# Request for Authorization to Use Radioactive Material

University Isotopes Committee, Penn State University

Complete the items in the form below using as much space as required for each entry. Submit this form electronically to The Office for Research Protections at [ORP-Isotope@psu.edu](mailto:ORP-Isotope@psu.edu). The form should be submitted in Microsoft Word document format or in Rich Text Format (rtf) as an attachment from the Principal Investigator’s Penn State Email account. If you have trouble submitting this form electronically, please contact ORP at 814-865-1775.

1. **Applicant Information.**

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| --- | --- | --- | --- |
| Last Name\* |  | First Name |  |
| College |  | Department |  |
| Office (Room & Bldg) |  | Email (Penn State) |  |
| Campus Mail |  | | |
| Office phone |  | Laboratory phone |  |
| Home phone (required) |  | Cell phone (Emergency) |  |
| Budget/Fund number for annual radiation license fee | |  | |
| Contact person for budget information | |  | |
| Email |  | Office phone (required) |  |

\*If this is your first request at Penn State, you must also complete Section 17: Required Training and Experience Information for First Time Applicants

1. **Type of application.** Please check all that apply.

New research  Renewal of current authorization #

New or renewal, classroom only  Amendment to current authorization #

New or renewal, sealed source(s) or device(s)  New user or new radioactive material

1. **Radionuclides and activity**. List all of the radionuclide(s) and the activity for each isotope to be covered in this authorization. All radionuclides that will be used in your research on this application should be included unless they are exempted sources. The generic chemical form should be used.

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| --- | --- | --- | --- | --- |
| **Radionuclide** | **Typical activity per order (mCi)1** | **Possession Limit (mCi)2** | **Physical form3** | **Generic chemical form4** |
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1 Normal activity per order - The activity that you expect to order for use in the laboratory.

2 Possession limit - The maximum activity permitted in your laboratories at any one time, NOT including the activity in the waste containers. This should probably be no more than 5 times the amount you expect to purchase at any one time.

3 Physical form - Solid (S), liquid (L), gas (G), sealed source (SS), or plasma (P)

4 Chemical form - Nucleotide, methionine, acetate, activated metal, encapuslated, etc.

1. **Location**. List all rooms in which radioactive material will be used.

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| --- | --- | --- | --- |
| **Room** | **Building** | **Intended use (Lab bench, dark room, counting room)** | **Other supervisors who use this room for radioactive or non-radioactive work.** |
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1. **Personnel**. List all persons, and their email addresses, who are permitted to receive and use radioactive material under this authorization. All persons listed must have completed radioactive material safety training at PSU prior to working with radioactive material. When someone new joins your laboratory and will be working with radioactive material, make sure the required safety training is completed prior to working with radioactive material.

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| **Last Name** | **First Name,  Middle Initial** | **University Status  (Faculty, staff, post-doc, etc.)** | **Penn State Email (xyz123@psu.edu)** | **Last EHS Training Date** |
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1. **Proposed use(s).** Briefly describe the overarching goals of your research for each radionuclide requested in this authorization in two or three sentences. Use language that can be easily understood by reviewers who are not in your research field.
2. **Procedures**. Describe the experimental procedures for the use of **each** radionuclide requested in this authorization. For each radionuclide, the procedures should include sufficient details including personal protective equipment (PPE), precautions to prevent contamination and radiation exposure of personnel, specific amount of radioactive material and other reagents used, experimental steps that users should follow, waste type, amount and composition. If airborne radioactive material can be produced (Powder, vapor, gas, or aerosol), describe the procedures and facilities that will be used to control the airborne material. Radioactive material users in your lab must follow these standard operation procedures to ensure materials are used safety and in compliance. Each user is required to routinely survey his/her work area for contamination before and after each use of radioactive material.

Precautions to prevent contamination and personal exposures, including work station setup, PPE, shielding, etc.

Procedures for radioisotope #1

Step 1.

Step2.

