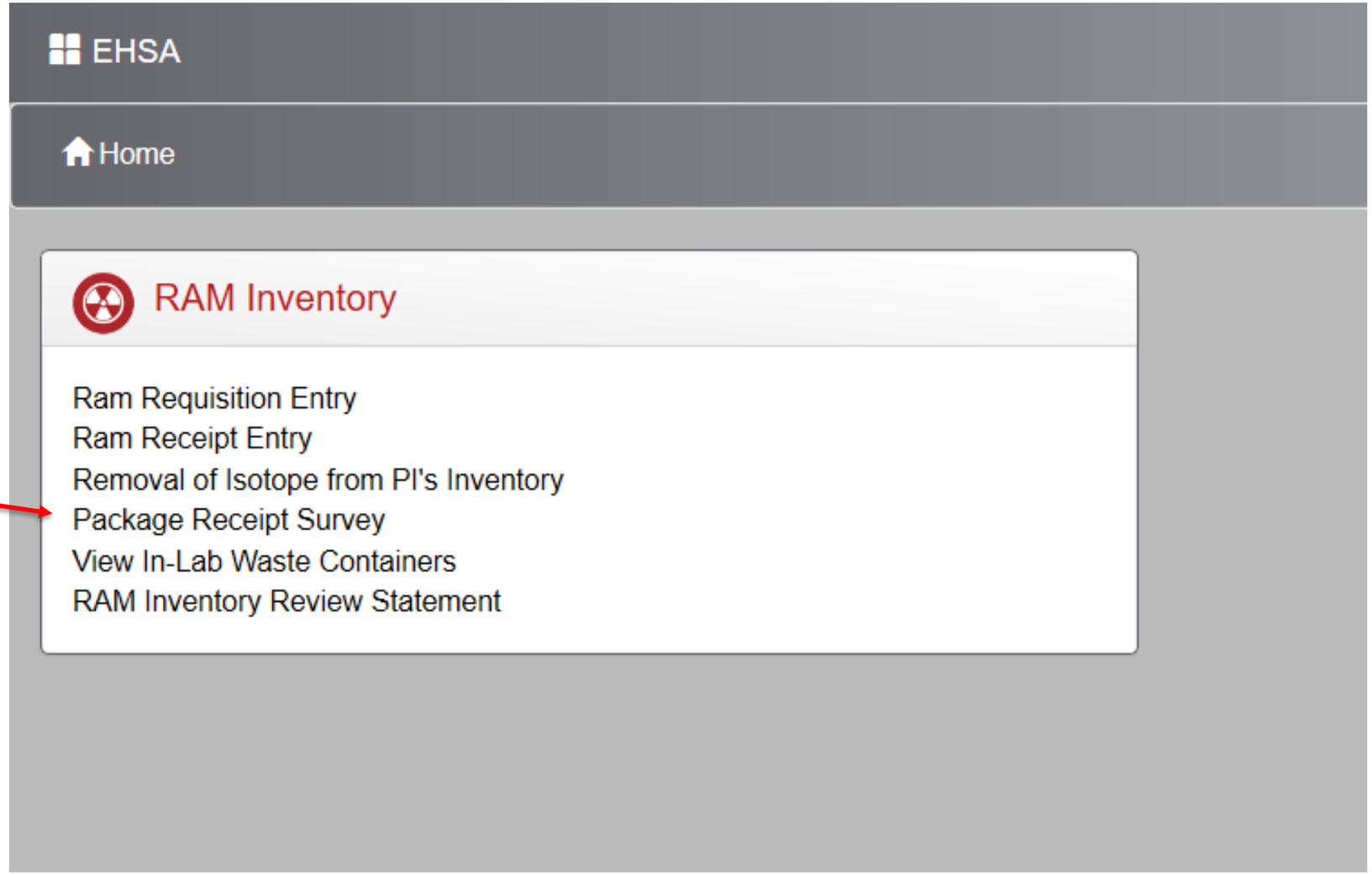
Please contact the RCO directly if you have specific questions on to how to operate or set up your specific LSC

# EHSA Database – Online Package Check-in


Select “Inventory” from the EHSA Database Home Page

# EHSA Database – Online Package Check-in

**Select "Package Receipt Survey"**



# EHSA Database – Online Package Check-in

**PI:** Curie, Marie

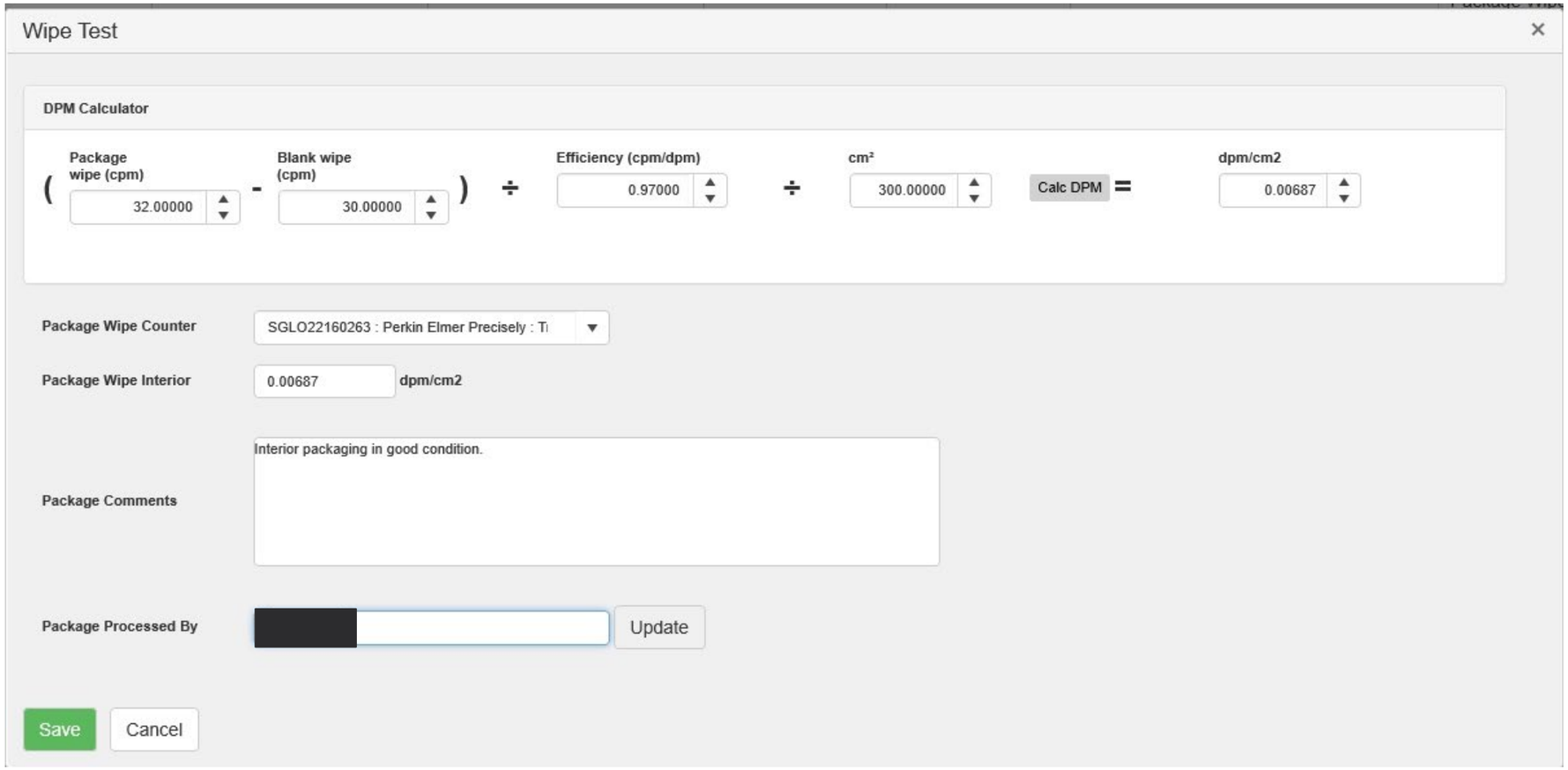
Drag a column header and drop it here to group by that column

| Inventory # | PI Name | Isotope | Receipt Date | Permit # | | Package Processed By | Package Wipe Counter | Package Wipe Interior |
|---|---|---|---|---|---|---|---|---|
| 0015072 | Curie, Marie | P-32 | 05-05-2020 | 19R-032-01 | Wipe Test | [redacted] | SGLO22160263 | 0.47000 |
| 0015073 | Curie, Marie | S-35 | 05-05-2020 | 19R-032-01 | Wipe Test | [redacted] | SGLO22160263 | 0.28000 |

**Select "Wipe Test" for the inventory number you wish to check-in.**

# EHSA Database – Online Package Check-in

1. Enter your interior package & blank wipe test results
2. Enter the instrument efficiency into the calculator.
3. Select ‘Calc DPM’
4. Select your “Package Wipe Counter” from the dropdown
5. Enter any package comments
6. Select update to automatically enter that you processed the package
7. Select Save



# EHSA Database – Online Package Check-in

## What is Considered Contamination?

**DOT Regulations require that:**

**If your interior package wipe is greater than 20 dpm/cm$^2$ the RCO must be Notified that day!**

# EHSA Database – Online Package Check-in

**University Policy Requires that:**

**If contamination is identified inside the package that is three standard deviations above your mean background but under the 20 dpm/cm$^2$ you must treat the package as contaminated and dispose of the contaminated interior packaging through the radiation waste stream, and clean & rewipe the contaminated stock vial and/or pig until it's below your 3 standard deviation cut off.**

# EHSA Database – Online Package Check-in

## How to Dispose of Radioactive Material Packaging

**Once you've verified the interior packaging is free of contamination:**

- **Obliterate all evidence that the package contained radioactive material by using a <u>heavy-duty permanent marker</u> to completely mark out all labels and tre-foils.**
- **And / or remove radiation stickers and shred if possible.**
- **Dispose of box and packaging through the proper waste stream**


Source: Gary V. Heller, Robert C. Hendel: Nuclear Cardiology: Practical Applications, Third Edition


Examples of Radioactive Postings that can be on the shipping box


BEFORE


AFTER

# Tracking & Separating Radioactive Material and Waste

# Tracking & Separating Radioactive Waste

All radioactive material inventory must be accounted for and tracked from cradle to grave

- The RCO assigns a unique Inventory Number to all RAM to help identify each one
- The RCO provides an RF-13C Radioisotope Material Acquisition and Disposition form for every assigned inventory number to track inventory usage and disposal
- The RF-13C form must be completed by the Qualified User or PU and the completed copy must be sent to the RCO once the inventory number has been totally disposed

Following instructions listed

RF-13C Page 1: Track Inventory usage (subtract from original activity)

**Colorado State University**
Environmental Health Services
Radiation Control Office

RF-13C RADIOISOTOPE MATERIAL ACQUISITION AND DISPOSITION RECORD

Inventory #: 0015077 — Principal User: Marie Curie

Radionuclide: S-35 — Department: Environmental Health Services

Activity (mCi): 2.00 — No. of Units: 1.000 — Activity/Unit: 2.00 — Building Name: General Service Building

Compound: Easy Tides dATPaS, [35S] 1250 Ci/mmol — Location: 131

Receipt Date: 5/15/2020 — Assay Date: 6/1/2020 — PO/DPO#:

1. Record all transfers and disposals of the material listed above.
2. **EACH ENTRY SHOULD BE EXPRESSED AS A PERCENTAGE OF THE INITIAL QUANTITY LISTED ABOVE.** Activity units may be used if isotope decay is negligible.
3. **For each disposal to a radwaste container or package, THE RADWASTE CONTAINER NUMBER MUST BE ENTERED AND THE TYPE OF WASTE MATERIAL CIRCLED.** The quantities reported on inventory dispostion will be checked against activities entered on radwaste disposal forms.
4. **Transfer to another user or location** must be approved in advance by the RCO and recorded below.

