

Radiation Protection Program

U N I V E R S I T Y O F M I N N E S O T A D U L U T H

CAUTION



RADIOACTIVE MATERIALS

Permit Holder's Name: _____

Phone Number: _____

In Case of Radiation Emergency

Call: 726-7273 or page 726-7139

After hours, from 5:00 p.m. to 8:00 a.m.,
Page 725-6751 or call 343-3130.

On Holidays, Call: 911, request university police, and state that you have a radiation emergency.

University Health Physicist: 612-626-6002

Environmental Health and Safety Office

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How to Contact Us:

UMD-Environmental Health and Safety Office (EHSO)

Email: ehso@d.umn.edu

Phone: 726-7273

Fax: 726-8127

Campus Mail: 31 DADB

Radiation Protection Division (RPD), Minneapolis

Jerry Staiger, Radiation Protection Officer

Email: staig001@tc.umn.edu

Brian Vetter, Health Physicist

Email: vette001@tc.umn.edu

US Mail: W-140 Boynton Health Service

410 Church Street SE

Minneapolis, MN 55455

Phone: 612- 626- 6002

Fax: 612- 625- 1608

1.

Introduction.

The University of Minnesota Duluth (UMD) is required to manage radioactive materials in compliance with Title 10, Part 20 of the Code of Federal Regulations (10 CFR, Part 20) and other applicable federal, state and university regulations.

The University of Minnesota Radiation Protection Division (RPD), Department of Environmental Health and Safety, with the review and approval of the All University Radiation Protection Advisory Committee (AURPAC), establishes uniform policies and procedures for the use of sources of ionizing radiation, and ensures compliance with the required procedures for collection, packaging, labeling, transport and disposal of radioactive waste generated throughout the University of Minnesota.

The Nuclear Regulatory Commission (NRC) requires that all licensees maintain written records regarding the receipt, storage and disposal of radioactive material. This information must be recorded by Permit Holders and their staff and supplied to RPD on a routine basis for documentation. The RPD maintains these required records for review by the NRC as part of their annual inspection of the University NRC license.

As an investigator generating radioactive waste, your assistance and cooperation with all waste handling procedures, and compliance with NRC license requirements is essential to assure a safer management of radioactive waste, and use of radioactive materials at UMD.

2.

Radioactive Source Possession and Use Requirements: University Broad Scope License.

To obtain a permit to possess and use radioisotopes under the university broad scope license, you must proceed with the following:

I. Obtain and fill out a permit application:

Permit application forms may be obtained from the UMD Environmental Health and Safety Office at 7273, or downloaded from our web site at:
<<http://www.d.umn.edu/ehso/Radiation/Permit.doc>>

Fill out all requested information on permit application. For guidance on how to fill out the application, use the permit application instructional guide from this URL, <http://www.d.umn.edu/ehso/Radiation/P_guide.doc>.

Completed application and radiation protection training questionnaires must be sent to the Radiation Protection Division at:

Radiation Protection Division
University of Minnesota
W-140, Boynton Health Service.
410 Church Street S.E.
Minneapolis Minnesota, 55455.

Permit application will not be processed until documentation of training of all personnel working with radioisotopes and/or work in radioisotope use area (laboratory) is received by the RPD.

Required Radiation Protection Training consists of 8 videotapes and a questionnaire, available at the UMD Library, Learning Resources Center (Rm. 465, phone 726-8102). The questionnaire must be completed at the time of viewing the tapes and signed by the permit holder to document training.

II. Permit Review and Approval:

The applicant will be contacted by a RPD upon receipt of the application to set up a meeting to:

1. Inspect the laboratory facility and isotope use area.
2. Review needed monitoring instrumentation, radiation shielding, waste collection containers, personnel dosimetry, ventilation requirements, and laboratory security controls.
3. Provide a **“train the trainer”** session with the applicant and/or designated laboratory supervisor.

When above facility review and training are satisfactorily completed, RPD will forward the permit application to the AURPAC for review at their next Monthly meeting.

Approved Permit Application will be signed by the All University Radiation Protection Advisory Committee chair, and the University Radiation Protection Officer (RPO).

A copy of the signed application will be returned to the applicant and will serve as the permit for the possession and use of only those radioisotopes and activity levels listed, and in only those locations specified on the permit.

3.

Purchase, Receipt And Transfer of Radioisotopes.

I. Purchase and Receipt of radioactive materials

To order and receive radioactive materials, follow these instructions:

- Fill out the "**Radioactive Material Order Form**" Form completely. Omission of any information will result in delays in processing your order.
- Use black marker or dark print, or type when preparing the form for faxing to improve clarity and minimize errors.
- Arrange to have a staff person from your lab present at the delivery location (your laboratory) to sign for receipt of the material. If unable to be there, please leave a note at the Isotope receipt Desk (252 med school) with instructions for an alternative delivery location.
- All orders must be faxed to the RPD at 612-625-1608 with the following exceptions and additions:
- All written requisitions and phone orders for radioisotopes must specify the following central delivery address:

**University of Minnesota Duluth
Dept. of Biochemistry & Molecular Biology
252 School of Medicine
10 University Drive
Duluth, MN 55812
ATTN: Name of Approved User/Department**

- Complete the "**Record of Radioisotope Order**" form and send a copy to: (252 Med. School). Include the name of the approved user, phone number, date of order, radioisotope and activity ordered, supplier, and expected date of delivery.