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Waste type, amount and composition

1. **Radiation detection equipment**. All radioactive laboratories, except those using tritium only, are required to have proper portable survey meter(s) available any time radioactive material is used. Therefore shared portable survey instruments are generally not acceptable. Each laboratory must have all probes appropriate to work being done. Users of I-125 must have a NaI probe, and all other isotope users must have a pancake GM probe available. Laboratories using tritium must have a liquid scintillation counter (LSC) available, but not necessarily located in that lab. LSC and auto-gamma counter rooms must be listed in Section 4 above as a room where radioactive material will be used. List the equipment that is available to detect radiation and radioactive contamination. Include the location, manufacturer, model, serial number and probe type (NaI, GM, Alpha, or neutron ball) for all instruments.

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| --- | --- | --- | --- | --- | --- |
| **Type of survey equipment** | **Location** | **Manufacturer** | **Model** | **Serial Number** | **Probe Type** |
| LSC |  |  |  |  | N/A |
| Auto-gamma |  |  |  |  | N/A |
| Portable survey meter 1 |  |  |  |  |  |
| Portable survey meter 2 |  |  |  |  |  |
| Portable survey meter 3 |  |  |  |  |  |

1. **Training.** Personnel, listed in Section 5 above, who will be using radioactive materials in your laboratory must have been trained by EHS, and have passed the exam. All radioactive users will also have to complete a refresher safety training provided by EHS annually. In addition, specific safety training must be provided by you or your delegated senior radioactive material user. Please check all that apply to your application.

New personnel will be trained by me or by one of my senior trained personnel in the safe handling of radioactive material, in the use of survey meters, how to perform wipe or smear tests, how to maintain inventory records, how to prepare radioactive waste for pickup, and how to maintain proper security of radioactive materials.

Personnel performing radio-iodination will be trained by me and then will arrange for specific laboratory training by EHS. This EHS training will include non-radioactive and radioactive experiments.

Personnel using more than 5 mCi of 32P at one time will be trained by me and then will arrange for specific hands-on laboratory training by EHS. This EHS training will include non-radioactive and radioactive experiments.

My laboratory requires a vehicle to transfer radioactive material between research locations; prior to anyone performing such transfers, I will arrange to have EHS train my personnel and myself.

Radioactive material is used as part of an approved class: . The radionuclide safety training of the students for this class is described below.

Long-term radioactive-animal caretakers will need to be trained by EHS.

Additional training specific to this authorization includes: .

1. **Dosimetry.** The need for monitoring the amount of radiation to which users of radioactive material are exposed is based upon federal and state regulations and University Isotopes Committee policy. EHS will issue whole body or finger dosimeters to radioactive material users with potential exposures exceeding 10% of the applicable annual exposure limits. For evaluation purpose, dosimeters might be issued to users of all radioactive materials but H-3, C-14, and I-125 immunoassay kits for certain period of time. The monitoring results will be used as the determination base for future dosimeter issuance.

I will contact EHS for a dosimetry evaluation before beginning work as well as any time the work changes.

If dosimetry is issued to me or any of my workers, I will ensure that dosimetry is used properly whenever work is performed.

1. **Security of radioactive material**. You are responsible for providing security adequate to "prevent the unauthorized removal of radioactive material" from any location where you and your staff use radioactive material. Typical security method can be: (1) The laboratory door(s) should be locked at all times, even when the room is occupied; or (2) Room will be locked when lab personnel are not present, or (3) the radioactive material itself should be securely locked except when it is in use. When material is being used, it should be under direct supervision at all times if the room is not locked. In addition, unknown individuals entering the laboratory should be challenged to show their identification and explain their reason for entry.

I understand that I am responsible for the security of radioactive material in my possession and will take proper methods to secure the radioactive materials including radioactive wastes in my laboratory.

1. **Waste disposal.** The radioactive material user is responsible for preparing, segregating, labeling and storing all radioactive waste according to the procedures established by EHS. No radioactive waste may be released to the sanitary sewer, the hood, or the normal trash container in the lab. Release to the sanitary sewer from washing glassware is limited to 0.1 uCi/day. Additional information concerning radioactive waste handling can be found at “Radioactive Waste Management” under the Radiation Protection tab of the EHS website. Radioactive waste is to be separated by isotope and each different isotope must be disposed of in its own radioactive waste container supplied by EHS. Mixing of radionuclides in waste is only allowed with prior EHS approval. When waste is placed in a container the date, description, and activity of the material must be logged on the yellow waste card. Radioactive waste containers are to be keep closed when not in use. Tritium and carbon-14 waste can be co-mingled.