| Waste Tag No., Location, or Name of Recipient | Category | Amount | Circle Units | Container Description | Volume of Liquid | Initials | Date |
|---|---|---|---|---|---|---|---|
| Receipt Container | Remaining | 2.0 | % uCi mCi | Stock Vial | | MC | 6/12/20 |
| | | 1.0 | % uCi mCi | Vial | | MC | 6/15/20 |
| | | 0.6 | % uCi mCi | Vial | | CP | 6/16/20 |
| | | 0.5 | % uCi mCi | Vial | | MC | 6/20/20 |
| | | 0 | % uCi mCi | Vial | | CP | 6/22/20 |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |

**Categories**
T = Transfer to another CSU P.U.
A = Animal Waste
D = Dry Waste or Sharps
F = Flammable or other haz. Liq.
N = NHNT liquid (bulk or vials)
R = Remaining Inventory (storage)

# Tracking & Separating Radioactive Waste


All RCO waste containers are assigned a unique waste tag # (yellow sticker) that can be found on the side of the container

RF-13C Page 2: Track the activity placed each in waste container

RF-13C RADIOISOTOPE MATERIAL ACQUISITION AND DISPOSITION RECORD

Inventory #: 0015077

Principal User: Marie Curie

Radionuclide: S-35

Department: Environmental Health Services

Activity (mCi): 2.00

No. of Units: 1.000
Activity/Unit: 2.00

Building Name: General Services Building

Compound: Easy Tides dATPaS [35S] 1250 Ci/mmol

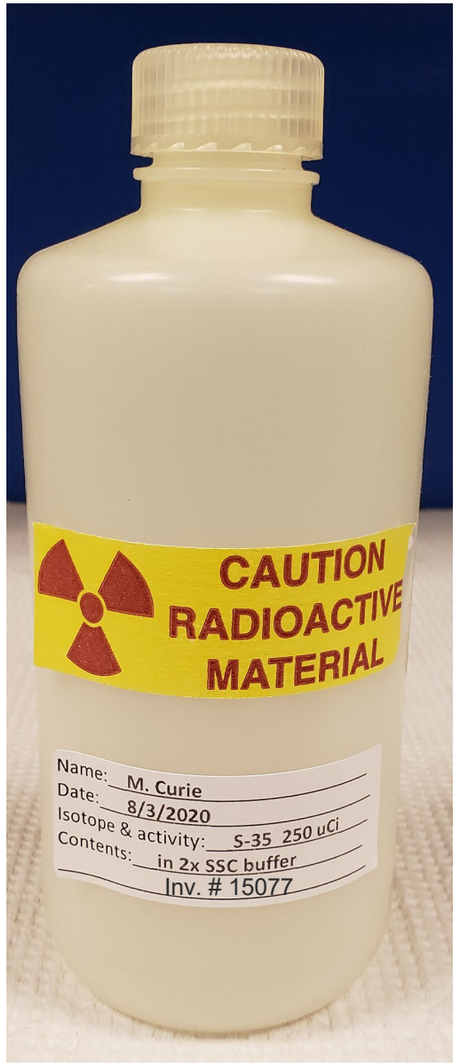
Location: 131

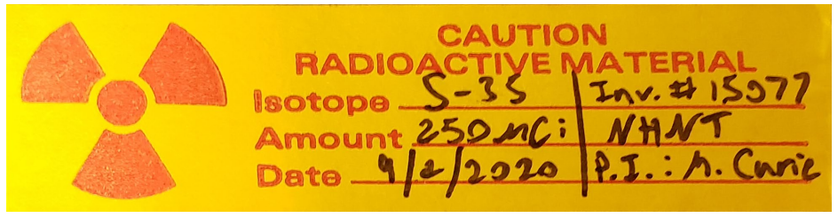
| Waste Tag No., Location, or Name of Recipient | Circle One Category | Amount | Circle Units | Container Description | Volume of Liquid | Initials | Date |
|---|---|---|---|---|---|---|---|
| 9995 | T A (D) F N R | 1.00 | % uCi (mCi) | | N/A | MC | 6/30/20 |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| 9996 | T A D F (N) R | 0.1 | % uCi (mCi) | Bottle A | 3.0 L | MC | 7/3/20 |
| | | 0.5 | % uCi (mCi) | Bottle B | 3.8 L | MC | 7/3/20 |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| 9997 | T A D (F) N R | 0.4 | % uCi (mCi) | 4L Bottle | 3.75L | MC | 7/6/2020 |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |
| | | | % uCi mCi | | | | |

Categories
T = Transfer to another CSU P.U.
A = Animal Waste
D = Dry Waste or Sharps
F = Flammable or other haz. Liq.
N = NHNT liquid (bulk or vials)
R = Remaining Inventory (storage)

# Tracking & Separating Radioactive Waste

## Storing Viable RAM Samples




All samples containing radioactive material must be identified with a “Caution Radioactive Material” label and should include the following information to prevent unknown legacy waste:

- Isotope
- Activity
- Assay Date
- Person responsible
- Inventory number
- Contents

Dispose of all nonviable samples in the RCO provided RAM waste containers to prevent legacy waste from accumulating in the laboratory

All radioactive caution postings, stickers, and trefoils must be obliterated before placing in trash and/or short half-life waste containers.

# Tracking & Separating Radioactive Waste


CSU's approved RAM waste containers are provided by the RCO

<u>RCO provides the following container sizes:</u>

- 5-gallon bucket
- 5-gallon carboy (bulk liquid)
- 30-gallon drum
- 55-gallon drum

All radioactive waste must be submitted to the RCO for disposal. It is not permitted for PI's to decay radioactive waste in their laboratories and dispose of waste themselves through the landfill and/or sewer.

# Tracking & Separating Radioactive Waste


The RCO will deliver your waste containers

Inside the “Empty” waste containers you will find:

- Plastic Liner
- “Caution Radioactive Material” sticker
- Radiation waste tag
- Zip tie (to attach the waste tag to the outside of the container)

Before placing waste inside container remove the “EMPTY sticker on the top of the container and replace it with the “Caution Radioactive Material Sticker”

Always line the inside of the waste container with the plastic liner before adding waste

# Tracking & Separating Radioactive Waste

**Radioactive Waste must be separated into RCO provided designated waste containers; radioactive waste is separated by:**

1. Long from Short half-life Radioisotopes
   a. Short half-life – radioisotopes with a half-life of <90 days
   b. Long half-life – radioisotopes with a half-life >90 days

2. Solid (Dry) from Liquid waste

3. Mixed waste from non-hazardous waste
   a. Definition of mixed waste: Radioactivity that is mixed with any material classified by the EPA as hazardous (example: P-32 and Formamide)
      i. Ignitable
      ii. Corrosive
      iii. Reactive
      iv. Toxic
   b. Only compatible mixed waste contents can be placed in the same radioactive mixed waste containers (example: separate acids and basis into two mixed waste containers)

# Tracking & Separating Radioactive Waste

## RAM Waste Container Color Codes

Waste containers are color coded so RAM users can easily identify and separate their waste into the appropriate containers

| | | | |
|---|---|---|---|
| Short Half-Life | Short Half-Life | Short Half-Life | Short Half-Life |
| Liquid | Solid | Liquid | Solid |
| Non-Hazardous | Non-Hazardous | Mixed (Hazardous) | Mixed (Hazardous) |

| | | | |
|---|---|---|---|
| Long Half-Life | Long Half-Life | Long Half-Life | Long Half-Life |
| Liquid | Solid | Liquid | Solid |
| Non-Hazardous | Non-Hazardous | Mixed (Hazardous) | Mixed (Hazardous) |

# Short Half-life, Dry, Non-Hazardous Waste Containers

Radioisotopes with a half-life of < 90 days

Examples: $^{32}P$, $^{125}I$, $^{131}I$, & $^{35}S$

Examples of acceptable waste items are: Dry solids such as gloves, paper towels, absorbent paper, pipette tips, glass, empty vials and test tubes that are contaminated or potentially contaminated.


**NO LIQUIDS**

- transfer all liquids into the appropriate radiation waste container
- No free-standing liquid (even drops of liquid)
- Leave lids to vials and test tubes uncapped

**NO RAM LABELING**

All evidence of radiation labeling such as stickers and trefoils must be defaced and or obliterated from all vials, trays, bags, and boxes before being placed in waste containers

**NO HAZARDOUS WASTE OF ANY KIND!**

Including lead pigs

**SHARPS**

Any sharps that may potentially puncture the skin, example include needles, broken glass, pasteur pipettes need to be placed inside cardboard boxes or coffee cans


**NO BIOHAZARDOUS WASTE**

- Biohazards or infectious waste must be disinfected before placing it in the waste pail
- The approved method of disinfecting is stated in the PI's radiation safety plan.

# Short Half-life, Liquid, Non-Hazardous Waste Containers


Radioisotopes with a half-life of < 90 days

Examples: $^{32}P$, $^{125}I$, $^{131}I$, & $^{35}S$

**NO RAM LABELING**

All evidence of radiation labeling such as stickers and trefoils must be defaced and or obliterated before placed in waste containers

**Separate waste containers into two types of liquids:**

**BULK LIQUID**

- Any liquid >40 ml or carboys
- All containers must be tightly capped

**NO HAZARDOUS WASTE OF ANY KIND!**

pH must be ≥2 and ≤12.5

**LIQUID VIALS**

- Any liquid <40ml
- All containers must be tightly capped


**NO BIOHAZARDOUS WASTE**

- Biohazards or infectious waste must be disinfected before placing it in the waste pail
- The approved method of disinfecting is stated in the PI's radiation safety plan.

# Tracking & Separating Radioactive Waste

## Bulk Liquid Disposal


- Label each bulk liquid bottle so the RCO can easily identify the different containers and their contents (example A, B, & C)
  - Bottle A
    - 2x SSC buffer, 0.100 mCi S-35
- Do not overfill containers, leave head space
- Secure the lids on each bottle
- Use newspaper or packing material to secure the bottles inside the container
- No peanuts or other packing material

# Tracking & Separating Radioactive Waste

## Bulk Liquid Disposal - Carboys

- Never remove carboy from secondary container
- Do not overfill carboy, leave plenty of head space
- Always secure carboy cap when waste is not being added
- Always close the secondary container lid when not adding waste

# Tracking & Separating Radioactive Waste

## Liquid Scintillation Cocktail Vials

- Separate LSC vials containing nonradioactive LSC cocktail from LSC vials containing RAM
  - Do not pour nonradioactive LSC cocktail down the drain
  - Nonradioactive LSC cocktail can be submitted to Hazardous waste for disposal
  - Radioactive LSC cocktail can be placed in the liquid RAM waste containers

- Classical LSC cocktail solvents are aromatic organic solvents and can contain Toluene, Xylene, mixture of isomers, or Pseudocumene. These LSC cocktails must be disposed of in <u>Mixed waste containers</u>

- Safer LSC cocktail solvents have a lower toxicity, for RCO's disposal purposes these LSC cocktails need to be placed in the <u>Nonhazardous waste containers</u>

- Include the LSC cocktail brand and manufacturer used in the "Description of Waste" when submitting for a waste pickup.

