

Brigham and Women's Hospital Department of Neurology
Guide to Radiation Safety procedure

The Commonwealth of Massachusetts regulates the storage and use of radioactive materials. These materials are naturally occurring radioactive materials; source materials such as uranium, thorium and related ores; byproduct materials (radioactive materials that were made in a reactor; accelerator produced radioactive materials; special nuclear materials; irradiators. The Commonwealth also requires registration of radiation generating devices including x-ray machines, particle accelerators, electron microscopes and any other device that can generate an ionizing radiation beam.

The Department of Neurology at the Brigham and Women's Hospital has appointed personnel in effort to centralize resources, financial record keeping, billing and other inquiries. All new and renewed training certificates should be forwarded to Shannon Huey (shuey@rics.bwh.harvard.edu). All invoices to the Permit holders should be forwarded to KyungAh Chung-Benedetti (kchung@rics.bwh.harvard.edu, or 617-525-5737) who will work with each Permit Holder or their representative to ensure proper billing based on the up-to-date listings of lab personnel. Each Permit Holder is however responsible for upkeeping and maintaining his/her own permit, hence advised to have a designated lab personnel who will supervise all radiation related activities. Please see *highlighted responsibilities for Permit Holders* in Page 5. Some of the information provided in this guide was extracted from BWH Radiation Safety Policy and Harvard Radiation Safety Manual.

For those who occupy research space at NRB, HSPH, HIM and other Harvard owned buildings, please see Page 3 for *Harvard Radiation Safety Procedure*. For those who occupy research space at LDDN and the main BWH hospital buildings, please see below for *Radiation Safety Procedure at BWH*.



Radiation Safety Procedure at BWH

BWH Radiation Safety Office at the Department of Health Physics and Radiopharmacology

General BWH Radiation Safety Office: 617) 732-6056

For Landsdowne location contact person: Cliff Lasalle at (617) 768-8248

BWH Radiation Safety Officer: Frank Castronovo, PhD

<http://research.bwh.harvard.edu/radsafe.htm>

All employees who will be working with or around radionuclides are required to have appropriate training and to wear a film badge for monitoring their radiation exposure. Prior to receiving a film badge, EVERYONE must attend the BWH Radiation Safety Orientation, held every 2nd and 4th Thursday of each month. Employees are also required to attend the Basic Radiation Protection Lecture given bimonthly by the Department of Health Physics & Radiopharmacology's Radiation Safety Office unless they can provide written documentation of having taken a similar course.

Who should obtain permits issued by BWH? Any research and/or clinical laboratories located in BWH owned properties that utilize radioactive materials and/or devices.

How can I obtain the Radiation Permit through BWH? The forms can be downloaded from http://research.bwh.harvard.edu/radsafe_forms.htm, contact KyungAh or Josephine Austrie at 617-732-6056 for a complete application package.

Where can I attend the orientation/training? Orientations are held every 2nd and 4th Thursday of each month, between 2:30pm – 4:30pm, at 1620 Tremont Street, the Ledge Room BC4-002E.

How often do I need to attend orientation? Every two years.

Where can I receive a film badge? After attending the orientation and lecture, you will receive a certificate. New employees should bring to orientation a completed "Film Badge Manual", signed by the Permit holder and a "Training and Experience Form". No film badge will be issued until the employee completes this training and turns in a badge application.

How often do I receive new badges? BHW issues new badges every month as long as you are active in the program. Old badges should be collected by the designated lab personnel and sent back to BWH Radiation Safety Office.

How can I purchase radioactive materials? Effective May 2005, purchasing of radioactive materials is being done through the Partners eBuy system. Laboratories will need pre-authorization of radionuclides and ordering limits before using the eBuy system. Users located in HIM and NRB are now responsible for placing their own orders via Partners Purchasing and Harvard Radiation Protection Office website:

What does it cost me to obtain a BWH Permit? There is no annual Permit fee required by BWH. However every Permit holder will be charged for badge fees and waste disposal:

Badge fee: assessed twice a year

- \$60 per employee for every six months.
- \$25 per person for employees badged less than 6 weeks.

Waste Removal: even if the Permit holder uses a separate vendor for radioactive waste removal, the service costs will remain the same. Radioactive wastes with greater half lives over 120 days will be handled by a commercial company and these charges will be billed directly to the Permit holder. Storage of low-level radioactive waste WILL NOT be allowed within research laboratories.