Spills might occur while handling radioactive waste. Small bench-top temporary waste containers may be used to collect waste during the course of a day’s experiments as long as these containers are properly labeled and the material is transferred to the EHS supplied containers at the end of the day’s work. Otherwise, all waste generated must be immediately placed in EHS supplied containers.

* 1. **Non-Radioactive Chemicals Expected in Waste.**

The use of EPA hazardous chemicals must be avoided where possible. If these chemicals are required for your research, each must be discarded into a separate radioactive waste container to minimize the total volume of radioactive/chemical waste that will require special handling. Please contact EHS staff if you need to use any of these chemicals. We will gladly assist in finding specialized waste containers and shielding to fit your needs. The hazardous chemicals to avoid include:

**Metals:** Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Thimerosal (Hg)

**Pesticides:** Endrin, Lindane, Methoxychlor, Toxaphene, 2,4‑D, 2,4,5‑TP (Silvex), Chlordane, Heptachlor (and its hydroxide)

**Volatiles:** Benzene, Carbon tetrachloride, Chlorobenzene, Chloroform, 1,2‑Dichloroethane, 1,1‑Dinitrotoluene, Methyl ethyl ketone, Tetrachloroethylene, Trichloroethylene, Vinyl Chloride

**Base neutrals:** 1,4‑Dichlorobenzene, 2,4‑Dinitrotoluene, Hexachlorobenzene, Hexachlorobutadiene, Hexachloroethane, Nitrobenzene, Pyridine; and Pentachlorophenol, 2,4,5-Trichlorophenol, 2,4,6-Trichlorophenol

**List all the chemicals** that are used in your experiments that will be in the liquid or solid radioactive waste. List the full name of the chemical, not just the chemical symbol or abbreviation. For buffers and other solutions, list all the chemicals, not just the name of the buffer.

* 1. **Solid Waste**

I will not place the following items in solid waste without prior RPO approval: EPA hazardous material, active (untreated) biological waste, sharps that are not in a sharps container, thick glass, lead, pyrophoric material, corrosive material, explosive material, flammable material, LSC vials, or liquids in excess of 10 ml per waste container.

I will ensure the yellow waste card is completely filled out prior to requesting a waste pickup.

* 1. **Liquid Waste**

I will ensure that no EPA hazardous material is placed in liquid radioactive waste container without prior EHS approval.

I will ensure that all information on the Yellow waste card (chemical names, CAS numbers, amounts, pH, isotope, activity, total volume, and signature) is completed prior to requesting a radioactive waste pickup.

I will ensure that liquid waste containers will be kept within secondary containers to reduce the likelihood of floor contamination.

* 1. **Biological Waste**

Radioactive biological wastes (e.g. pathogens, microbes, cells, viruses) are biological as well as radiological hazards, so both sets of regulations apply to this waste. All liquid radioactive waste containers that will contain biological waste must contain at least 10% bleach solution (based on final volume) to inactivate pathogens and prevent microbial growth during storage. All solid radioactive wastes containing biohazardous material must be sterilized in an autoclave prior to placing the material into the solid radioactive waste containers provided by EHS. All University research and instructional activities involving biohazardous materials must be reviewed and approved by the Institutional Biosafety Committee (IBC) prior to the use of any such reagent. See PSU’s Safety Policy RP11 - Use of Biohazardous Materials in Research and Instruction.

I will **not** be generating radioactive biological waste in my radiological research.

I will be generating radioactive biological waste in my radiological and I will do the following:

* I will ensure that 10% (final concentration) bleach is added to all aqueous waste containers that will contain biological waste prior to adding biological waste to the container, and
* I will ensure that all solid radioactive biological waste is sterilized prior to placing the radioactive material into the solid waste container.
  1. **Animal Waste**

Because radioisotopes in animals may pose special disposal problems, additional handling and preparation in the laboratory may be required. In addition, because waste disposal may be expensive, producers of high volume animal waste may be charged for the disposal of the waste. Animal wastes include carcasses, beddings, sharps, and other materials contaminated with animal material.

I will not be using radioactive material in animals.