# Short Half-life, Liquid, Mixed Waste Containers

Radioisotopes with a half-life of < 90 days

Examples: $^{32}P$, $^{125}I$, $^{131}I$, & $^{35}S$

## HAZARDOUS WASTE

- All mixed waste must be approved by the RSC in the RAM Safety approval before use
- Personnel who generate mixed waste will need to complete Hazardous Waste Generator Training in addition to this training
- **DO NOT** mix or combine any incompatible chemicals together
- It's considered a mixed waste if it has a pH of ≤2 or ≥12.5
- Separate incompatible hazardous waste into different RAM waste containers - i.e. separate acids and bases into different RCO waste containers
- Refer to Hazardous Waste Manual Appendix B, page 9


## NO BIOHAZARDOUS WASTE

- Biohazards or infectious waste must be disinfected before placing it in the waste pail
- The approved method of disinfecting is stated in the PI's radiation safety plan
- No biohazardous waste bags

**Separate waste containers into two types of liquids:**

## BULK LIQUID

- Any liquid >40 ml or carboy
- All containers must be tightly capped

## LIQUID VIALS

- Any liquid <40ml
- All containers must be tightly capped

## NO RAM LABELING

All evidence of radiation labeling such as stickers and trefoils must be defaced and / or obliterated before placed in waste containers

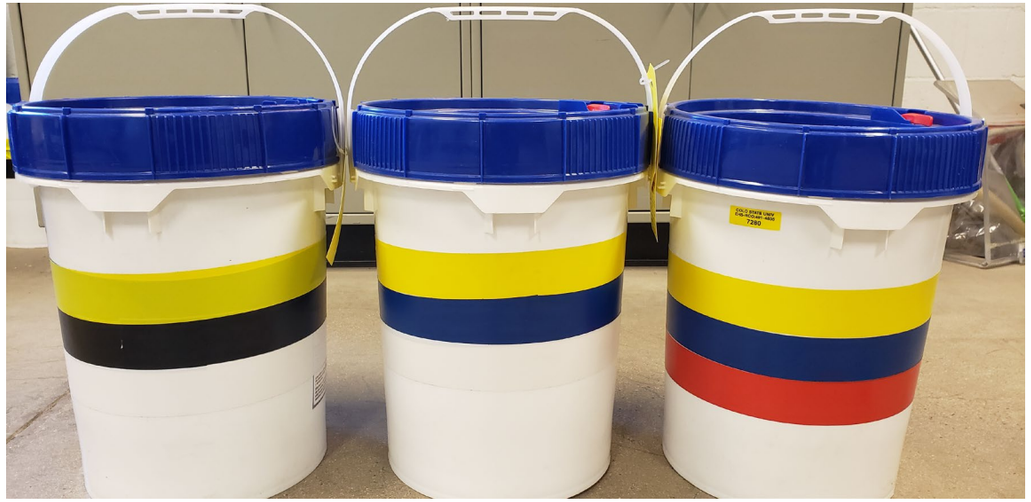
# Tracking and Separating Radioactive Waste

## Long half-life Waste Containers

- Long half-life waste containers are separated the same way short half-life waste are from the previous slides, the only exception is that you do not have to remove or obliterate radioactive material labels or trefoils

- Long half-life waste is consolidated by the RCO into 55 gallon drums at our waste facility and picked up by our waste broker for final disposal

- The cost to dispose of long-half waste is substantial to the University therefore it is requested that you try to minimize the activity you use for each experiment as much as possible



# Tracking & Separating Radioactive Waste

Long half–life waste goes for shallow Burial

# Tracking & Separating Radioactive Waste

In-lab container safety

Do not store waste containers with their liners exposed, this can cause tears in the liner and may spread contamination

Do not store funnels inside carboys or bulk liquid waste, always screw the caps on tightly when waste is not being added to prevent accidental spills

**To prevent accidental spills always secure the lids to the waste containers when waste is not being added!**

# Tracking & Separating Radioactive Waste

In-lab container safety

Seal the liner with adhesive tape when bucket is full


30 or 55 gallon Drums – Tighten the nut and bolt in the orientation shown above

**Complete the waste tag:**

- Isotope(s) inside the waste container
- Amount - total activity inside waste container
- Pail # - Number on the yellow sticker found on the side of the waste container
- Assay – Assay date of the Inventory
- PU – Principal User
- Type – description of waste contents inside waste container

# Tracking & Separating Radioactive Waste

## In-Lab Waste Container Storage

**<u>RAM waste containers must be submitted for a waste pickup when:</u>**

- Waste container(s) are full
- Waste container(s) have been in the lab for 6 months
  - To prevent legacy waste
  - Can submit waste even when container is not full
- Radiation work has been completed and there are no immediate plans to work with RAM within the next month

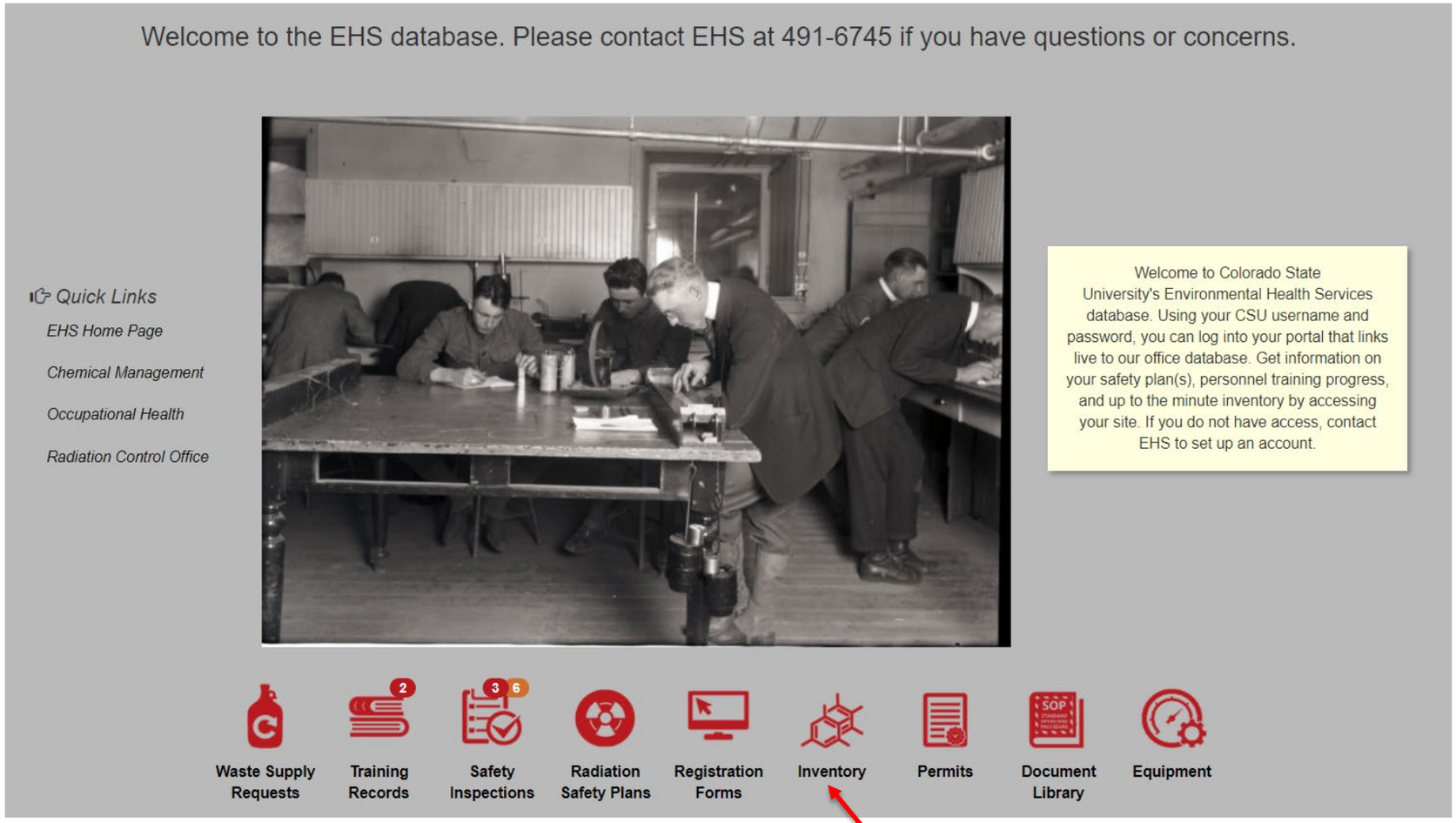
# Online RAM Waste Disposal

1. Add all Inventory into waste containers online
2. Request a waste pickup

Instructions can be found on the RCO Website for future reference:
RAM Waste Disposal Instructions Link

# EHSA Database – Online RAM Waste Disposal

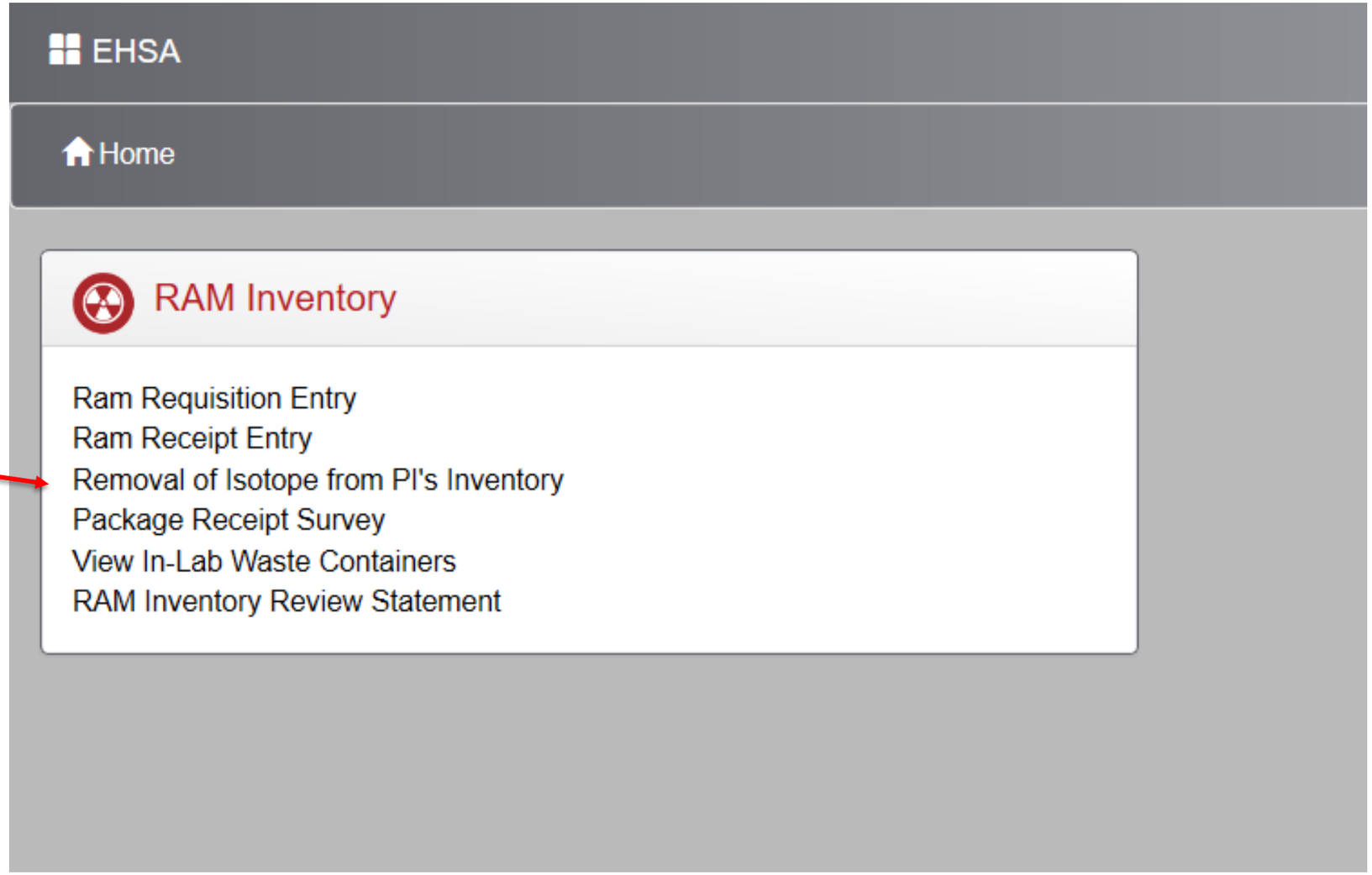
## Step 1: Add Inventory into Waste Containers




