UMassAmherst

Environmental Health & Safety

117 Draper Hall,
40 Campus Center Way
AMHERST, MA 01003-9244

FROM: Radiation Safety Services

TO: Prospective Radiation User

SUBJECT: Request to Use Radioactive Material (RM) Here at UMASS

The use of RM is highly regulated at all levels from small research quantities to high exposure irradiators under a license issued by the Massachusetts Department of Public Health's Radiation Control Program (MRCP) sanctioned by the U.S. Nuclear Regulatory Commission under the Atomic Energy Act of 1954. At UMass Amherst, the peer review Radiation Use Committee (RUC) is responsible for setting radiation safety policy, ensuring that all regulations are followed and that all license conditions are met. As the Radiation Safety Officer, I am responsible to the RUC for assuring that all users and laboratory supervisors understand their responsibilities under our license and any state, federal or local regulatory agency requirements during inspections.

The following instructions and application forms as well as the Radiation Safety Manual are for your use in making a formal application to the Committee. Please return the completed form to me for review of regarding safety or regulatory concerns. After I review your application, I will forward your request via email to the RUC, which will review the entire application. The RUC may give you permission to begin your research with radioisotopes or radiation generating machines before voting on your application at the next quarterly RUC meeting via email or they may request further information before issuing a permit.

In any case, please be advised that ordering new stock or transferring radioisotopes, radiation generating machines, instruments containing radioactive sources such as a GC unit with an ECD or a liquid scintillation counter or other items that use or generate radiation onto campus before a permit is approved by the is a violation of our license and could lead to delays in your permit receiving approval from the RUC.

If you need any assistance in completing your application, please do not hesitate to contact me.

Sincerely,

(*Signature on file)*

Haneef Sahabdeen
Senior Radiation Safety Services Manager
413-545-5131
hms@ehs.umass.edu

RADIATION PERMIT APPLICATION / RENEWAL INSTRUCTIONS

1. The person applying for Authorized Principle Investigator status must complete a "Radiation Permit Application". The application is reviewed by EH&S for radiation safety before it is forwarded for final approval by the Radioisotope Use Committee.

2. The Authorized Principle Investigator must submit a list of all personnel who will be using radioactive materials (RAM) in experimental procedures to EH&S (see Part B)

3. The Authorized Principle Investigator must complete a radiation safety profile to the Radiation Safety Officer for a safety review (Part B and Part C of this application) a copy of each experimental procedure (protocol) utilizing RAM under to be authorized under this permit.

For example, while dCT^{32}P and dAT^{32}P hybridization experiments may require only one protocol because of their similarity, two protocols would be needed for the I-125 permit where one experiment uses pre-packaged RIA kits and the second experiment involves radiosynthesis using Na^{125}I in the elemental form. For any experiment involving animals, a review by the UMass Amherst IACUC is required prior to the protocol being submitted to the RUC.

The protocol should include all instruments and equipment used during the procedure, the model and type of radiation generating machines, rooms or areas of rooms where radiation work will take place, maximum specific activity of labeled solution to be used and a brief step-by-step procedure with flow chart to determine handling hazards. Please list the reagents and volumes to be used.

4. All personnel to be working with RAM are required to attend a radiation safety training session conducted by EH&S prior to beginning work with RAM. Training dates and times are posted on the EH&S website: www.ehs.umass.edu. In addition, the Authorized Principal Investigator is required to complete

5. Each lab (or group of adjoining labs) where radioactive materials are in use will be supplied with a copy of the UMASS Radiation Safety Manual. The following signs must be posted in prominent locations where radiation workers can regularly read them:

a. Form MRCP "Notice to Employees"
b. The location of where laboratory personnel may obtain copies of 105 CMR 120.000 Regulations Title 10, "To Control the Radiation Hazards of RAM and of Machines which Emit Ionizing Radiation"
c. Pertinent safety memoranda and signs from EH&S.

In addition to the above posting, signs, stickers or tags reading "Caution Radioactive Materials" **must** be on each entrance to the room, on refrigerators or where radioactive materials are stored, on fume hoods or incubators that use radioactive materials and around the perimeter of the work bench or work area. All required postings may be obtained from EH&S.

6. Upon authorization and protocol review, the Radiation Safety Officer may request the researcher to perform a "Dry Run," i.e. run through the experimental procedure without using RAM. In any case, a member of the Radiation Safety Office will inspect the lab before work with RAM begins to assure that adequate safety precautions have been implemented as planned.