- 5 gallons at \$50
- 15 gallons at \$100

What do I do if there is an emergency involving radiation or radioactivity? Contact the Radiation Safety Office 2-6056 immediately. If there is no answer, contact Frank Castronovo, Ph.D, Radiation Safety Officer at 617-732-6057 beeper #11084 or Health Physics Specialist on call: beeper #33330.

All spills of radioactive material must be cleaned up promptly. The responsibility for cleaning and/or for calling for more experienced help depends on the area and the radionuclide involved. The Radiation Safety Office should be notified immediately of all accidents involving possible body contamination or ingestion of radioactivity by personnel, overexposure to radiation, non-removable contamination of equipment, difficulty in cleaning up a contaminated area, or spread to an unrestricted area.

The Radiation Safety Office must be notified immediately in the event of loss of radioactive material. The cleanup techniques should be planned with the same care as is used in quantitative chemical analyses or in handling of virulent microorganisms.

How do I dispose radiation waste? There are strict requirements placed on each waste generator by federal, state and local authorities regarding radioactive waste form, packaging and the design and operation of waste storage facilities. The programs and procedures with regard to radioactive waste management have been established to ensure that radioactive wastes generated at BWH are stored and disposed of in compliance with all federal, state and local regulations. Contact the appropriate location shown below and follow the disposal procedure:

DISPOSAL FOR	LOCATION/PHONE	DAY/TIME
Amorv Thorn MRR and PRR	(Rad waste room) - ground floor	Wednesdays

Bldgs	near loading dock/ 3-2250	10:00 am - 11:00 am
Richardson Fuller Bldg, BLI, EBRC, and MCP Wing	Ground floor, BLI/ 8-0601	Mondays 1:00 pm - 2:00 pm
Landsdowne Facility	Ground floor	By Appointment Contact cliff at 617-768-8248

Disposal Procedures

- * Deface all "radioactive" signs.
- * No sharps (use red biohazard boxes)
- * One radionuclide per box
- * Complete the radiation waste tag including P.O.#.
- * Note if mixed waste (biohazard and radioactive)
- * Frozen animals - call 8-0601 to confirm
- * Liquids - water soluble - fill container with absorbent; organic solvent - no absorbent.
- * No lead.



Radiation Safety Procedure at Harvard University

Radiation Protection Office at the Department of Environmental Health and Safety

Harvard Radiation Protection Officer: Joseph Ring, PhD

Dosimetry Coordinator: Ari Wertheimer

<http://www.uos.harvard.edu/ehs/rad.shtml>

Tel: 617) 495-2060

The Permit issued by Harvard Radiation Protection Office authorizes a faculty member (Authorized User) to use specific radioactive material, radiation generating devices or lasers in his or her laboratory under the University's Radioactive Materials License issued by the Massachusetts Department of Public Health's Radiation Control Program. Under the License, the University can purchase, process and use radioactive materials under a prescriptive set of conditions. To ensure compliance, the License establishes a Radiation Safety Committee (RSC) to oversee the University's radiation safety program. The RSC is the University Standing Committee responsible for radiation safety and is governed by the License and its Charter.

Who should obtain permits issued by Harvard University? Any research laboratories located in Harvard owned properties that utilize radioactive materials are required to obtain a permit. Such buildings include but not limited to the New Research Building (NRB), and Harvard Institutes of Medicine building (HIM).

How can I apply for a Permit? Download the permit application and follow the process outlined in *Obtaining a Permit*. When the RPO receives the application, a health physicist will meet with the faculty member to review the application, discuss radiation safety aspects of the experiments and assist in the set up of radiation use laboratories. The Radiation Protection Officer will make a recommendation to the RSC, and the RSC reviews and approves or denies individual applications by voting by either a mail ballot or the next regularly scheduled meeting.

How long is the Permit valid? Approved applications are valid for two years.

What does it cost me to obtain and maintain a Harvard Permit? As of 7/1/2006, the following rates have been established for Radiation Protection service provided:

- Annual Permit Fee - \$1,227 (Assessed once per year for a Harvard issued Permit to use radioactive materials)

- Dosimetry fee - \$49 (Assessed once per year per person for dosimetry and registration services for anyone who registered in the program more than 31 days, including volunteers and graduate students)
- Survey fee - \$37.25 per space (For laboratory monitoring, assessment and support services, assessed typically once a month per survey per space)
- Operational Assessment - \$44 (Assessed once a year per person for operational services for anyone in the program more than 31 days)
- Purchasing fee - \$76 (Assessed once per year per person for services related to purchasing radioactive materials for anyone in the program for more than 31 days)
- Waste Removal
 - a. \$514 for short half life less than 180 days
 - b. \$583 for biological short half life
 - c. \$1,068 for deregulated liquid scintillation fluid
 - d. \$1,823 for radioactive liquid scintillation fluid
 - e. \$1,955 for commercial disposal

For special waste disposal, contact RSO for current rate

What is Radiation Dosimetry? It is a device worn by a person or placed in an area to measure external radiation exposure. All radioactive material users and other who occupy radioactive material use areas **MUST** wear radiation dosimetry. If you work with more than 1 mCi of any high-energy beta, x- or gamma emitter, or x-ray diffraction unit, you must wear a TLD finger ring. The monitored results are available from the Permit Holder and the RPO.

