OVERVIEW

The RS–1 form has sections to be completed by both the individual seeking approval **and** Radiation Safety (RS).

There is, as a minimum, two additional forms which **must** accompany RS–1 form. These are the RS–2 form (Authorized User Information Sheet) and the RS-6 from (Annual Training of Approved Users; Attendees and Results). The RS–5 form (Radioactive Lab Animal Information) may be required if the response to Section 2 is "Yes."

A pre-review is a process by which Radiation Safety reviews your application prior to submission for committee review. During the review, Radiation Safety will complete portions of the RS-1 Form designated "To be completed by RS." Radiation Safety will also provide you with written comments, questions and suggestions for improving the content of the application. Implementation of these suggestions will facilitate passage through the University Radiation Safety Committee.

The University Radiation Safety Committee meets quarterly. The original application must be submitted to Radiation Safety no later than noon 8 days prior to the second Tuesday of the second month of the quarter. Do not submit the permit until the mandatory Radiation Safety pre-review has been completed. **Consult Radiation Safety for exact deadline requirements and committee dates.**

University regulations require all supervisors and all users successfully complete the OSU On-Line Radiation Safety Course before beginning work with radioactive material.

The University Radiation Safety Officer can grant temporary approval for the use of radioactive materials. The temporary approval will be in effect until the next scheduled URSC meeting. The following criteria must be met before temporary approval can be granted:

1. Final submission of the RS-1 Form and other RS Forms as necessary (i.e. RS-2, RS-5, RS-6). This includes the pre-review process with the designated Laboratory Compliance Officer.
2. Documentation of the in-laboratory training provided to all users of radioactive materials (see section 9 of the RS-1 Form).
3. Completion of the Supervisor Evaluation Conference.
4. Successful completion of the OSU On-Line Radiation Safety Course by you and all users of radioactive materials in your lab.

COMPLETING THE RS-1 FORM

RS–1 Form: Application for the Use of Radioactive Material. This form must be completed by typing the required information. Hand-written forms will not be accepted.

Section 1: Locations: If the location of any of these facilities is in the laboratory of another approved supervisor, or is to be a shared location of use, a letter must accompany the application. The letter must acknowledge the use of the facility by the other approved supervisor or acknowledge that it is a shared facility. The letter, signed by both Approved Supervisors, must indicate who is responsible for smear wipes, record keeping and waste disposal.

Section 2: Animal Use: Indicate the appropriate yes/no response. If "yes," a completed RS–5 form and documentation of approval from ILACUC must be included.

Section 3: Limiting Facility Type: To be completed by Radiation Safety.

Section 4: Radionuclide Information: Items A through G are to be completed by you. Items H & I will be completed by Radiation Safety. Space has been provided for up to four radionuclides. If there is a need for more than four radionuclides, attach additional pages, available on our website, as necessary. Please pay particular attention to the following items:

- **Item 4.B** Individual chemical forms can be, but need not be listed. Chemical form groups can be identified. Examples of these groups include: nucleotides, NTP's, dNTP's, amino acids, fatty acids, proteins, salts, hormones, acids and sugars.

- **Item 4.D** You are required to provide the solubility of material you might dispose via the sanitary sewer system (Hot Sink disposals). (If you are using sealed sources, this requirement does not apply and thus you may leave the "Solubility" blank.) The University must comply with the following regulation as stated in the Ohio Administrative Code:

  OAC 3701:1-38-19(D) Disposal by release into sanitary sewerage

  A licensee may discharge licensed material into sanitary sewerage as follows:
  The material is readily soluble in water or is a biological material that is readily dispersible in water. (The rest of the text generally refers to limits on discharge.)

  The following discussion is from Information Notice 94-07, dated January 28, 1994, from the United States Nuclear Regulatory Commission. The full text is available from Radiation Safety.

  Determination of Compound Solubility Class

  1. ***Solubility Class Determination***
     *The solubility class of the compound to be released could be determined directly from common literature data (e.g., Handbook of Chemistry and Physics - CRC Press, and Lange's Handbook of Chemistry - McGraw-Hill Book Company). If a compound is classified as '**v s**' (very soluble) or '**s**' (soluble), this would indicate the compound is '**readily soluble**.' On the other hand, if it is classified as '**i**' (insoluble), '**sl s**' (slightly soluble), or '**v sl s**' (very slightly soluble), this would indicate materials that are '**not readily soluble**.' Certain compounds are designated as class 'd' (decompose). If the decomposed species of these compounds are classified as either '**v s**' or '**s**,' this would indicate that the parent compound is '**readily soluble**.' If these decomposed species are simple ions, such compounds (class 'd') should be considered '**readily soluble**.'*