Reminders – As Referenced from the UMASS Radiation Safety Manual

a. When ordering radioisotopes for experimental use, the order must be placed in the name of the Authorized Principal Investigator. EH&S must be notified of the order. All radioisotopes are delivered to the user by EH&S after receipt and inspection. After you place an order, you MUST notify EH&S using our website at www.ehs.umass.edu and then selecting "Radioactive Material Order Notification."

b. Laboratories using or storing radioactive materials will be inspected for radioactive contamination on a regular basis by EH&S. If contamination is found, the lab will be notified by EH&S as to the location and nature of the contamination. It is the responsibility of laboratory personnel to clean any contaminated areas (except in extremely severe cases, like those involving a spill) at the end of an experiment or before leaving the laboratory at the end of the workday.

c. Review the Emergency Procedures in the Radiation Safety Manual prior to beginning work with radioisotopes or radiation generating machines. Ensure that your entire staff who use the lab,

especially those who are not working with radiation, know there are health and safety issues associated with radiation and that they are empowered to bring any laboratory or personal safety concerns directly to EH&S. The EH&S contact number is 545-2682.

d. Please review all applicable waste disposal segregation procedures for your experiments. Please ensure that anyone who is listed as a radiation user under this permit is acquainted with the proper waste disposal procedures so that we may stay in compliance with very strict waste segregation, packaging and disposal regulations. All radioactive waste picked up will be picked up upon request by visiting our website at www.ehs.umass.edu and selecting "Hazardous Waste Pickup Request". Pickup may take place at any time during the day so it is important that your RAM waste be properly labeled (name, isotope, activity, and date) and packaged before pickup. Please feel free to contact EH&S for assistance in determining the proper holding.

The Radiation Safety Checklist (Part C) must be completed for all new permits and permit renewals.

UNIVERSITY OF MASSACHUSETTS AMHERST
RADIATION PERMIT APPLICATION
PART A

INSTRUCTIONS: Please complete all pertinent items, and forward to
Radiation Safety Officer, EH&S, 117 Draper Hall, Fax: 545-2600

Name of Applicant	Department	Office Location	Telephone

Building and room numbers where radiation will be used or stored

☐ Room Change
(Complete Part A only)

☐ Initial Application ☐ Renewal ☐ Add Isotope(s)
(^^^^^^^^^ Complete Parts A, B and C ^^^^^^^^^)

☐ Increase Limits ☐ Remove Nuclide
(^^^^^^ Complete Part A only ^^^^^^)

Radioisotope information. (Attach a supplementary sheet, if more space is needed.)

	Activity Limits				
Nuclide ("X" for X-ray)	Per Shipment (mCi)	Per Experiment (mCi)	Total Lab Storage (mCi)	Chemical compound or x-ray device	Experimental Use

Persons who will perform protocols or experiments on this permit.

Approved Principal Investigator (Print)	Signature	Date
Reviewed by Radiation Safety (Print)	Signature	Date
Authorized by Radiation Use Committee	Signature	Date

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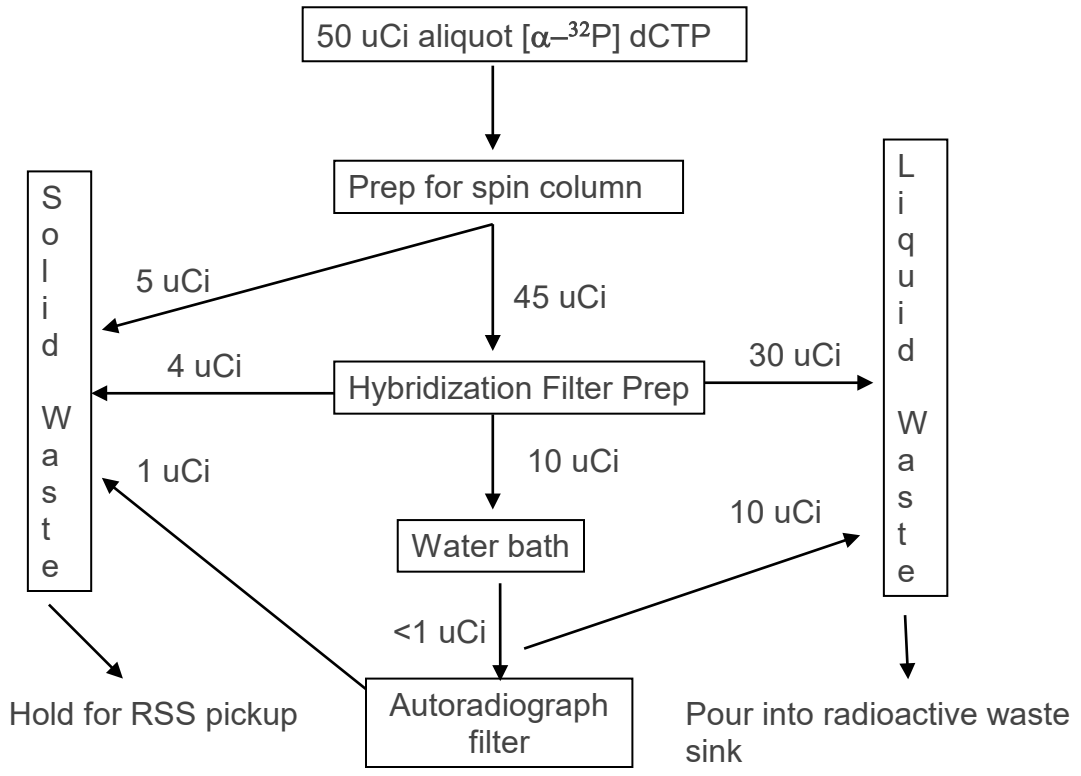
RADIATION PERMIT APPLICATION
PART B

Provide a brief, step-by-step description and a flow chart for each radionuclide and each different experiment or protocol to be approved under this permit.

