Instructions for Obtaining Authorization to Use Radioactive Material.

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The use of radioactive material at all University locations, other than the Hershey Medical Center, requires approval of the University Isotopes Committee. University faculty and staff members must request such approval by completing a Request for Authorization to Use Radioactive Material form. The form, in Rich Text Format (RTF), should be downloaded from the EHS website (http://www.ehs.psu.edu) for completion on your computer. Please contact Environmental Health and Safety or Office of Research Protections staff for assistance. It will usually save time if the applicant discusses the request with EHS staff prior to initial application. Once the application is complete, it should be submitted electronically to the Office of Research Protections via the Principal Investigator's Access Account. Please e-mail the file, in an attachment in rich text format (RTF), to ORProtections@psu.edu. If the application cannot be transmitted electronically then mail it to:

The Office of Research Protections
212 Kern Building
University Park, PA 16802

ORP will review the request and distribute copies to the University Isotopes Committee members.

The University is licensed by the Nuclear Regulatory Commission to possess and use byproduct material (radioactive material produced in a nuclear reactor), source material (U and Th) and special nuclear material (Pu, 233U, and material enriched in 235U) and by the State of Pennsylvania to possess and use naturally occurring and accelerator-produced radioactive material. Persons using radioactive material are responsible for compliance with the license conditions, federal and state regulations pertaining to radioactive material, and the Rules and Procedures for the Use of Radioactive Material at The Pennsylvania State University. The latter document is available on-line, and a printed copy of the University "Rules and Procedures" will be provided for each laboratory supervisor for use by the persons in his/her laboratory. It is the authorized user's responsibility to insure that all individuals using radioactive material under his/her authorization are properly trained and aware of the regulations. See Penn State Policy SY-14 Use of Radioactive Materials.

The following suggestions and examples are provided to assist in completing the Request for Authorization to Use Radioactive Material. If the applicant supplies sufficient information and the applicant meets all the requirements, the application could be approved in as few as thirty days.

Header Leave the license number, authorization number, and the expiration date blank for completion by ORP or EHS.

Items 1-3 Enter the faculty or staff member information for the person who is in charge of the laboratory. See SY-01 for details.

Item 4 Type of Application: Check the type(s) of application being submitted. Check all lines that apply. Renewals of and amendments to existing authorizations should reference the current authorization number.

Item 5 Radionuclides and Activity: List each radionuclide to be included and the maximum activity (in mCi) expected to be in inventory at one time (not the maximum activity per shipment). It is important to
note whether the material will be solid, liquid, gas, finely divided powder, sealed source, or in a
chemical form that is very volatile or very reactive. In general, all radionuclides that will be used in
your research should be included on a single application.

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Possession Limit (mCi)</th>
<th>Typical Activity per Order (mCi)</th>
<th>Physical Form</th>
<th>Generic Chemical Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-3</td>
<td>5 mCi</td>
<td>0.25 mCi</td>
<td>L</td>
<td>thymidine</td>
</tr>
<tr>
<td>C-14</td>
<td>1 mCi</td>
<td>0.25 mCi</td>
<td>S</td>
<td>amino acid</td>
</tr>
<tr>
<td>P-32</td>
<td>5 mCi</td>
<td>0.25 mCi</td>
<td>L</td>
<td>nucleotides</td>
</tr>
</tbody>
</table>

**Example**

**Item 6**  
**Location:** List all the locations where the radioisotopes will be used, including rooms primarily assigned to others, and describe the nature of the use (cold room, counting room, darkroom, etc.) and the types of facilities involved (fume hoods, sinks, incubators).

<table>
<thead>
<tr>
<th>Room</th>
<th>Building</th>
<th>Intended Use</th>
<th>Other supervisors who use this room for radioactive or non-radioactive work</th>
</tr>
</thead>
<tbody>
<tr>
<td>732</td>
<td>Althouse</td>
<td>general research laboratory</td>
<td>Dr. Nittany</td>
</tr>
<tr>
<td>638</td>
<td>South Frear</td>
<td>dark room</td>
<td>Dr. Lion</td>
</tr>
</tbody>
</table>

**Item 7**  
**Personnel:** Enter the name of each person permitted to use and accept deliveries of radioactive material. Indicate the University status of each individual, as well as an email address. All persons listed must have completed the radioisotope safety training provided by EHS. Notify EHS when names should be added or removed from the list.