IMPORTANT: Do not use a Departmental Purchase Order (DPO) or Contract Release Order (CRO) to order radioactive materials. Use of DPO or CRO for radioisotope orders will result in an NRC-License violation subject to civil penalty.

2. Transfer of Radioactive Materials and Radioisotopes

To transfer radioactive materials, from one UMD permit holder to another, or from a different Institution to a UMD user, you must obtain approval prior to the transfer by following these instructions:

- Fill out the **Radioactive Material Transfer Form**,
Fill in the radioisotope name and activity in (mCi) to be transferred.
- Under the Note section of the order form, fill in the permit holder name and laboratory room number to whom you wish to transfer the radioisotope.
- Send or fax the completed form to:
Environmental Health and Safety Office
31 DADB
Fax: 726-8127
Att: Mahjoub Labyad
- You will receive an authorization from our Office to proceed with the transfer only if the compliance status of the "permit holder" (*person to whom the material is being transferred*) is confirmed.
- Finally complete the "**Record of Radioisotope Order**" form as above, and send a copy to: (252 Med. School). Include the name of the approved user, phone number, date of order, radioisotope and activity ordered, supplier, and expected date of delivery.

4.

Personnel Radiation Monitoring.

The Nuclear Regulatory Commission (NRC) and Minnesota Department of Health regulations require that all individuals who work in areas where personal radiation monitoring is required must receive radiation protection training prior to using sources of ionizing radiation. Therefore, training documentation is a prerequisite to obtaining a radiation monitoring dosimeter.

Radiation Dose received by individuals must be maintained as low as reasonably achievable within the radiation dose limits specified by the NRC regulations and University license condition.

The following is a description of personnel monitoring methods and procedures for the measurement of radiation doses received by individuals using sources of ionizing radiation.

Methods of Monitoring

1. External Dose Assessment: Personal Monitoring Devices

The following are three types of external personal monitoring devices (dosimeters) commonly used at the University.

- **Thermo-Luminescent Dosimeter (TLD) Body Badges:**
Used primarily for monitoring the radiation dose to the trunk of the body.
- **Thermo-Luminescent Dosimeter (TLD) Rings:** Used primarily for monitoring radiation dose to the hands and wrist.
- **Film Badges:** A monthly body dosimeter used to monitor exposure of declared pregnant employees.

Please Note that Personal Radiation Monitoring dosimeters do not protect the individual from effects of radiation, but only record the radiation dose an individual has accumulated.

2. Internal Dose Assessment: Bioassay

When quantities of radioactive material used by personnel presents a potential for internal contamination, or in the event of a radioactive material spill, the Radiation Protection Division (RPD) will require the necessary bioassay procedure to determine the quantity of the internal disposition and the resulting dose if any.

All bioassay procedures are performed by the Department of Environmental Health and Safety, or by organizations approved by the RPD. RPD will maintain radiation dose records on all personnel requiring bioassay for assessment of possible internal deposition.

In general the following three bioassays procedures may be used.

- **Urine Analysis:** Will be performed on any individual who uses more than 100 mill-Curies (mCi) of tritiated water, gas or sodium borohydrate, or more than 10 mCi of 3H-Labeled nucleotides per experiment within one week. If the above quantities are used routinely, a weekly urine analysis (bioassay) is required.
- **Thyroid counts:** Performed on any individual who uses 125I and 131I (Iodine 125, 131) in procedures where volatilization is likely (e.g. protein labeling, column separation, dialysis) within one week following the procedure. For continuing operations of the above procedures, monthly thyroid counts are required.
- **Whole Body Count:** Required when appreciable internal contamination is suspected or when the potential for internal contamination warrants the procedure.

How to Apply for, and Obtain a Radiation Monitoring Device

- Application request cards of appropriate radiation dosimeters for assessment of personnel radiation dose are available from the UMD Environmental Health and Safety Office, 31 DAdB, 726-7273.
- Completed request cards should be sent to the RPD at the address listed on the request card.
- Personnel radiation dosimeters are not necessary for individuals who use 3H, 14C, 35S, 33P, 45Ca or other low energy beta emitters, because these radioisotopes present little or no external radiation exposure potential.

For 32P Users, dosimetry is required only when the activity of the isotope used is at or above 0.5 mCi, and a TLD Ring is also required if the activity is at or above 1 mCi. Questions on when a personal dosimeter is required should be referred to the Radiation Protection Division (612) 626-6002.