Select “Inventory” from the EHSA Database Home Page

# EHSA Database – Online RAM Waste Disposal

Step 1: Add Inventory into Waste Containers




**Select "Removal of Isotope from PI's Inventory"**

# EHSA Database – Online RAM Waste Disposal

## Step 1: Add Inventory into Waste Containers

Helpful tip: to view your In-Lab Waste Containers select "View In-Lab Waste"

EHSA Inventory / Ram Inventory Usage

Usage Log | PI: Curie, Marie | Inventory: Current Inventory | View In-Lab Waste

Drag a column header and drop it here to group by that column

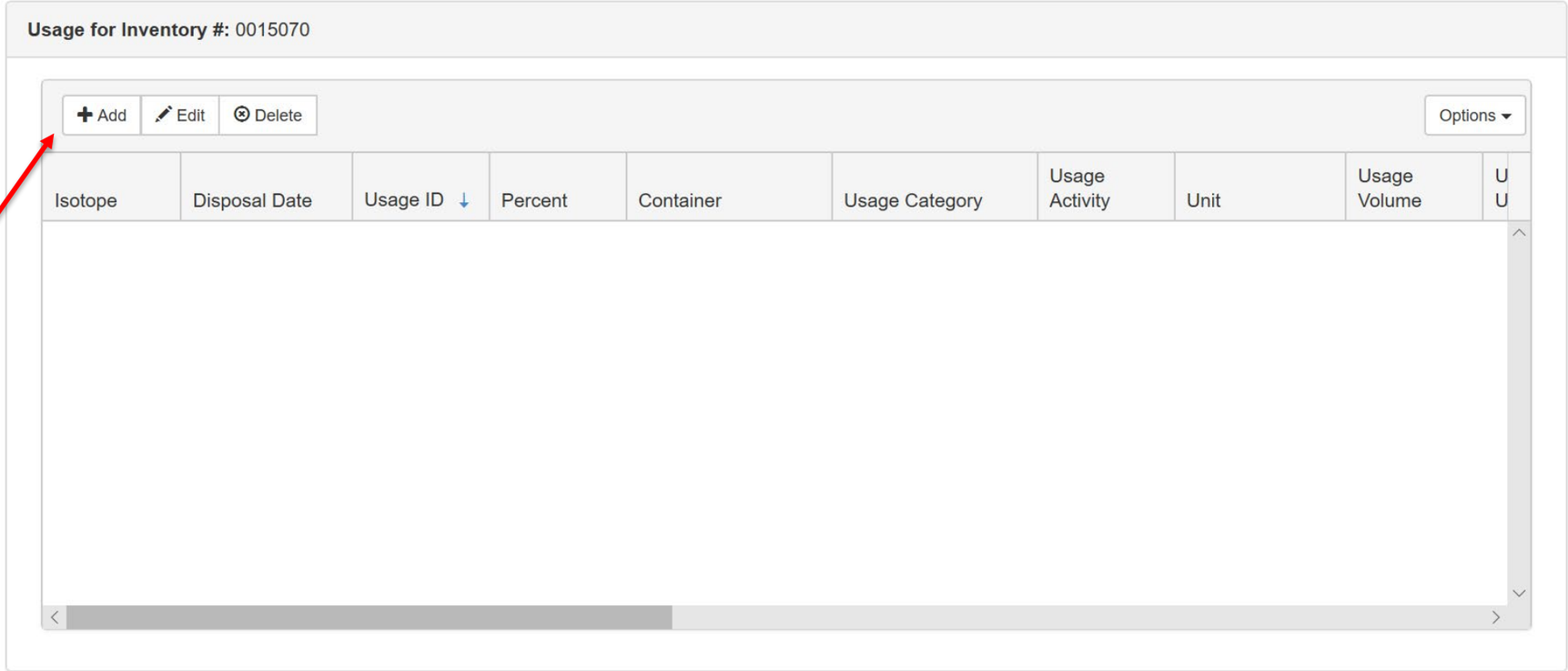
| Inventory # | PI Name | Isotope | Receipt Activity | Unit | Receipt Date | Lab/Location | Lic. Line # | Permit # |
|---|---|---|---|---|---|---|---|---|
| 0015077 | Curie, Marie | S-35 | 2 | mCi | 05-15-2020 | General Services Building:133 | 1A | 19R-032-01 |
| 0015074 | Curie, Marie | S-35 | 3 | mCi | 05-12-2020 | General Services Building:133 | 1A | 19R-032-01 |
| 0015075 | Curie, Marie | P-32 | 4 | mCi | 05-12-2020 | General Services Building:133 | 1A | 19R-032-01 |
| 0015072 | Curie, Marie | P-32 | 5 | mCi | 05-05-2020 | General Services Building:133 | 1A | 19R-032-01 |
| 0015073 | Curie, Marie | S-35 | 5 | mCi | 05-05-2020 | General Services Building:133 | 1A | 19R-032-01 |

**Double click on the inventory number you wish to make a disposal for**

# EHSA Database – Online RAM Waste Disposal

## Step 1: Add Inventory into Waste Containers

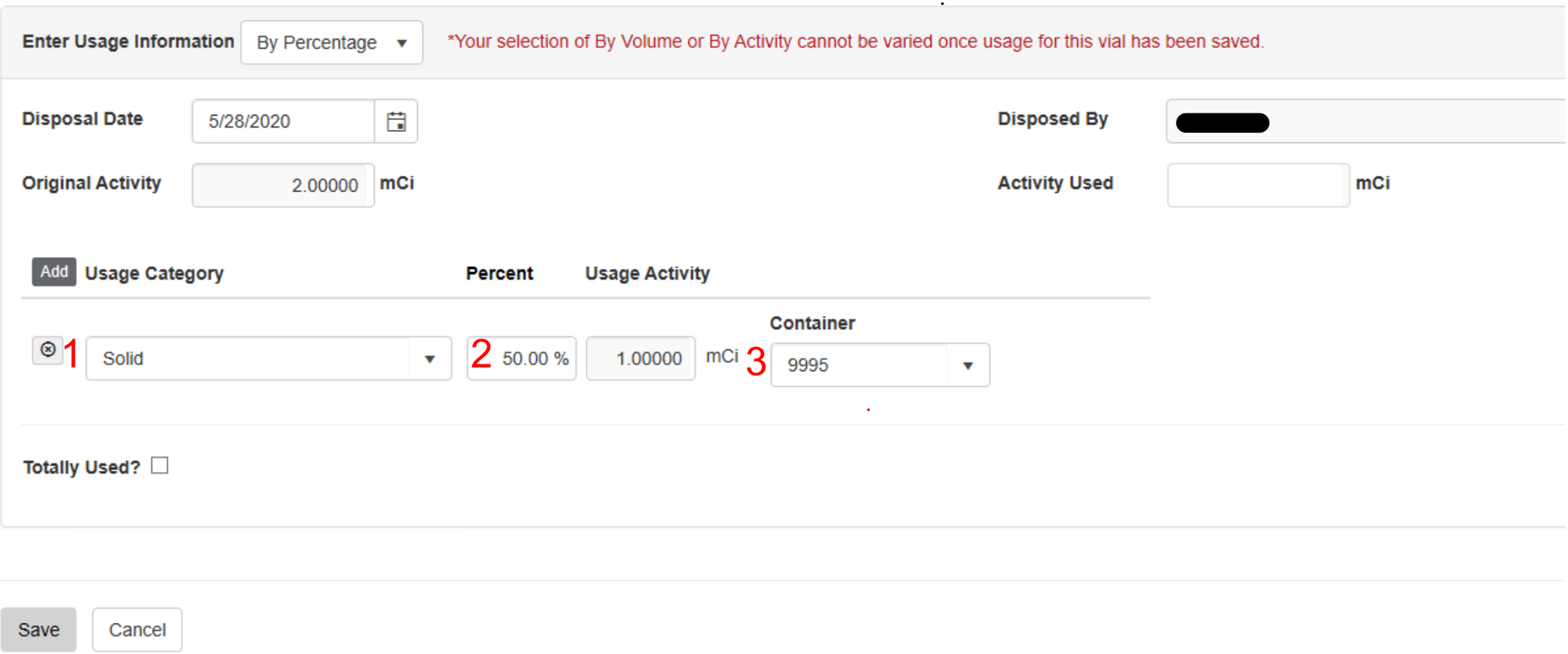
**Scroll down to the bottom of the screen to "Usage for Inventory #" and select "Add"**



# EHSA Database – Online RAM Waste Disposal

## Step 1: Add Inventory into Waste Containers

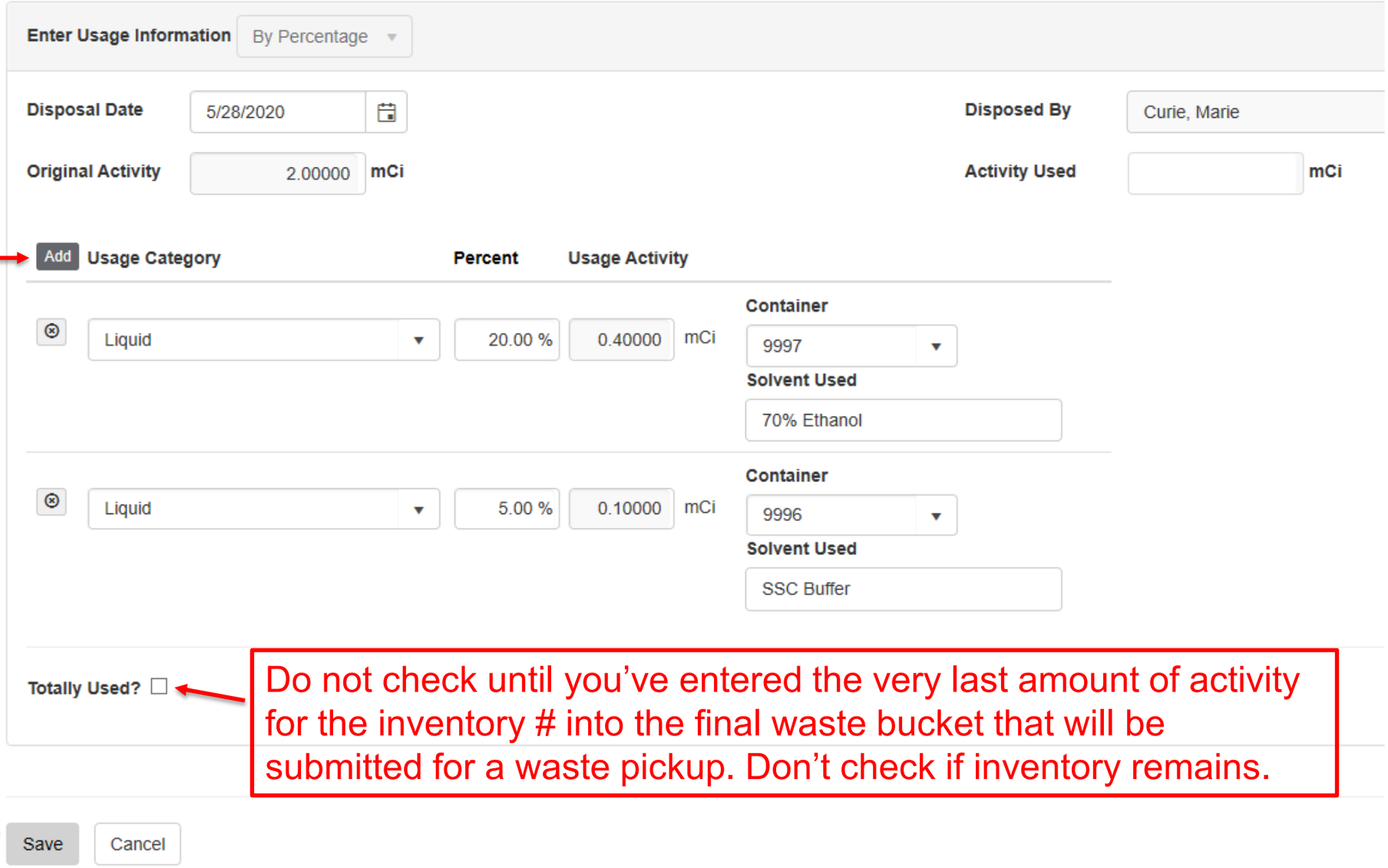
1. Select Usage Category drop down – Solid or Liquid.
2. Add percent of the inventory put into the waste container
3. Select the waste container No.