**Item 8**  
**Proposed Use(s):** Briefly describe the overarching goals of your research in two or three sentences. Use language suitable for a lay audience.

**Example:** I propose to cure cancer and find a limitless supply of energy.

**Item 9**  
**Procedures:** This section should list the safety precautions for the proposed use(s) and explain the experimental procedures to be used. Protocols should specifically incorporate elements relating to radiation safety, e.g., the amount of activity to be used, handling and transfer techniques, disposition of radioactive solutions/materials to waste, expected releases, contamination control, and performance of required radiation and contamination surveys. If you will be using a standard published procedure, include a copy with the application. Do not submit journal articles as procedures. For atypical research projects, more detail will be required. This is especially true if the research project involves large quantities of radioactive material.

**Example #1**  
(for radioiodination)

Persons performing iodinations will have a "cold run" and the initial "hot run" monitored and reviewed by the EHS staff. A shielded container is used for storage of the stock solution. Stock solution and reaction vessel will be septum stoppered with all transfers via syringe. Stock solution syringe will be kept in hood in closed container with activated carbon absorber. Iodinations will be done in the activated-carbon-filtered hood in 307 Henning. A smear survey will be performed after each use of the room. All liquid waste and purification columns will be solidified after the iodination. Gloves, lab coats, bench covers, and smear/wipe tests will be used for contamination control in the laboratory. Thyroid bioassay by EHS will be performed within 7 days of each iodination. See the details inserted below.
Example #2  
(for H-3 and C-14 experiments)

Typical stock materials will have an activity of about 1 mCi for $^3$H and 0.25 mCi for $^{14}$C. Individual experiments will utilize 0.01-0.05 mCi. All materials are relatively non-volatile. Gloves, lab coats, bench covers, and smear/wipe tests will be used for contamination control. The protocols are inserted below.

Example #3  
(for P-32 experiments)

Individual experiments will utilize 0.025-0.050 mCi from a stock vial of 0.25 mCi. Storage of stock materials will be in a locked freezer in an appropriately shielded container. Reactions will be performed behind 3/4” plastic shields, especially during removal of material from stock vials and removal of unincorporated material after labeling. All materials are relatively non-volatile. Gloves, lab coats, bench covers, and smear/wipe tests will be used for contamination control. See inserted protocols for experimental details. For protocols that will involve using more than 5 mCi of P-32 at one time, special training requirements apply. Contact EHS for assistance.

Do not submit journal articles as procedures

Item 10  
Radiation Detection Equipment: List the equipment that is available to detect radiation and radioactive contamination.

<table>
<thead>
<tr>
<th>Type of Detection Equipment and Location</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Type of Probe</th>
<th>Range of Detector</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMSM (Geiger-Mueller)</td>
<td>Ludlum</td>
<td>Model 3</td>
<td>44-9</td>
<td>0 - 50,000 cpm</td>
</tr>
<tr>
<td>Liquid Scintillation Counter</td>
<td>Beckman</td>
<td>LSC-200</td>
<td>----</td>
<td>not applicable</td>
</tr>
</tbody>
</table>

Item 11  
Waste Disposal

Item 11.1  
Chemicals in Radioactive Waste

Since the presence of certain hazardous chemicals in radioactive waste can present major disposal problems, greatly increasing disposal costs or preventing disposal entirely under current hazardous materials regulations, chemicals used in experimental protocols are examined so proper disposal procedures can be implemented before 'problem' waste is generated. Specific examples of hazardous chemicals are listed in the application. Even for routine radioactive waste, the disposal procedures that must be followed to satisfy federal, state, and local regulations require a complete and accurate description of the chemical contents of liquid waste containers transferred to EHS. Radioisotope users are required to supply this information as part of the waste collection procedure.

List the full name of the chemicals, not just the chemical symbol or an abbreviation. For defined biological media from commercial sources, a copy of the medium formulation provided by the supplier is acceptable.