- The UMD EHS-Office will have replacement dosimeters, and will be responsible for returning all exposed dosimeters to the RPD on the designated monthly or quarterly change schedule.
- Individual dosimeter holders are responsible for returning their dosimeters on the scheduled change date. Failure to do so may result in a financial penalty issued by the RPD.

5.

Management Of Radioisotope Laboratory and Use Areas.

1. Safety and Security Procedure

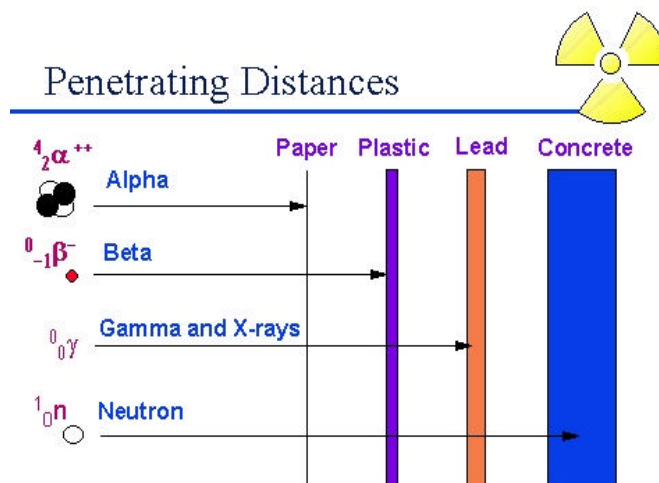
Laboratory and Radioactive Materials and use Areas Security:

Radioisotope sources and radioactive wastes must be stored in a secure area. Therefore, it is required that radioactive material laboratory and use areas' doors must be closed all the time, and locked when no one is in the laboratory. Failure to do so constitutes a violation of the University's NRC License, and may result in a hold on radioactive materials purchases and possible permit close out.

Shielding of Radioactive Sources:

Appropriate shielding must be provided so that radiation exposure rate from radioisotope sources is less than 2.5 mR/hour in any controlled area and less than 0.25 mR/hour in any uncontrolled area.

Radiation exposure rates must be maintained as low as is reasonably achievable within these limits. 3-sided Lucite shields are available for P-32 short half-life solid waste

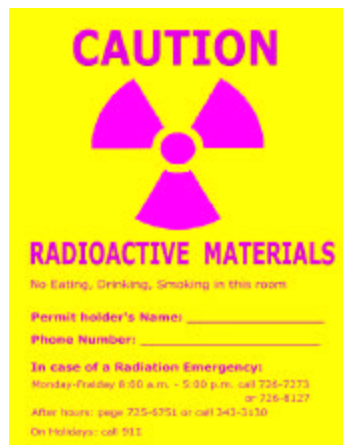


containers from RPD. To order a Lucite shield for your lab, or for more information on available shielding materials and techniques, contact the Radiation Protection division at 612-625-1682.

Radioisotope Laboratory/Storage Areas Posting:

All areas where radioactive materials are stored or used including refrigerators must be labeled with a "**Radioactive Materials Caution Label**" (see picture to the side), to inform others of radiation hazard within the laboratory.

To request a "Caution Label" for your laboratory or equipment, contact our office at 7273, or by email at <ehso@d.umn.edu>.



2. Record Keeping, inventory, and Laboratory and Use Areas Surveys

Record Keeping and Inventory:

An inventory of all radioactive materials under the use permit must be submitted to the RPD at the end of each calendar quarter. This inventory must include the total, decay corrected activity of each radioisotope in stock form as of the end of the quarter, plus the total decay corrected activity of each radioisotope in waste form as of the end of the quarter

- In order to maintain accurate radioisotope inventory records, all users of radioactive materials are required to complete and file **radioactive waste inventory records, quarterly report records** and **employee training records**.

The RPD staff and the NRC audit these records annually and during inspection of the University NRC license.

- Use the **Radioactive Waste Inventory Form** to generate and maintain an accurate waste inventory. The use of this form will aid in tracking small amounts of radioactive stock material from the vial to ultimate disposal in a waste container. Once full, form should be used to determine total activity of each radioisotope in any individual waste container.
- Use the **quarterly report form** to generate accurate quarterly reports and records.
- Use the **employee training form** to maintain accurate employee training records.

Laboratory and Use Area Surveys:

Contamination survey results, and in some cases exposure rate survey results, must be submitted with the Quarterly Report. All radioisotope use areas for which the permit holder is responsible must be accounted for on the Quarterly Report. A diagram of your areas, showing where smears were taken, must also be included with the survey results. Identify the area by using both the building name and room number(s).