How often do I receive radiation dosimetry badges? Harvard issues new ones every two months as long as you are active in the program. When you receive a new one, the old one should be sent back to Harvard RPO. The designated lab personnel who receive new badges on behalf of the entire lab members should be responsible for collecting old badges and send them back in the provided return envelop addressed to Ari Wertheimer.

How often do I need to obtain training? Once an application is approved, everyone who is going to use radiation needs to take the Radiation Safety Seminar regardless of prior experience. For those who obtained formal radiation safety training, a refresher seminar is required every two years. Users can take on-line training or attend regularly provided lectures.

Where can I find the training schedule? Please visit

http://www.uos.harvard.edu/ehsapps/training/training_radiation.jsp#RADSAP for scheduled seminars.

Where can I obtain the application forms? For new permits, the forms can be downloaded from http://www.uos.harvard.edu/ehs/radsafety/aut_for.shtml or use Appendix I and/or Appendix II attached below. For an amendment, submit the completed application form containing only the desired changes.

Application Procedure

Submit a completed Application for Authorization to Use Radioactive Material. The application includes the following information:

1. The applicant's name, academic degree, department, faculty title, office building and room number, and phone number. Also include the name of the alternate permit holder who will be responsible for the laboratory in your absence and the person to send general correspondence (the contact person).
2. A list of all rooms where Radiation Training will be used or stored. Specify Radiation Training work areas and waste storage locations.
3. A list of each isotope for which possession authorization is requested with the following information:
 - a. isotop half-life,
 - b. maximum activity to be possessed,

- c. chemical form or class of compound, and
- d. physical form (e.g. liquid, gas, powder, sealed source).
- e. For each experimental procedure that is performed provide:
 - i. a descriptive summary, such as a published paper with the procedure highlighted,
 - ii. approximate frequency,
 - iii. approximate amount of isotope activity per procedure, and
 - iv. list any chemical or biological hazard, including reference to a material safety data sheet(s) (MSDS), or the MSDS itself.
 - v. If the procedure involves the use of animals, include a copy of the protocol submitted to the Animal Care and Use Committee.
4. The formal training of the applicant including training location and duration.
5. Laboratory training and experience using the requested radioisotope(s).
6. Names of all those who will be working with Radiation Training, their training in radioactive material use and laboratory experience.
7. List the detection equipment such as liquid scintillation counters, gamma counter, and survey meter, to be used. Include the manufacturer and model of each, as well as the probe type [Geiger-Mueller (GM) or sodium iodide].
8. A description of the radiation safety hazards that these procedures may produce and the methods used to minimize those hazards. For example:
 - a. radiation shielding,
 - b. radiation surveys,
 - c. storage location and methods for radioactive material security,
 - d. personnel dosimetry
 - e. control technologies such as self-contained work boxes for iodinations.
9. List the form and type of waste expected from the procedures, and the method of disposal and what will be done to minimize the volume of radioactive waste.

For more detailed guideline, please visit http://www.uos.harvard.edu/ehs/radsafety/aut_obt.shtml.

What am I responsible for? Some of the *highlighted responsibilities for the Permit holder* include:

- Maintaining an up-to-date listing with the RPO of radiation generating devices, rooms where such materials or devices are used or stored, and names of personnel who may use these devices and materials. Provide the updated personnel list to KyungAh so that she can update the information with the RPO.
- Ensuring that lab staff members follow the policies and procedure
- Contacting the RPO before: starting a new procedure that varies from the authorized protocols; renovating, altering, repairing or vacating any laboratory space; changing or leaving laboratory locations; repair, transfer or disposal of any radioactive-use equipment(s); students under 18 are involved in experiments using radioactive materials or radiation generating devices.
- Allowing only personnel who are registered with and trained by the RPO to use such materials or devices
- Ensuring that dosimetry is used and dosimeters are returned on time
- Minimizing radiation exposures to the registered user, environment and general public
- Minimizing and properly packaging radioactive wastes

For more detailed Radiation Safety Manual, please contact KyungAh Chung-Benedetti at kchung@rics.bwh.harvard.edu or visit <http://www.uos.harvard.edu/ehs/rad.shtml> for a copy of the complete Harvard University Radiation Safety Manual.