# EHSA Database – Online RAM Waste Disposal

## Step 1: Add Inventory into Waste Containers

Select "Add" to enter activity into a different waste container




Do not check until you've entered the very last amount of activity for the inventory # into the final waste bucket that will be submitted for a waste pickup. Don't check if inventory remains.

Select SAVE!

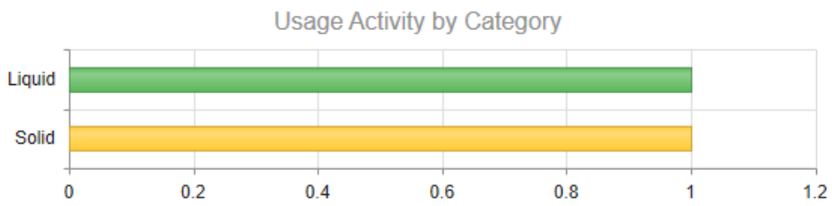
# EHSA Database – Online RAM Waste Disposal

## Step 1: Add Inventory into Waste Containers

1. Verify that you entered the correct activity into the correct waster container

2. Once you verified everything is correct select “Done”

Done




**Usage for Inventory #:** 0015077

Reactivate

Options

| Isotope | Disposal Date | Usage ID | Percent | Container | Usage Category | Usage Activity | Unit | Usage Volume | U U |
|---|---|---|---|---|---|---|---|---|---|
| S-35 | 05-28-2020 | 44958 | 5 | 9996 | Liquid | 0.1 | mCi | 0 | |
| S-35 | 05-28-2020 | 44958 | 20 | 9997 | Liquid | 0.4 | mCi | 0 | |
| S-35 | 05-28-2020 | 44957 | 25 | 9996 | Liquid | 0.5 | mCi | 0 | |
| S-35 | 05-28-2020 | 44956 | 50 | 9995 | Solid | 1 | mCi | 0 | |

# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup

Once you've entered every inventory number into the corresponding waste container submit for a waste pickup.

## First - Complete a Container Survey:

1. Wearing proper PPE wipe the outside of the waste container using a filter. Include the lid, bottom, sides, & handle; then run the wipe in the LSC with a blank to check for removable contamination.
   - If there is removable contamination, clean & rewipe the waste bucket until below your background upper control limit.

2. Survey the outside of the waste container with your survey meter at the surface of the container, record the highest CPM reading.

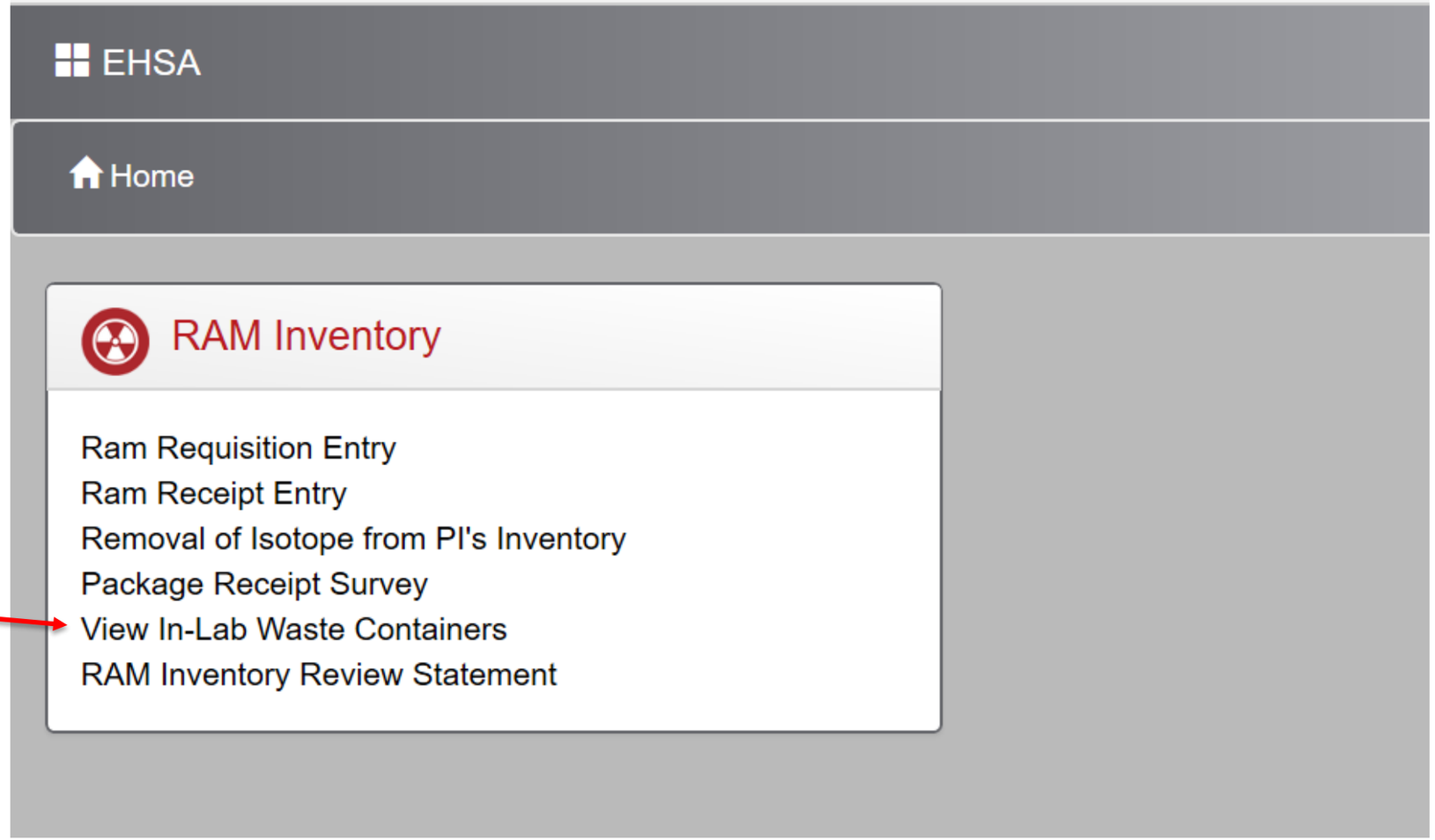
# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup


Select “Inventory”

# EHSA Database – Online RAM Waste Disposal

Step 2: Request for a Waste Pickup




Select “View In-Lab Waste Containers”

# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup

Here you can view all your in-lab waste containers

EHSA Waste / In Lab Containers

In Lab Container Reports | PI: Show All | View: In-Lab Waste | Container Category: RAM

Drag a column header and drop it here to group by that column

| Container / Drain # | Volume | Disposal Volume Unit | Waste Type | Container Category | | | | Contents Description | Isotope |
|---|---|---|---|---|---|---|---|---|---|
| 9995 | 5 | GAL | SDN | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |
| 9996 | 5 | GAL | SLN | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |
| 9997 | 5 | GAL | SLM | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |

# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup

In Lab Container Reports | **PI:** Show All | **View:** In-Lab Waste | **Container Category:** RAM

Drag a column header and drop it here to group by that column

| Container / Drain # | Volume | Disposal Volume Unit | Waste Type | Container Category | | | | Contents Description | Isotope | Storage Type | PI Name |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9996 | 5 | GAL | SLN | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 | I-RAM | Curie, Ma |

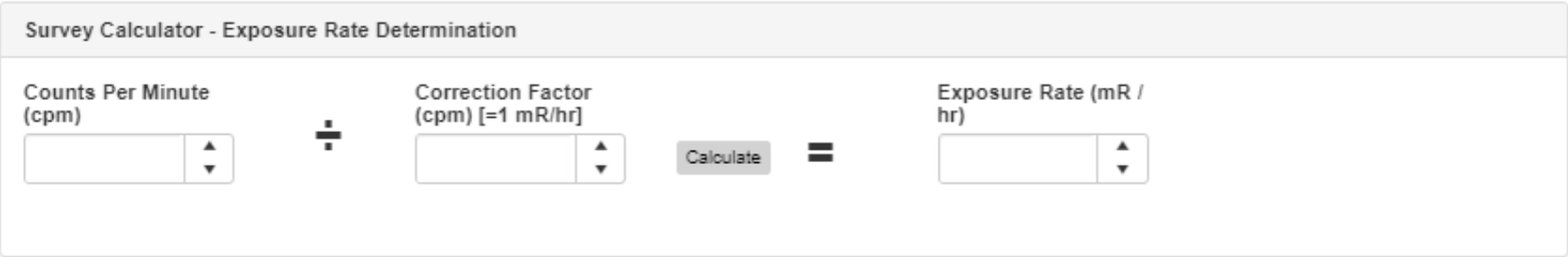
+ Add | Edit

| Isotope | PI Origin | PI Name | Orig Inventory # | Disposal Date | Est. Disposal Date | Waste Code | Disposed? | Receipt Activity | Unit |
|---|---|---|---|---|---|---|---|---|---|
| P-32 | [redacted] | Curie, Marie | 0015075 | 05-28-2020 | 03-22-2021 | | | 3 | mCi |
| S-35 | [redacted] | Curie, Marie | 0015077 | 05-28-2020 | 05-28-2020 | | | 0.5 | mCi |
| S-35 | [redacted] | Curie, Marie | 0015077 | 05-28-2020 | 05-28-2020 | | | 0.1 | mCi |
| S-35 | [redacted] | Curie, Marie | 0015074 | 05-28-2020 | 05-28-2020 | | | 0.75 | mCi |

- Select the yellow arrow to view all the contents in that waste container and verify that everything is correct.
-Once you've verified everything is correct select "Add Container Survey" red button

# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup





Use the calculators to determine your Highest Exposure rate at the surface of the container in mR/hr
And the highest wipe Activity in DPM/$cm^2$

# EHSA Database – Online RAM Waste Disposal

Step 2: Request for a Waste Pickup

Enter Survey Information:

Container Survey

| | | |
|---|---|---|
| **Container #** | 9996 | Autofill |
| **Survey Date** | 5/29/2020 | |
| **Mixed Waste?** | No | |