1. Frequency of Surveys

- All active, radioisotope areas that are classified as **“Low Risk”**, must have contamination surveys completed each month, and the results submitted with the Quarterly Report. Refer to your copy of the radioisotope use permit for the risk classification of your areas.
- All restricted areas where there was **no handling** of radioactive materials during the entire calendar quarter must have one survey completed **during** that quarter. This survey should be taken in the vicinity of any stored radioisotopes (e.g., refrigerator, freezer, cold room shelf, etc.), or radioactive waste containers.

2. Survey Information Requirements

Surface contamination smear surveys are required for all restricted radioisotope areas. The surveys should be conducted using dry filter paper and analyzed with the appropriate counting instrument (liquid scintillation or auto-gamma counter). All results must be reported in disintegrations per minute (DPM).

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- Record on the survey form which radioisotopes were used in the area.
- Record what counting efficiency was used in determining DPM.
- Record the make and model of the counting instrument.
- Number the smears and indicate on the survey map where these smears were taken.
- Describe their locations in the **SMEAR SURVEY DATA** column. Locations should include those where radioactive materials are stored, handled, and/or discarded. For example (work station bench top or fume hood working surface floor in front of work station, refrigerator/freezer shelves and handles, floor in front of refrigerator/freezer etc.)
- Record the DPM per 100 square centimeters for each smear. (DPM = [smear CPM - background CPM] / [fractional counting efficiency]). For more information on smear surveys consult the **Quarterly Report Instructions**

6.

Proper Radioactive Waste Segregation, Collection and Disposal Procedures.

In order to: (1) minimize the volume of radioactive waste generated at the laboratory level, (2) reduce the toxicity of the waste, and associated disposal cost, and (3) eliminate the generation of mixed waste and prevent pollution, The RPD has initiated the following waste minimization and segregation strategies. In order for these strategies to succeed, it is necessary that all authorized Permit Holders, and lab personnel implement them to the fullest extent possible.

I. Waste Segregation

1. Segregate long-lived radioisotopes (greater than 90-day half-life) from short-lived radioisotopes (less than 90-day half-life).
2. Segregate all short half-life beta emitters from all short half-life gamma emitters, and dispose of into separate waste containers. See **Table I**, for list of commonly used gamma and beta emitters).
3. Segregate I-125 from all other short half-life gamma emitting radioisotopes and dispose of into a separate container.
4. If long half-life radioisotopes cannot be separated from short half-life radioisotopes then the waste must always be disposed of into the long half-life waste container.
5. Segregate H-3 and C-14 from all other long half-life radioisotopes and dispose of into separate waste containers.

It is important to have long half-life and short half-life radioactive waste containers located in separate areas within a lab to prevent mixing of long and short half- life radioactive wastes.

II. Mixed Waste Minimization and Segregation

A. Definition: [MIXED WASTES] are defined as any waste that contains a radioactive material in combination with a hazardous chemical waste. Mixed waste is subject to dual (EPA, NRC) regulatory requirements, and presents special handling and disposal problems for lab and Environmental Health and Safety personnel. In addition, mixed waste disposal options are expensive and in some cases, there are no current disposal options.

B. Mixed Waste Minimization: It can be achieved by modifying lab processes, improving operations, or using substitute material.

1. Avoid the use of hazardous chemicals in conjunction with radioactive materials. In particular, avoid the use of chlorinated organic solvents such as chloroform. See Table II, for a list of prohibited chemicals.
2. Do not combine "Mixed Waste" with any other radioactive waste. Damping a small amount of mixed waste into a container of aqueous radioactive waste will render the combination a mixed waste.
 1. Never combine two different types of mixed wastes together. Different types of chemicals may react producing extremely toxic and radioactive vapors or byproducts.
 2. If you cannot avoid using chemicals, MINIMIZE the volume of mixed waste you generate by using small quantities per experiment, at concentrations lower than the MAC, and dispose of in a separate liquid radioactive waste container. ($MAC = \frac{[Chemical Volume]}{[Total Volume]}$).

3. If the concentrations of the Chemicals used are greater than the "MAC", you must contact the RPD 612-625-1682 to discuss alternative procedures for mixed waste minimization. [See Table III](#) for a list of commonly used chemicals and corresponding Maximum Allowable Concentrations.
4. Avoid the use of flammable solvent-based scintillation cocktails; use only environmentally safe/biodegradable scintillation cocktails. Solvent-based cocktails are considered hazardous waste and therefore their use will increase the volume of mixed waste.
5. Do not mix solvent-based scintillation vials, with biodegradable ones. Always collect in separate containers.
6. **Never mix any of the following:** in the Dry Solid waste container
 - Animals, parts of animals, or tissue sample.
 - Liquid scintillation vials,
 - Stock vials,
 - Sharps,
 - Any amount of liquid.
 - Lead (This item is collected separately. Contact EHSO for pick-up. 7273),
 - Solid radioactive bio-hazardous waste. This must be autoclaved prior to disposal in a radioactive solid waste container.