Can I order radioactive materials directly from vendors? No. No radioactive materials orders can be placed without authorization from the RPO. In addition, effective July 5th, 2005, radioactive materials orders placed with PerkinElmer (formerly NEN), GE Health Care (formerly Amersham) and MP Biomedicals (formerly ICN) will no

longer offer the self-order option. This does not directly impact many users since the majority of orders are placed by the RPO already. No one is allowed to order over the limit specified in each Permit without amending the Permit. Users located in HIM and NRB are now responsible for placing their own orders via eBuy, Partners Materials Management and Harvard RPO website. Please follow the ordering instruction below:


- When ordering radioactive supplies via eBuy, please put the category in as Radio. Choose Joann Canole as a buyer. It will then flow properly to Radio Safety for approval and then reach Joann. If the wrong category is entered it goes to Joann first and then she has to fax it to the safety dept. and wait for it to be returned. It will delay your order.
- Put full description of the Isotope & volume of the Isotope.
- Make sure permit number and licensee name is on the requisition when sent to Purchasing. **End users on Harvard's site in addition to putting permit holders name and number must FAX a copy of their permit to Purchasing referencing the on-line req number each time an order is submitted.**
- End users on Children's Hospital site in addition to putting permit holders name and number must forward the email approval from the RSO at Children's and reference the on line req. number in the subject field.
- Put catalog number for Isotope.
- If placing order early for a specific later date, put that in your Header comments.
- If ordering from Perkinelmer use vendor # 8.
- If ordering from Amersham use vendor # 6
- If ordering from Amersham Healthcare # 14074
- Always put your information in the Edit Defaults field before entering it again in any other area on the requisition.
- When confirmation is returned and may show an Item number, besides the catalog number, that will be your People soft number to use going forward when placing another order for that item. Please use them!
- If these instructions are not followed your order cannot be placed.
- Once a purchase order number is issued, you need to place your order directly through Harvard Radiation Safety website. Partners purchasing department will only issue POs for end users located at HIM and NRB. The Harvard Radioactive purchasing website is http://www.uos.harvard.edu/ehs/radsafety/pur_web.shtml. You will need a PO number in order to place your orders through Harvard website.

Partners Purchasing buyer for radioactive supplies: Joann Canole (617-724-8889, jcanole@partners.org)
Harvard Radiation Purchasing contact: Ari Wertheimer (617-495-0841, ari_Wertheimer@harvard.edu)

I am adding/expanding/repairing/vacating/renovating space from my research laboratory. Do I need to notify the RPO? Yes, you need to contact the RPD before such activities occur.

How can I terminate my permit? A written notice should be submitted to RPO 30 days prior to the desired termination date. The Permit Holder must ensure the proper transfer of materials, devices and records and the completion of appropriate bioassays and laboratory termination surveys before terminating the permit.

APPENDIX I

<input type="checkbox"/> New <input type="checkbox"/> Amendment <input type="checkbox"/> Renewal <input type="checkbox"/> Transfer		Harvard University Application for a Permit to use Radioactive Materials Return to: Harvard University Radiation Protection Office 175 North Harvard Street, Boston, MA 02135 Facsimile: (617) 496-5509							
Authorized User: (Last) (First) (M.I.) (Permit Holder)			Degree(s):						
Appointment:			School:			Dept:			
Office Address: (Bldg.) (Room) (Street Address) (City)			Telephone:						
E-mail address:						Facsimile:			
Alternate Permit Holder: (Last) (First) (M.I.)			Alternate's Telephone:						
Alternate's e-mail address:						Alternate's Facsimile:			
Preferred Contact: (Last) (First) (M.I.)			Contact's Telephone:						
Contact's Title (Laboratory Safety Officer, Admin, etc.):									
Contact's e-mail address:						Contact's Facsimile:			
SECTION 1: LABORATORY SPACES									
SECTION 1	Building(s):					Laboratory Room Numbers:			
SECTION 2: RADIOISOTOPE USAGE INFORMATION									
SECTION 2	Isotope	Half-Life	Estimated Maximum Activity per Procedure	Maximum Qty Purchased at any one time (in mCi)	Maximum Activity for Possession at any one time (in mCi)	Chemical Form or Class of Compound	Procedure(s) in which the Isotope will be used	Estimated Frequency of Procedure (per month)	
SECTION 3: X-RAY PRODUCING EQUIPMENT									