1. Select Yes or No for Mixed waste in the dropdown menu

2. Complete all the fields - do not leave any blank, enter N/A if not applicable **then select "Save"**

| | | |
|---|---|---|
| Highest Exposure rate at Surface | 0.02 | mR/hr |
| Highest Wipe Activity | 0.0 | DPM / cm² |
| Survey Meter | | |
| Wipe Test Counter | 7069084 : Beckman : LS 6500 | |
| Are Sharps Secured Within Container? | N/A | |
| pH | 7 | |
| method of Biohazard Disinfection | N/a | |
| Weight | 15.0 | lbs. |
| Surveyor | M. Curie | |
| Description of Waste | Bulk Liquid - 2 x 4 Liter Glass Bottles with 50% SSC buffer and 50% water | |

3. Test the pH using litmus paper
(dispose of litmus paper in a Dry waste container)

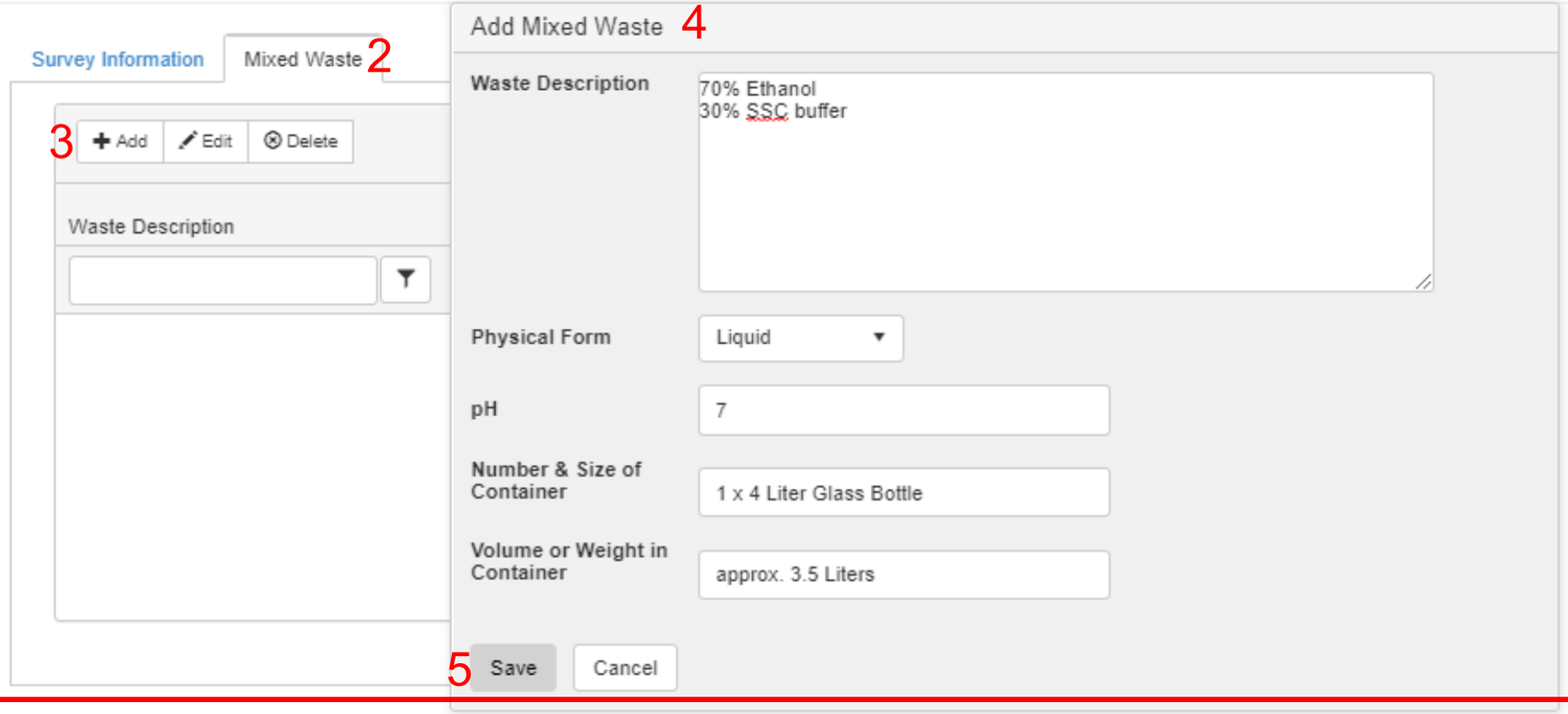
4. Enter as much information as possible in the description of waste:
(i.e. LSC vials with 7 mL each of Ultima Gold LSC Cocktail)

# EHSA Database – Online RAM Waste Disposal

Step 2: Request for a Waste Pickup

**Mixed Waste Example:**

1. Select “Yes” in the Mixed Waste dropdown
2. Select the mixed waste tab
3. Select “Add”
4. Enter the mixed waste contents in detail
5. Select “Save”

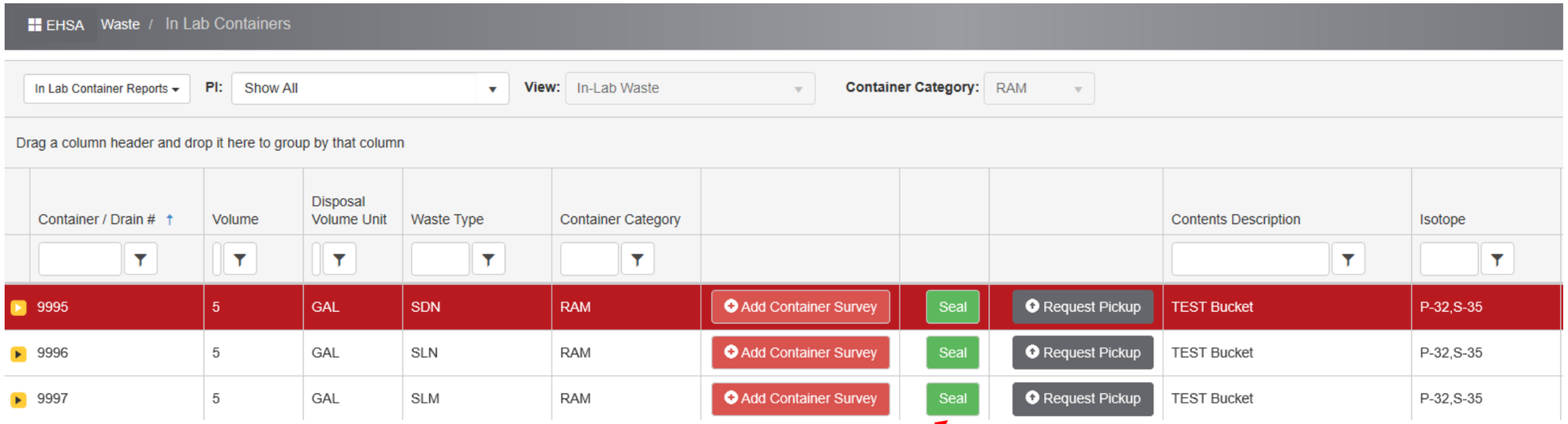



**Notes:**

- Enter percentages to total 100%
- Select “Add” for each bottle in waste container if they are different
- All mixed waste hazardous chemicals must be approved by the RCO in the RAM Safety approval before use
- **DO NOT** mix or combine any incompatible chemicals inside the waste container (Refer to Hazardous Waste Manual Appendix B, page 9) - i.e. separate acids and bases into separate RCO waste containers

# EHSA Database – Online RAM Waste Disposal

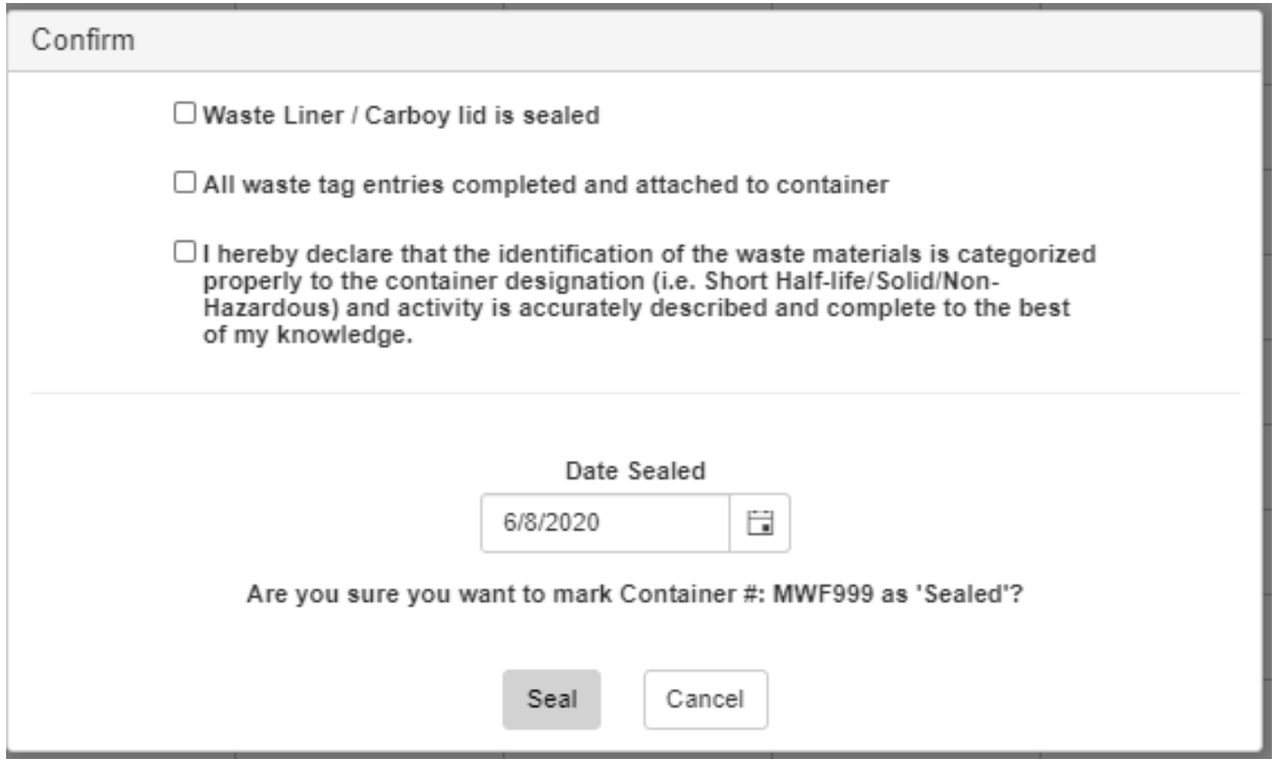
## Step 2: Request for a Waste Pickup




1. Select “Seal” to seal the waste container

# EHSA Database – Online RAM Waste Disposal

Step 2: Request for a Waste Pickup




Confirm the requested items by checking them and select Seal

# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup

EHSA Waste / In Lab Containers

In Lab Container Reports | PI: Show All | View: In-Lab Waste | Container Category: RAM

Drag a column header and drop it here to group by that column

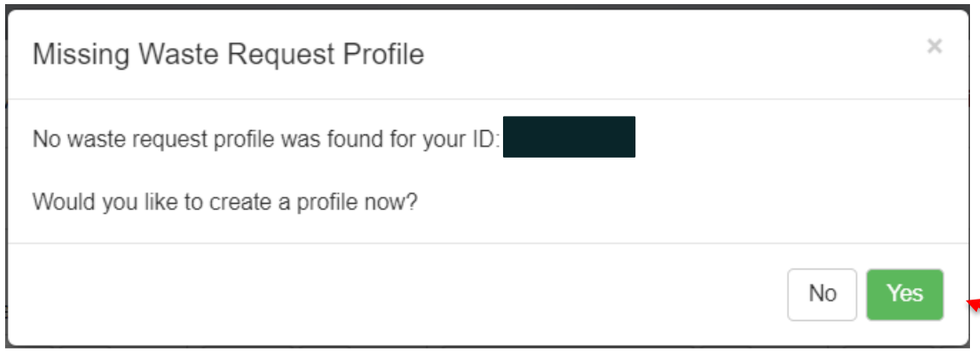
| Container / Drain # | Volume | Disposal Volume Unit | Waste Type | Container Category | | | | Contents Description | Isotope |
|---|---|---|---|---|---|---|---|---|---|
| 9995 | 5 | GAL | SDN | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |
| 9996 | 5 | GAL | SLN | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |
| 9997 | 5 | GAL | SLM | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |

Select “Request Pickup”

# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup

You will need to create a waste request profile if this is your first time submitting for a waste pickup, this is only required to be completed once, if a waste profile has already been created for you and this "Missing Waste Request Profile" pop-up does not appear you may continue to slide #77



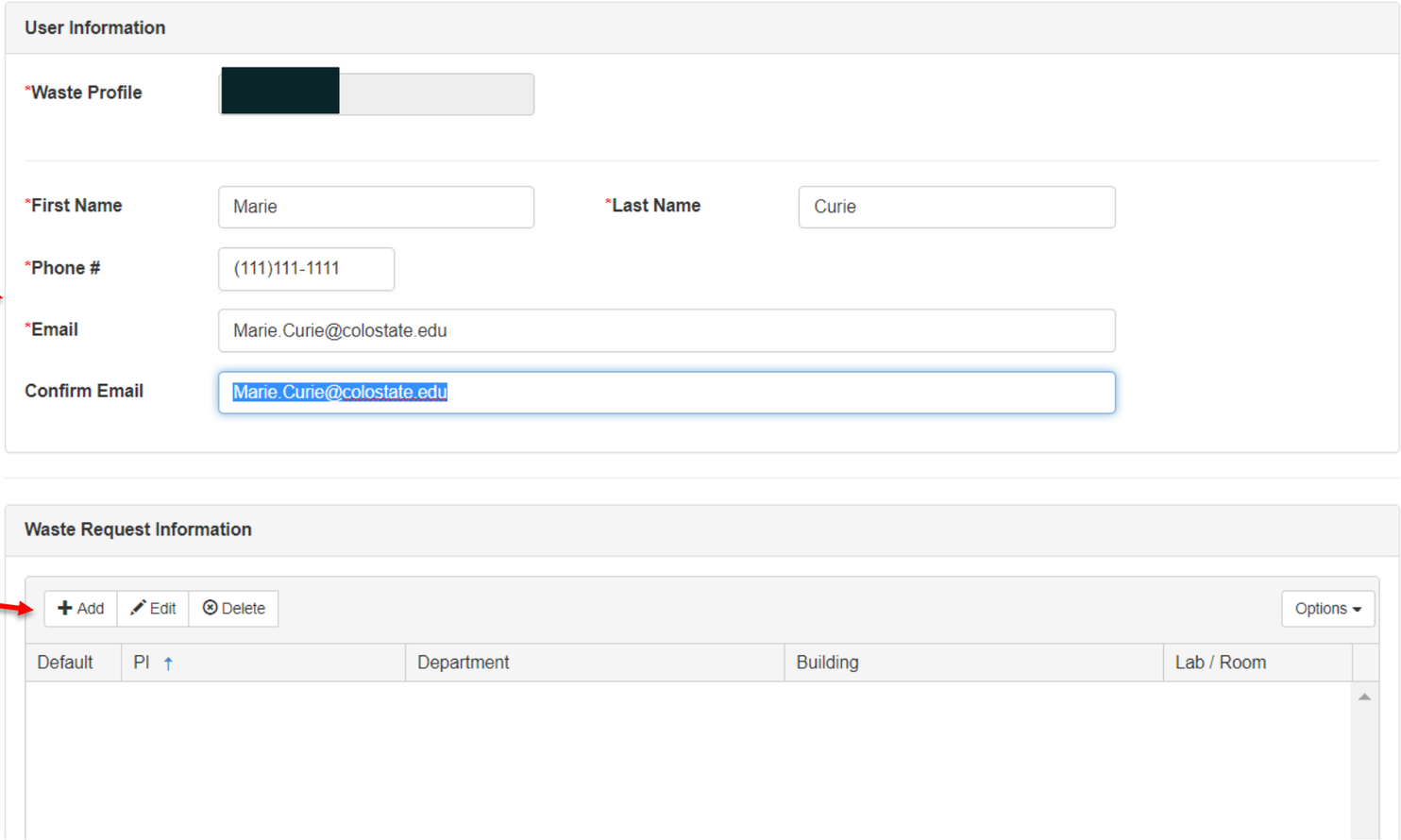

Select "Yes" to Create your Waste Request profile.

# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup

Verify User Information is correct and make edits here.

Select “Add” to Attach Your Principal User.

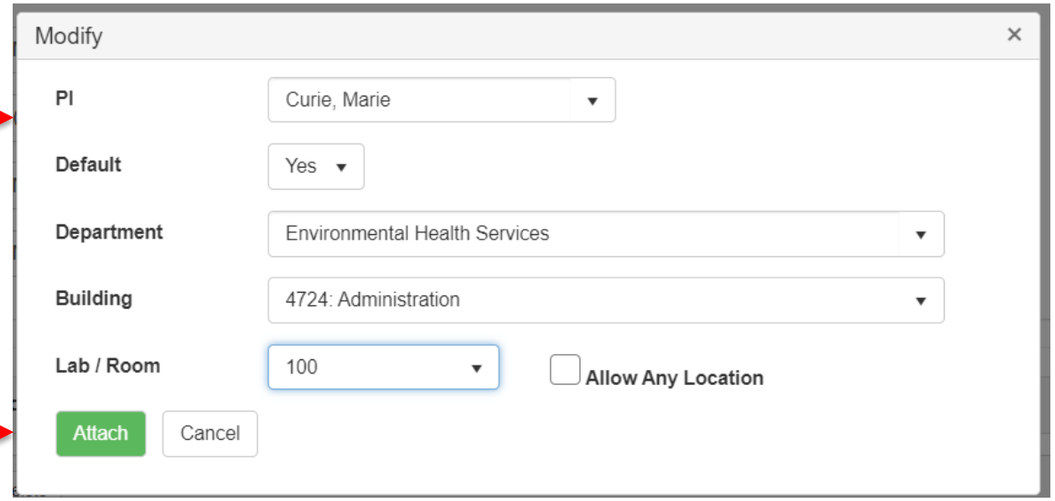


# EHSA Database – Online RAM Waste Disposal

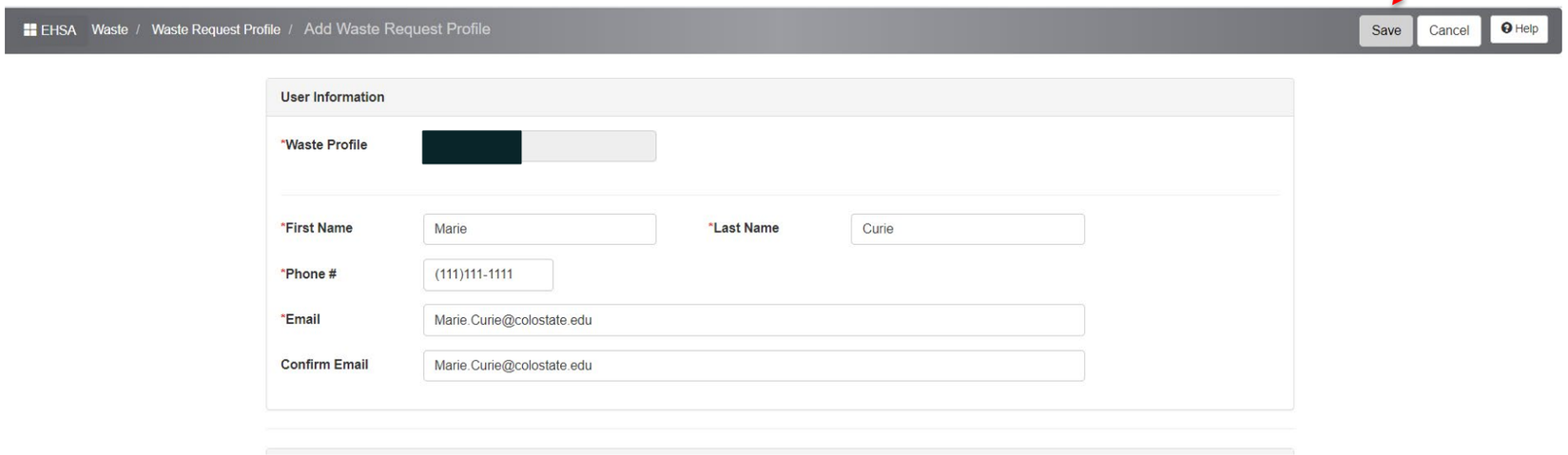
## Step 2: Request for a Waste Pickup

Enter your PI, Department, Building and Lab #

Select “Attach”




Then **Select “Save”** and you will be returned to the User Information Page



# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup

EHSA Waste / In Lab Containers

In Lab Container Reports | PI: Show All | View: In-Lab Waste | Container Category: RAM

Drag a column header and drop it here to group by that column

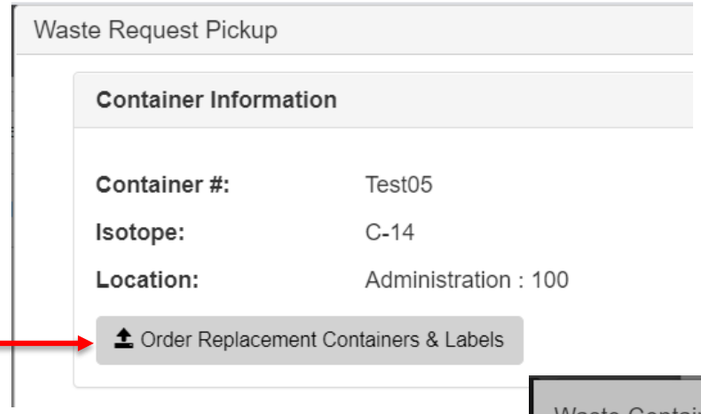
| Container / Drain # | Volume | Disposal Volume Unit | Waste Type | Container Category | | | | Contents Description | Isotope |
|---|---|---|---|---|---|---|---|---|---|
| 9995 | 5 | GAL | SDN | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |
| 9996 | 5 | GAL | SLN | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |
| 9997 | 5 | GAL | SLM | RAM | Add Container Survey | Seal | Request Pickup | TEST Bucket | P-32,S-35 |

Final Step: Select “Request Pickup” for the waste container you would like to submit for a waste pickup