Table I - Commonly Used Isotopes

Isotope	Half-Life	Emission
P-32	14.3 days	Beta
P-33	25.2 days	Beta
S-35	87.2 days	Beta
H-3	12.33 years	Beta
C-14	5730 years	Beta
Cl-36	3.07 e ⁵ years	Beta
Tc-99m	6.007 hours	Gamma
Cr-51	27.8 days	Gamma
I-125	59.7 days	Gamma
Sr-85	64.7 days	Gamma
I-131	8.06 days	Gamma / Beta
Rb-86	18.6 days	Gamma / Beta
Ce-141	32.5 days	Gamma / Beta
Nb-95	35.1 days	Gamma / Beta
Fe-59	45 days	Gamma / Beta
Sc-46	83.8 days	Gamma / Beta
Zn-65	243 days	Gamma / Beta
Na-22	2.6 years	Gamma / Beta

Table II - Prohibited Chemical Use List

Use the following tables as a guide for mixed waste minimization:
This is only a list of the most commonly used chemicals. If you have any questions call 812-726-7273.

$$MAC = \frac{\text{Chemical Volume}}{\text{Total Volume}}$$

Chemical Name	Formula	MAC
Acetone	C ₃ H ₆ O	0%
Acetonitrile	CH ₃ CN	0%
Benzene	C ₆ H ₆	0%
Chloroform	CHCl ₃	0%
Dichloromethane	CH ₂ Cl ₂	0%
Ether	C ₄ H ₁₀ O	0%
Ethyl Acetate	C ₄ H ₈ O ₂	0%
Heptane	C ₇ H ₁₆	0%
Hexane	C ₆ H ₁₄	0%
HPLC	Varies	0%
Isopropanol	C ₃ H ₈ O	0%
Mercury	Hg	0%
Pesticides	Varies	0%
Xylene	C ₈ H ₁₄	0%

Generating mixed waste with the chemicals listed above significantly increases the cost of waste disposal. If you cannot avoid use of the chemicals in the table listed above you must contact the RPD and discuss procedures for minimization of mixed waste.

Table III - Maximum Allowable Concentrations for Commonly Used Chemicals

Chemical Name	Formula	MAC
Acids and Bases	N/A	pH 7-10
Bleach	OclNa	pH 7-10
Ethanol (EtOH)	C ₂ H ₅ OH	5%
Formaldehyde	CH ₂ O	4%
Formalin	CH ₂ O	4%
Formamide	CH ₃ NO	100%
Methanol (MeOH)	CH ₃ OH	10%
Phenol	C ₆ H ₆ O	50%
Polychlorinated biphenyls	PCB ^{1S}	<50ppm
Sodium Azide	N ₃ Na	1%

If you cannot avoid the use of the chemicals that are listed above and have concentrations that are greater than the MAC you must contact the RPD and discuss procedures for minimization of mixed waste.

Important: Even if your chemical concentration is less than the MAC you are still required to fill out a **hazardous waste disposal form**, along with the **radioactive waste disposal request form** since the mixed waste is considered both hazardous as well a radioactive waste.

III. Radioactive Waste Collection and Disposal

- A. Collect radioactive wastes in separate approved radioactive waste containers only. **See Radioactive Waste Disposal Chart**, below for specific container requirements and types of waste per each container. Never flush radioactive waste down the drain, no matter the activity.
- B. Keep inventories on waste isotopes you place per container, Use the following **Radioactive Waste Inventory Form**. Inventorying the waste will be of great help when filling out your quarterly reports, and waste disposal request forms. For instruction on how to fill out the Waste inventory form, go to:
<<http://www.d.umn.edu/ehso/Radiation/wasteins.html>>
- C. Prior to radioactive waste pick up by a UMD Environmental Health and Safety representative, all wastes must be packaged and labeled properly according to the following instructions
1. **Solid Waste** (Short and Long Half-Life)
 - Label container with appropriate UMD [Solid Waste Container Label](#)
 - Complete appropriate [UMD Radioactive Waste Collection Request Form](#), and list all radioisotopes and corresponding activities in millicuries (mci) contained in each container.
 2. **Liquid Waste** (Aqueous, Flammable, Short and Long Half-Life)
 - Label container with appropriate UMD [Liquid Waste Container Label](#)
 - Complete appropriate [UMD Radioactive Waste Collection Request Form](#), and list all radioisotopes and corresponding activities in millicuries (mci) contained in each container.
 - Do not overfill liquid waste container, Jar must be only 3/4 full, and closed shut at the time of pick up.
 - For Flammable (hazardous and radioactive) liquid waste you must also fill out and label the container with the [Hazardous](#)

[Waste disposal form](#). Hazardous Waste Disposal Forms can be obtained by calling 7273.