I will be using radioactive material in animals and will obtain Institutional Animal Care and Use Committee (IACUC) approval **prior** to beginning any animal work. I will prepare waste in accordance with the University Isotope Committee’s and IACUC’s instructions. I will be producing radioactive animal waste as follows (type of animal, estimate of numbers per year): .

* 1. **Liquid Scintillation Counter (LSC) Vials**

Because flammable liquid scintillation cocktails pose an added disposal expense and are a hazard in the laboratory, laboratories are strongly encouraged to use non-flammable liquid scintillation fluid. Non-flammable fluid is a liquid with a flash-point greater than 140 °F (60 °C). If specific requirements of your research require the use of flammable fluids please explain the reasons for this request below.

I will not be using liquid scintillation cocktail.

I will use water as the cocktail to count my P-32 samples in the LSC. (Only works with P-32)

I will use only non-flammable liquid scintillation fluids. Examples include: Cytoscint, Ecolume, Fisher’s Scintiverse BD, Scintisafe Econo 2, Scintisafe Econo F, National Diagnostics Ecoscint A, C, H and O, and OptiScint Hisafe and Hisafe 3. More examples can be found at EHS website https://ehs.psu.edu/radioactive-waste-management/radioactive-waste-management-resources.

I will ensure all LSC vial caps are on tightly and all vials are stored upright in the EHS supplied waste containers.

I require the use of flammable liquid scintillation fluid in my research. My reasons are explained in detail below.

1. **Exemptions.** If you are requesting a special exemption to normal UIC policies, or if you wish to continue an exemption previously granted by the UIC, explain your request. Include a copy of any supporting documents. An example would include special laboratory arrangements that allow food consumption in a part of your lab.
2. **Restrictions**. This section will be completed by EHS or the University Isotopes Committee prior to approval if any restriction is required for this authorization.
3. **Applicant’s statement.** The applicant is responsible for insuring that all persons using radioactive material under this authorization have been adequately trained in the procedures used in the laboratory and are aware and agree to comply with the University Rules and Procedures for the Use of Radioactive Material. Radioactive material is only to be used as described in this authorization and in the locations listed above. No use of radioactive material in humans or in field releases is permitted. All procurement, transfer or shipment of radioactive material, except as specifically authorized, is to be done through EHS. Experimenters are responsible for performing routine contamination surveys and the immediate decontamination of contaminated areas. The University Isotopes Committee reserves the right to revoke or cancel this authorization.

I understand the conditions of this authorization and agree to comply with the University Rules and Procedures for the Use of Radioactive Material. (Type in your name and the date of the application prior to emailing it to [**ORP-Isotope@psu.edu**](mailto:ORP-Isotope@psu.edu).)

By Date

1. **Radiation Safety Officer’s, or delegate’s, recommendation to the UIC for approval**

By Date

1. **Required Training and Experience Information for First Time Applicants**

First time applicants must satisfy educational, training and experience requirements before they will be permitted to act as a Radiation Laboratory Supervisor. Please provide the following information identifying the formal training and experience you have in the specific topics listed below.

Formal Classroom Education or Training.

|  |  |  |  |
| --- | --- | --- | --- |
| Topic | University/College or company name **and** address where you received education or training. | Course Title | Course length in hours or number of credits. |
| General principles of radioactivity and radioactive materials. |  |  |  |
| Characteristics and types of ionizing radiation. |  |  |  |
| Units of radiation dose and radioactive material quantities. |  |  |  |
| Radiation detection instrumentation. |  |  |  |
| Biological hazards and effects of exposure to ionizing radiation. |  |  |  |
| General principles of radiation protection practices. |  |  |  |

Radiation Detection Instrumentation Experience.

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| --- | --- | --- | --- |
| List each instrument separately.  (GM survey meter, liquid scintillation counter, gamma spectroscopy, etc.) | University/College or company name and address where you gained experience with the instrument. | Type of work performed.  (Contamination surveys, sample analysis, etc.) | Years of experience. |
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Please identify the types of dispersible radioactive materials, sealed sources or radiation generating devices you have experience working with, and the type of work performed.

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| Isotopes and/or devices used. (list individually) | University/College or company name and address where you gained experience working with these materials. | Type of work performed. (DNA labeling, gel electrophoresis, radio-iodination, x-ray crystallography, etc.) | Activity of isotopes used.  (mCi) | Years of experience. |
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