Examples

5-nitro-2(3-phenylpropylamino)-benzoic acid, not NPPB
phospholipase A$_2$, not PLA$_2$
l-thyroxine, not T$_4$
octylphenoxypolyethoxyethanol, not Triton X-100
tris(hydroxymethyl)amino methane, not Tris, THAM, Trizma, etc.

Item 11.2 All University research and instructional activities involving biohazardous materials must be reviewed and approved by the University Biosafety Committee (UBC) prior to the use of any such reagent. See PSU’s Safety Policy SY24 - Use of Biohazardous Materials in Research and Instruction.

Item 11.3 If animals will be used, a completed IACUC Proposal Application must be submitted for separate review by the Institutional Animal Care and Use Committee (IACUC).

Item 11.4 If specific requirements of your research require the use of flammable liquid scintillation fluids you must explain the reasons for this request.

Item 12 Indicate the types of additional training in the use of radioactive materials that will be provided for personnel working under this authorization.

Item 13 Indicate the type of security precautions that will be employed to prevent the unauthorized removal of radioactive material covered by this authorization.

Item 14 Any exemptions granted by the University Isotopes Committee will be noted.

Item 15 Any restrictions imposed by the University Isotopes Committee or EHS will be noted.

Item 16 Read the applicant responsibility statement. Sign and date.

Item 17 To be completed by EHS after review.

Item 18 To be completed by the Chairperson after approval by the University Isotopes Committee.

A copy of the approved authorization will be returned to the applicant to notify him or her that the request has been approved. The UIC may make changes in the application or apply special restrictions. A copy of the approved authorization is also sent to the Breazeale Nuclear Reactor, if the reactor facilities will be used.

Requirements for Radioiodination Authorizations

The following items are standard requirements for all authorizations issued by the University Isotopes Committee to perform radioiodinations.

1. A written procedure for the iodination must be reviewed and approved by EHS. Changes in the procedure are also to be submitted to EHS for review.
2. Persons performing radioiodinations must be listed on the authorization and must have completed specific radioiodination training by EHS. Such training is to include:
   a. Observation of others performing an iodination or experience performing iodinations prior to coming to Penn State.
   b. A demonstration of the iodination procedure without radioactive iodine observed by a member of EHS. Changes in the procedure may be required based on the results of this demonstration.
c. A demonstration of the iodination procedure using radioactive iodine observed by a member of EHS. Changes in the procedure may be required based on the results of this demonstration.

3. Within 7 days of each iodination the person(s) performing the iodination are required to have a bioassay for radioiodine performed by EHS. This normally requires a 10-minute count of the photon emissions from the thyroid using a NaI scintillation counter. If several iodinations are performed within a period of a few days, only one bioassay is required, as long as long as the time between the bioassay and any of the iodinations does not exceed 7 days.

4. Stock vials of radioiodine (NaI) and reaction vials are to be kept sealed at all times. Transfers of solutions are to be made through septum’s using syringes and needles. This is to prevent the loss of volatile radioiodine from the air space in these containers which occurs when the caps are removed, even momentarily.

5. All reactions, including the initial purifications, are to be conducted in one of the hoods approved for radioiodinations. These hoods equipped with activated carbon filters are located in rooms 307 Henning and S38A Henderson.

6. After each iodination, the hood and work area are to be thoroughly surveyed including the use of smears to detect any transferable surface contamination, high radiation levels, or any contamination of skin or clothing. If any unusual contamination levels are found or there is any suspicion that there might have been some release of radioiodine during the iodination or purification, it should be reported immediately to EHS.

7. A survey meter is to be available at all times during the iodination and use of the labeled radioiodine compounds. Because of the low sensitivity of Geiger-Mueller detectors, it is required that a sodium iodide scintillation probe designed for the detection of $^{125}\text{I}$ be used to check for contamination of the work area and the hands, clothing, and shoes of the persons using $^{125}\text{I}$.

Exceptions to these conditions require approval by the University Isotopes Committee and will be made part of the authorization. A model iodination procedure prepared by EHS that specifically incorporates these requirements may be downloaded from our web site and modified by investigators to accommodate a variety of radioiodination protocols.