3. Scintillation Liquid Waste

- Label container with appropriate UMD [Scintillation Waste Container Label](#)
- Complete appropriate [UMD Radioactive Waste Collection Request Form](#), and list all radioisotopes and corresponding activities in millicuries (mci) contained in each container.
- For Flammable (hazardous and radioactive) scintillation liquid waste you must also fill out and label the container with the [Hazardous Waste disposal form](#). Hazardous Waste Disposal Forms can be obtained by calling 7273.
- Indicate name of chemical compound used, and concentrations per vial on the hazardous waste disposal form, and the radioactive waste collection form, as well as number of vials.
- Flammable scintillation vials must be packed for disposal in their original box. Make sure vials are upright, and closed tightly to avoid spillage and box contamination

4. Stock vials

- Stock vials must be segregated into short half-life (<90day) and long half-life (>90day) waste streams and collected in separate waste containers. When disposing of a stock vial, put it back into its original shipping container (sometimes known as a pig) and place it into a the disposal box or container.
- Label container with appropriate UMD [Stock Vial Container Label](#)
- Complete appropriate [UMD Radioactive Waste Collection Request Form](#), and list all radioisotopes and corresponding activities in millicuries (mci) per each container.

5. Animal Waste

- Segregate animal carcass into short and long half-life waste streams, and collect in separate waste containers.

- Before placing animal carcass in the disposal box, Animal Carcass must be in a transparent or translucent double bag. Do not individually wrap animal carcasses and do not place paper, gauze pads, etc. in the bag with the carcasses. The double bag must be sealed and labeled with a radiation caution label, which includes the name of the approved user, the number and type of animal carcasses, the radioisotopes and total activity of each radioisotope in millicuries (mci) per carcass.
- Label container with appropriate UMD [Animal waste Container Label](#)
- Complete appropriate [UMD Radioactive Waste Collection Request Form](#), and list all radioisotopes and corresponding activities in millicuries (mci) per each carcass.
- The bagged carcass must be stored/frozen in the laboratory until pick up by Environmental Health and Safety Office personnel.



6. **Radioactive Sharps**

Sharps means: discarded items that can induce sub-dermal inoculation of infectious agents, including needles, scalpel blades, Pasteur pipettes, broken glass and other sharp items derived from human or animal patient care, laboratories and research facilities. Disposal procedure:

- All sharps are required to be disposed of into a puncture resistant sharps disposal container available from the University Stores catalog.
- Label all radioactive sharps containers with "Caution Radioactive Material" tape to avoid mixing with non-radioactive sharps.
- Do not over fill sharps containers.
- Disposal containers must be shut (i.e. capped or tapped) prior to being collected and transported.
- Do not place sharps containers inside of a solid radioactive waste container.
- Once a sharps container is full you must fill out a [sharps container label](#), attach it to the container and submit a [UMD Radioactive Waste Collection Request Form](#) to have the container removed from your lab.



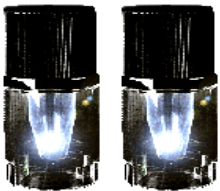


Note: Radioactive wastes will not be removed from your laboratory unless the above requirements are satisfied, correct information is provided, and forms are properly completed. For Waste Pick up, send or fax completed [UMD Radioactive Waste Collection Request Form](#) to: **Mahjoub Labyad, 31 DADB, Fax: 726-8127.**

VI. Radioactive Waste Disposal Chart

Abbreviation	Waste Type	Radioisotopes	Container
S^{LH}	<p><u>Solid Long Half Life</u> This includes the following contaminated items: gloves, blue pads, paper, test tubes, beakers, broken glass, bedding, solid (at room temperature) Gels, etc.</p> <p>Note: Contaminated broken glass must be placed in a box (any box) before putting it in the container, to avoid cuts to waste handlers and waste bag.</p>	Long half-life More than 90 days	 Metal can
S^{SH}	<p><u>Solid Short Half Life</u> This includes the following contaminated items: gloves, blue pads, paper, test tubes, beakers, broken glass, animal bedding, solid gels (at room temperature) etc.</p> <p>PS: Place broken glass in a box to avoid cuts to waste handlers</p>	Short half-life Less than 90 days	 Fiber box
LA	<p><u>Liquid Aqueous</u> This waste consists of non-hazardous, non-flammable radioactive aqueous liquids waste only.</p>	All	


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UNIVERSITY OF MINNESOTA DULUTH

	For other types of liquid radioactive waste, see Mixed waste disposal procedure		
			8L Liquid jar
Abbreviation	Waste Type	Radioisotopes	Container
LF	<u>Liquid Flammable.</u> This is a mixed waste, and consists of hazardous or flammable and radioactive liquid wastes only.	Segregate By short and long half lives	 8L Liquid jar
SV	<u>Stock Vials</u> 	Segregate By short and long half lives	Original or any other box
A	<u>Animal Waste</u>	Segregate By short and long half lives	 Animal box
SHRP	<u>Sharps Items</u>	All	 Sharps container

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SW	<u>Scintillation Waste</u>	Segregate By short and long half-lives. Flammable scintillation vial waste must be collected in a separate container	 5-gal. Bucket
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Waste containers are supplied to users free of charge. At the time of waste collection/removal from your laboratory, all waste containers will be replaced free of charge. However, if you need to request additional containers, use the radioactive waste container request section at the bottom of the **Radioactive Waste Collection Request Form**. Indicate the number and types of waste container you want delivered to your lab.