SEC 3	Manufacturer	Model No.	Serial No.	Operating Parameters (KVp/Ma)	Type of Use (Analytical/Medical)

SECTION 4: RADIOACTIVE SOURCES (Including Generally Licensed Material Sources but not liquid stock bottle)

SECTION 4	Manufacturer	Serial Number	Isotope	Half-Life	Activity (in mCi)	Unit Type

SECTION 5: RADIATION DETECTION INSTRUMENTATION AVAILABLE TO THE LABORATORY

SECTION 5	<i>Liquid Scintillation Counters</i>			<i>Gamma Counters</i>			<i>Survey Meters</i>		
	Manufacturer	Model Number	Quantity	Manufacturer	Model Number	Manufacturer	Model Number	Probe Type	Quantity

SECTION 6: AUTHORIZED USER'S FORMAL TRAINING

SECTION 6	Coursework or Seminars	Training Location(s)	Duration (hours)	Date(s)
	<i>Principles of Radiation Protection</i>			
	<i>Radioactivity Measurements and Detection</i>			
	<i>Mathematics for the Use and Measurement of Radioactivity</i>			
	<i>Radiation Biology</i>			
	<i>Other:</i>			

SECTION 7: AUTHORIZED USER LABORATORY EXPERIENCE WITH RADIOISOTOPES / X-RAYS

SECTION 7	Isotope	Maximum Amt. Used	Procedure in which Isotope(s) used	Name of Institution	Duration of Experience (mos/ yrs)	Date(s), beginning with most recent

SECTION 8: LABORATORY WORKERS USING RADIOACTIVE MATERIALS / X-RAY EQUIPMENT

SECTION 8	NAME: (Last, First, Middle Initial)	Degree(s)	Harvard EH&S RAM Training Complete? (Y/N)	Other Formal RAM Training (in hours)	Laboratory RAM experience (in hours)

SECTION 9: SPECIAL RADIATION CONCERNS / ADDITIONAL INFORMATION (if appropriate)

Will radioactive material be used with animals? Yes No
If yes, please include the Protocol Number from the Standing Committee on Animals _____

Will radioactive material be used with any biohazardous materials? Yes No
If yes, please include the organism name _____ and COMMS Registration Number: _____

Will radioactive material be mixed with any hazardous chemicals? Yes No
If yes, please include the name of the chemical _____



SECTION 10: CERTIFICATION AND SIGNATURE

I have received, read, understand, and agree to follow the requirements of the Harvard University Radiation Safety Manual.

Signature of the Applicant

Date

APPENDIX II

<input type="checkbox"/> New <input type="checkbox"/> Amendment <input type="checkbox"/> Renewal <input type="checkbox"/> Transfer Received:	Harvard University Application for a Permit to use Non-Ionizing Radiation Devices 
 <u>Return to:</u> Harvard University Radiation Protection Office 175 North Harvard Street, Boston, MA 02134 Facsimile: (617) 496-5509	
Authorized User: (Last) (First) (M.I.) (Permit Holder)	Degree(s):
Appointment:	School: Dept:
Office Address: (Bldg.) (Room) (Street Address) (City)	Telephone:
e-mail address:	Facsimile:
Laser / NIR Safety Contact: (Last) (First) (M.I.)	Contact's Telephone:
Contact's Title (Lab Safety Officer, Admin, etc):	
Contact's e-mail address:	Contact's Facsimile:

SECTION 1: LASER SYSTEM EQUIPMENT

Manufacturer	Model No.	Serial No.	Building / Room #	Laser Media (e.g. Nd:YAG)	Laser Class
1.					
2.					
3.					
4.					
5.					
6.					
7.					

SECTION 2: LASER OPERATING PARAMETERS

Mode (CW/Pulsed/Q-Switch)	CW Power Output (W)	Energy Output (J) Per Pulse	Pulse Length (s)	Pulse Repetition Rate (Hz)	Wavelength (nm)	Beam Diameter (mm)	Beam Divergence
1.							
2.							
3.							
4.							
5.							
6.							
7.							

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SECTION 7: DESCRIBE INTENDED USE AND SPECIAL CONCERNS FOR NON-IONIZING RADIATION DEVICE (S)

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SECTION 8: CERTIFICATION AND SIGNATURE

I have received, read, understand, and agree to follow the requirements of the Harvard University Radiation Safety Manual.

Signature of Applicant

Date