Example protocol: Random primer labeling DNA probes with [a -32P] dCTP for

Southern hybridization analysis (from video)
- thaw 32P-dCTP for at least 30 minutes. DO NOT let sample vial sit for more than 1hr.
- in 1.5ml microcentrifuge tube, mix reagents (*not stated: reagent volume = 35ul)*
- add 5ul (50uCi) of 32P-dCTP
- add 2ul of 0.2M EDTA, pH 8.0, mix well.
- add 78ul of STE buffer, mix well
- pipette 100ul of probe directly into center of spin column. Spin at 1500rpm for 4min
- count 50ul of probe to determine radioactivity. Boil for 5 min then place on ice
- in plastic bag, add probe to nylon membrane. Seal bag and put in 65°C water bath
- wash blot with mild agitation. Repeat until blot reads 10-15 cps with G-M meter
- pour leftover wash in liquid radioactive waste bottle
- place blot in plastic bag, seal bag, flatten blot, place in cassette
- DO NOT shift blot. Lock cassette cover gently. Record date/time blot placed in freezer
- place used spin column in 50ml screw-top tube. Discard column in dry radioactive waste

Example Flow Chart Using ^{32}P Southern Hybridization Assay



Please note: In this example, only the liquid waste and autoradiograph filter would be able to be measured using a liquid scintillation counter. All solid waste values would need to be estimated by fractions

Therefore, for this example protocol, 80% of the initial sample was disposed of via the sink drain in the lab and 20% of the initial sample (50uCi) sent to disposal as solid waste would need to be estimated based on the fraction of the original aliquot that was disposed of as liquid waste. The fractions for liquid waste and solid waste would need to be entered on the inventory sheet each time a protocol is performed.
End Example.

UNIVERSITY OF MASSACHUSETTS AMHERST
RADIATION PERMIT APPLICATION
PART C

RADIATION USE AREA CHECKLIST

The Principal Investigator is to complete this section. All items must be completed before EH&S forwards this application to the Radiation Use Committee for review. Contact Radiation Safety Services at 413-545-5131 if you need help obtaining radiation safety equipment, marking radiation use areas or have questions.

☐ Part A & Part B, as required, of the *Radiation Permit Application* are complete and attached.

☐ I have personally reminded all persons listed on this permit that when working with radiation, they must use proper personal protective equipment; must not wear open-toes shoes, sandals, flip-flops or other open footwear; must not eat, drink, chew or apply cosmetics in the laboratory.

☐ Calibrated radiation survey meter is in the lab.

☐ Sink marked for disposal of liquid radioactive waste. ☐ No sink disposal

☐ Disposal log or reminder to adjust the inventory record is posted at waste sink. ☐ No sink disposal

☐ All radiation work areas, benches, instruments and devices are posted with warning signs or labels.

☐ Spill trays or absorbent pads are present on wet lab benches or work areas.

☐ Radioisotope storage areas (refrigerator, cabinets, etc) have locks or lock box inside.

☐ Appropriate waste containers (solid, LSC vial, etc) are available.

☐ All users have submitted the *Radiation Training Record* to EH&S and completed classroom training.

☐ There are non-radiation procedures, steps or chemical properties in your experiment that could affect safety? For example, volatile at room temperature, volatile during heating or incubation, cryogenic cooling, aerosols, high vacuum, high pressure, flammable, corrosive, poisonous, oxidizer, explosive, etc.

Facilities or lab equipment to be used with radiation on this permit. Please check all that apply.

☐ Refrigerators/freezers	☐ Biosafety cabinet	☐ Incubator	☐ Cryogenic liquid storage
☐ LSC or gamma counter	☐ Water bath	☐ Fume hood	☐ Hand-held survey meter
☐ Floor centrifuge	☐ Heat block	☐ Vacuum pump	☐ Hot/Cold Room

Other (please describe):

☐ My signature in Part A as Principal Investigator confirms that I have ensured that all laboratory personnel on this permit are familiar with the radiation safety requirements for the protocol(s) approved on this permit or will be trained in laboratory radiation use procedures before they perform any protocols on this permit for the first time. I have instructed or will instruct all laboratory personnel in the hazards associated with the use of radiation and have empowered them to bring any laboratory or personal safety concerns directly to EH&S.