Sharps Containers are not provided by RPD.

Additional waste container request (*Charge for additional liquid containers provide CUFS account below)

<input type="checkbox"/> Solid short half-life box	<input type="checkbox"/> Liquid jar (H ₂ O) *	Area-Org-SubOrg: - - () *
<input type="checkbox"/> Solid long half-life can <input type="checkbox"/> Animal container	<input type="checkbox"/> Liquid jar (flammable) * <input type="checkbox"/> Scintillation vial bucket	Signature:

- To schedule a waste pickup from your lab, you must complete the **UMD-Waste Collection Request Form** and list all radioisotopes and corresponding activities in millicuries (mCi) per container, send or fax completed form to:

Environmental Health and Safety Office
31 DAdB,
Fax: 8127
Att.: Mahjoub Labyad

Radioactive Waste Collection Request form can be obtained from our office or downloaded from the UMD Radiation protection website at <http://www.d.umn.edu/ehso/Radiation/forms.html>.

7.

Mopping or Waxing Of Radioisotope Use Areas.

If your laboratory floor requires cleaning (mopping and/or waxing) by custodial staff, you should get the area to be mopped or waxed ready:

- Remove all radioactive waste containers from the area to be mopped or waxed.
- Smear-survey the floors of the area to be mopped or waxed to check for any contamination
- If floor was found to be contaminated, decontaminate and smear survey until contamination is removed
- Send or Fax survey to Environmental Health and Safety Office or give a copy to custodial staff. Environmental Health and Safety will instruct custodian to perform the waxing or mopping.

Custodial staff is instructed not to handle any radioactive waste container. That is the responsibility of laboratory personnel.

Your cooperation is much appreciated.

8.

Radiation Emergencies.

In the Event of a Radioactive Material Spill

1. Report the Incident:

Immediately call or have someone Call Environmental Health and Safety Office

- Working Hours Call X7273 or X7139, if no answer:
- Call Facilities Management at X8262.
- After Hours Call: Pager at 725-6751 or Cell phone at 343-3130.
- Weekends and Holidays, Call 911
- [Follow emergency call procedure.](#)
- Provide a brief description of the nature of the emergency:
 1. Quantity of Radioactive Material Spilled
 2. Type of Isotope Spilled (32P, 35S, 125I, 3H, C14...)

3. Extent of Contamination (clothing, material, equipment.)
4. Spill Location: Department and Building Names, Room and Telephone Numbers

2. Prevent the Spread of Contamination:

- Restrict access to spill area.
- Notify all laboratory personnel of the spill.
- Instruct personnel to wait in a clean/safe area within the lab, and not to leave the room until Environmental Health and Safety representative survey them for contamination.
- Put on clean gloves and use GM instrument to self-survey personal clothing and skin surfaces.
- Remove all contaminated clothing and place in a bag or on a pad.
- If skin is contaminated, wash immediately with mild soap and water.
- If concerned about health impact seek medical help.

Important: All contaminated clothing will be confiscated, and placed in storage until decayed, so it is important to always use a lab-coat, safety Goggles and have extra clothing available.

In the Event of Radiation Exposure

- Immediately call, or have someone call Environmental Health and Safety Office at X-7273 and report the incident.
After hours (5:00 p.m.-8:30 a.m.), page 725-6751 or call 343-3130.
On weekends and holidays, call 911,
- For Eye Splashes, flush eyes immediately with copious amounts of water for at least 15 minutes
- Skin splashes, immediately wash contaminated skin with a mild soap and water.

- In case skin absorption, inoculation, or ingestion is suspected, urine sample will be needed for bioassays, and first report of injury must be filled out within 24 hours.
- In case of a severe injury seek medical help immediately.

9.

Radiation Protection Training.

The Nuclear Regulatory Commission (NRC) and Minnesota Department of Health regulations require that all individuals who work in areas where radioisotopes are used and/or personal radiation monitoring is required, must receive radiation protection training prior to working in such areas, or using sources of ionizing radiation.

Training must cover some or all of the following topics, depending on whether the trainee is a user of radioisotopes or not.