# EHSA Database – Online RAM Waste Disposal

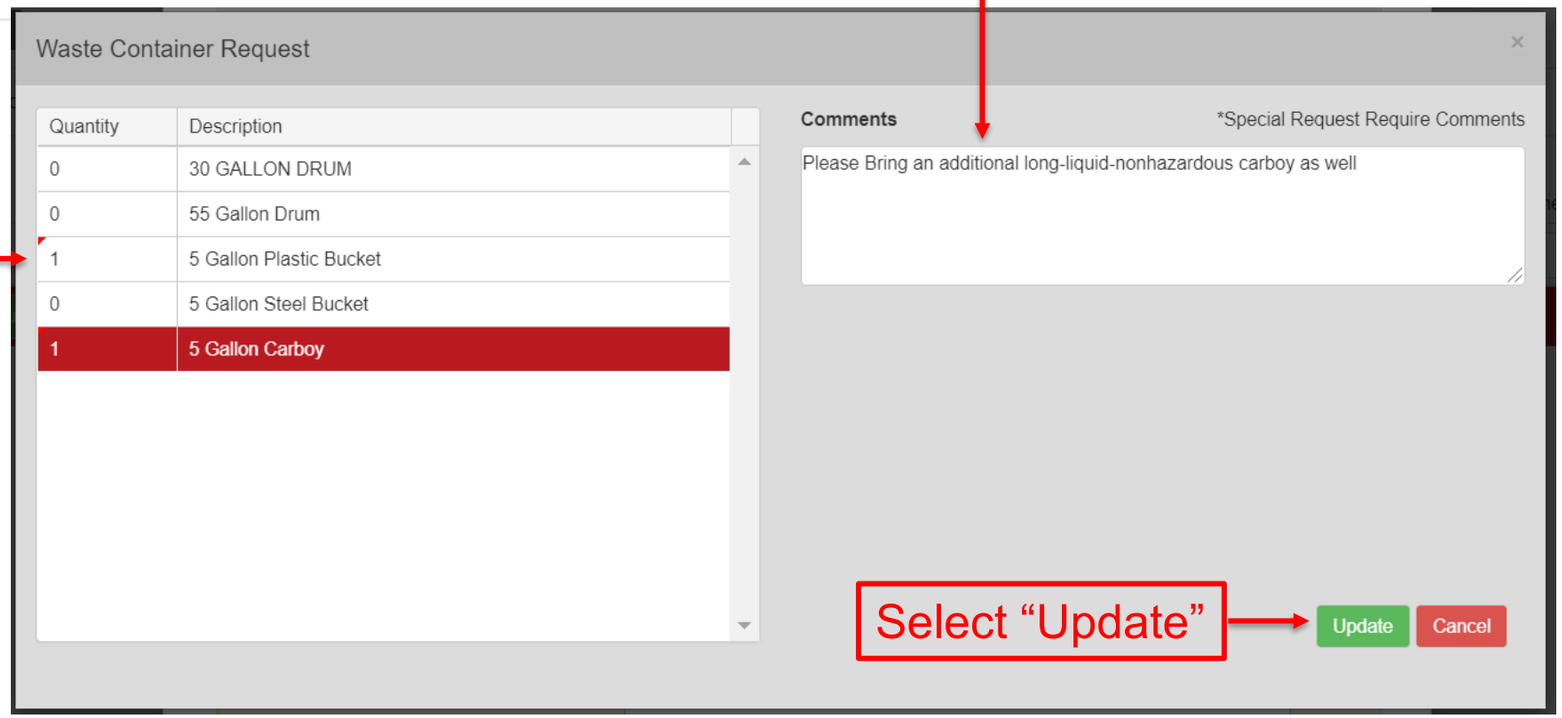
## Step 2: Request for a Waste Pickup

Select “Order Replacement Container” to request a new waste container




The RCO will replace the waste container with the same waste type that was submitted for a waste pick unless you request something different in the comments. You will also need to enter the container waste type if you request any additional waste containers.

Then select the container type and the quantity of replacement containers needed

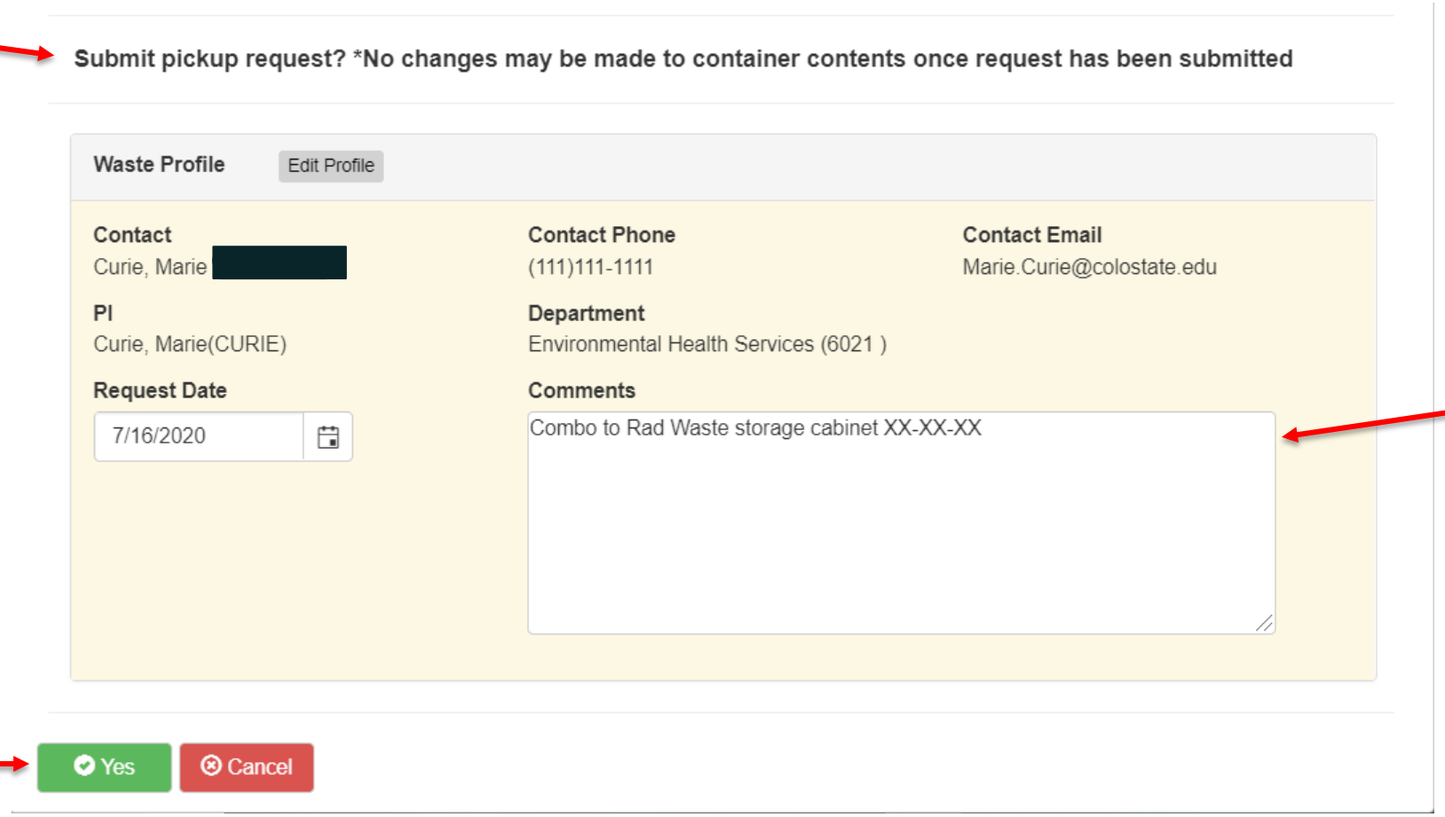



Select “Update”

# EHSA Database – Online RAM Waste Disposal

## Step 2: Request for a Waste Pickup

**Important!**



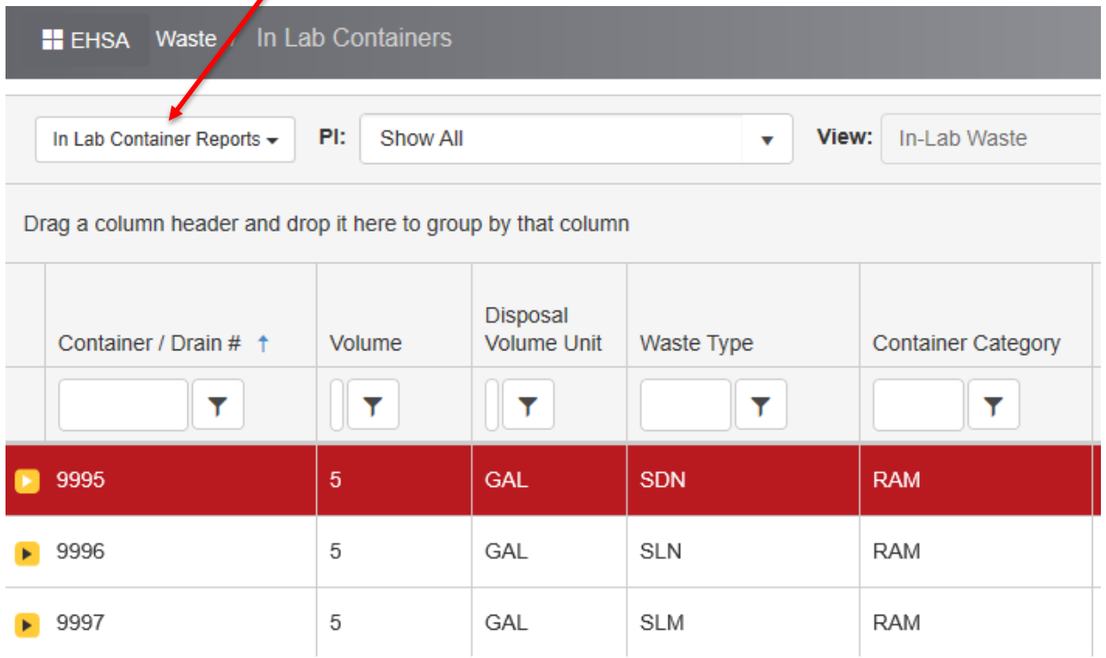

Enter any useful comments for the RCO

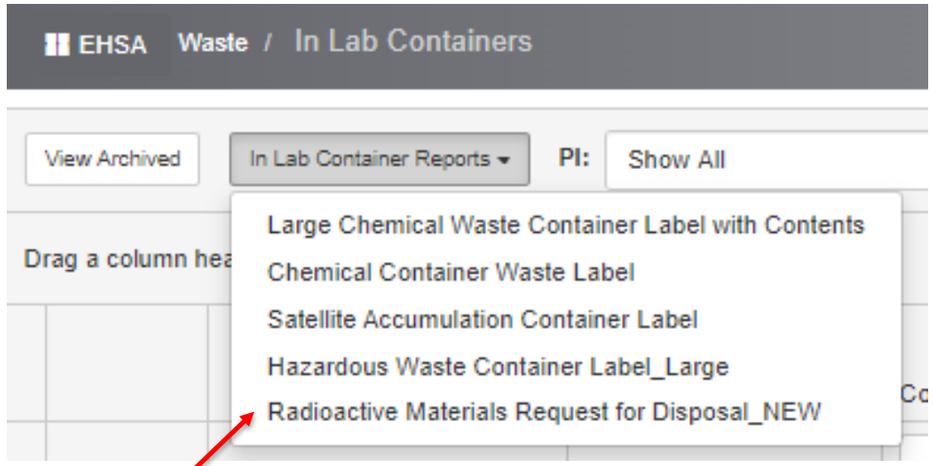
Select “Yes” to complete your waste pickup request

# EHSA Database – Online RAM Waste Disposal

Step 2: Request for a Waste Pickup

Once Waste pickup is requested highlight the waste container and select “In Lab Container Reports”




Select “Radioactive Materials Request for Disposal_NEW Print the report for each waste container to be picked up and save the printed report(s) in your Radiation Control Program Binder

# EHSA Database – Online RAM Waste Disposal

- 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 5:00pm

For more Information:

- Refer to your PI's full radiation safety approval
- The Radiation Control Manual
- The RF-13 Acquisition and Disposition form
- Contact the Radiation Control Office Personnel (Contacts)

rco
RADIATION CONTROL OFFICE

Please take the online quiz to receive credit for completing the course. You will need to score at least an 80% to pass and can retake the quiz as many times as needed.

However, if you do not pass on your second attempt, you'll have to wait 24 hours before taking it again.

# Thank you

Colorado State University