Training Topics

<ul style="list-style-type: none">• Radioisotope purchasing and transfer• Permit Holder responsibilities• Radioisotope spills and emergencies• Contamination surveys and instrumentation• ALARA considerations	<ul style="list-style-type: none">• General requirements (posting, security)• Radioactive waste management/disposal• Record keeping requirements• Prenatal exposure guide (NRC Guide 8.13, App S)• Personnel monitoring and dosimetry
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Appendix I:

Policy on Declared Pregnant Radiation Workers

To assure compliance with the revised Nuclear Regulatory Commission (NRC) regulations pertaining to declared pregnant radiation workers, the All University Radiation Protection Advisory Committee has adopted the following policy:

Policy:

At the time of employment and on an annual basis thereafter, all personnel who work with sources of ionizing radiation will be informed of the recommendations

of the NRC relative to the control of radiation exposure received by declared pregnant women. The supervisor (permit holder, registrant or designate) will be responsible for conducting this training, which should include an explanation of the new category of "declared" pregnant radiation worker. In the event that a worker declares pregnancy (in writing to her supervisor), the supervisor or his/her designate shall contact the Radiation Protection Division (RPD) to arrange for the completion of specific training.

Responsibilities of Supervisor (Permit Holder or designate)

New employee training and annual refresher training shall provide information on the new "declared" pregnant category of radiation worker and the reason why the NRC and State of Minnesota radiation protection rules recommend that a pregnant woman declare pregnancy. NRC Regulatory Guide 8.13 (Appendix S of the University Radiation Protection Manual) will be used in this training. During these training sessions the supervisor needs to inform all staff members that Appendix S contains information concerning prenatal radiation exposure and that specific steps must be followed once a worker declares her pregnancy.

Following declaration of pregnancy (contact the RPD for official form), the supervisor shall contact the RPD to arrange a training session for the pregnant worker and themselves.

NOTE: Prior to the training session, the supervisor and the pregnant worker must read the NRC guide reprinted in Appendix S of the Radiation Protection Manual.

The training session will include a review of this guide and of the precautions and procedures to be followed to assure that the worker's radiation dose is maintained within 500 mrem (total effective dose equivalent = summation of external and internal dose) for the entire 9-month gestation period. Also, the work assignment during pregnancy should be such that the pregnant woman does not exceed 50 mrem/month for each month following the declaration of pregnancy.

NOTE: If the pregnant women agree, the supervisor may wish to assign her to duties that do not involve occupational radiation exposure. This is especially true if she has been involved in protocols that may present a potential for

internal uptake of radioactive material (some chemical forms of I-125, S-35, C-14, and H-3).

A signed record of the above training shall be kept on file by the supervisor and a copy retained by the RPD.

A film badge dosimeter will be issued to the worker at the training session. The supervisor will assure that dosimetry film is returned to the RPD for processing on a monthly basis.

If required, assure that bioassay samples and counts (urine analysis and/or thyroid count) are completed on the required monthly schedule. Notify the RPD in the event of any radioactive materials spill, and arrange for appropriate bioassay monitoring for the pregnant person.

Responsibilities of the "Declared Pregnant Worker"

Complete and sign the [Declaration of Pregnancy](#) (see Appendix II) form, and give it to your supervisor.

Read NRC Guide 8.13 "Instructions Concerning Prenatal Radiation Exposure" (Appendix S pages 1-9, University Radiation Protection Manual). Attend training provided by the RPD on precautions to be followed or changes in work assignment to assure that radiation exposure is maintained below 500 mrem for the entire gestation period, and 50 mrem/month during pregnancy.

Complete and sign the film badge request card (available from the RPD). Be sure to change the film on the monthly change schedule, and return the used film to the RPD. After completion of the pregnancy term be sure to return the film badge holder along with the last month's film.

If you will handle potentially volatile radioactive materials, submit a monthly urine sample and/or report to the RPD for a thyroid count on a monthly basis. The RPD staff can assist you in determining if a radioactive material presents a volatility concern.

Appendix II:

Radiation Protection Forms and Applications

The following forms can be downloaded from:
<<http://www.d.umn.edu/ehso/Radiation/forms.html>>

Applying for a Permit to Possess and Use Radioisotopes:

1. Permit Application Form and Guide

Ordering Radioisotopes:

1. Order Form for Radioactive Material
2. Guide for Completing Order Form
3. Record of Radioisotope Order

Radioactive Waste Disposal and Labeling:

1. Radioactive Material Waste Collection Request Form
2. Solid Waste Container Label:
3. Liquid Waste Container Label
4. Animal waste Container Label
5. Radioactive Sharps Waste Container Label
6. Scintillation Waste Container Label
7. Stock Vial Container Label

Radioactive Waste Inventory and Reporting:

1. Waste Inventory Form
2. Waste Inventory Instructions
3. Quarterly Report Form Quarterly Report Form
4. Smear Survey (Quarterly Report) Form
5. Quarterly Report Instructions

Other Forms:

1. Declaration of Pregnancy Form
2. Application for Use of Ionizing Radiation in Human Subjects
3. Record of Training Form
4. Radioactive Material Receipt Form and Procedure
5. Radioactive Material Transfer Form for

**Environment Health and Safety Program Procedure Manual
Radiation Protection Program**

U N I V E R S I T Y O F M I N N E S O T A D U L U T H