  2. ***Formal Solubility Determination***
     *Compound solubilities (g/100 ml or mole fraction per 100 ml) are also listed in the chemical literature. From a review of general scientific literature, '**formal solubilities**' **greater than 0.003 mole/liter** would indicate the compound is **readily soluble**. Formal solubilities **less than 0.003 mole/liter** would indicate compounds that are '**not readily soluble**.'*

The above information should be readily available from your supplier of radioactive material. After determination of the solubility class, enter the correct abbreviation ("**RS**" = Readily Soluble, "**BD**" = biologically dispersible, and "**NRS**" = Not Readily Soluble) for EACH chemical form you intend to use. Responses for chemical forms that are "**NRS,**" "**Unknown,**" or left unanswered indicate these materials **CANNOT** be disposed via the hot sink into the sanitary sewer system. **ONLY** material having an "**RS**" response can be disposed via the hot sink into the sanitary sewer system. Disposal of radioactive material that is "not readily soluble" ("**NRS**") is a violation of Federal and University Regulations. Biologically dispersible material is defined as ground up plant or animal tissue, material taken up in cells, or compounds naturally found in plants or animals.

- **Item 4.E** is your possession limit.
  This is the activity you are allowed to have on hand at any one time.

- **Item 4.F** is the maximum activity in mCi of your stock vial.

- **Item 4.G** is your qualitative assessment of the potential for radioactive material to become airborne in the breathing-zone of workers handling the material. This assessment shall be stated in the following terms for each nuclide you plan to use:
  - **None** (sealed or solid sources not subject to abrasion)
  - **Low** (Little potential exists under normal use)
  - **Medium** (Some potential exists under normal use)
  - **High** (Potential exists under normal use)

  You should develop your assessment considering all chemical and physical properties and mechanisms. Use the following criteria as a guide:

  - DO NOT base your decision on possible accident scenarios. These are by definition not likely and not "normal use."
  - In the case of multiple potentials for the same nuclide (e.g. two different chemical forms with differing potentials for volatilization) state the highest potential.
  - When determining the potential be sure to consider all possible places in your procedures which could cause ANY release of radioactive material into the handler's breathing-zone. Examples of some things to consider:

    - Inherent volatilization potential of the chemical forms being used.
    - Reaction products which are more volatile than the constituents.
    - Opening of stock vials, or any other container, containing radionuclides that may be under positive pressure.
    - Vortexing, centrifugation, mixing, heating, cooling or any other operation that can change the vapor pressure of any container or create airborne radioactive aerosols.
    - Transfer of disposable experimental material to a waste container or hot sink.

Section 5: Radiation Detection Instruments: List all instruments to be used for analysis of experimental materials or contamination surveys. Please include instruments referenced in Section 1D of the RS-1 form.

Section 6: Personnel and Lab Monitoring: To be completed by RS.

Section 7: Laboratory Monitoring: To be completed by RS.

Section 8: Methods and Procedures: The URSC has adopted all procedures in the following publications:

1. "Current Protocols in Molecular Biology" by Roger Brent, David Moore, Robert E. Kingston, and Frederick Ausubel (editor) - published by Current Protocols; John Wiley & Sons, Inc.

2. "Molecular Cloning, A Laboratory Manual" by J. Sambrook, E.F. Fritsch, and T. Maniatis – published by Cold Spring Harbor Laboratory Press.

3. "Current Protocols in Immunology" - published by Current Protocols; John Wiley & Sons, Inc.

4. "Current Protocols in Protein Chemistry" - published by Current Protocols; John Wiley & Sons, Inc.

5. "Current Protocols in Pharmacology" - published by Current Protocols; John Wiley & Sons, Inc.

6. "Handbook of Veterinary Nuclear Medicine" – Clifford Berry and Gregory Daniel.

7. "Current Protocols in Cell Biology" – published by Current Protocols; John Wiley & Sons, Inc.

If you will be using any of the procedures in the above publications, you may indicate the name of the procedure, the publication number and page or section number of the procedure in the table in Section 8. Include the radionuclide, activity per experiment and frequency of the experiment in the table. In addition, you must identify the various types of waste generated and the activity associated with each type of waste. For each procedure, the activity per experiment and the total activity of waste generated must be equivalent. Any variations to the standard procedures, or variations within procedures, must be described.

If the procedure is not one of the seven publications adopted by the University Radiation Safety Committee, in addition to the activity of waste generated for each type of waste category, attach the detailed experimental procedure to be used. Include the proposed use and objectives, state the activities of radionuclide(s) used for each experiment, and the frequency with which the experiments will be conducted. In your own words, please outline the flow of the laboratory procedures to be followed and any other relevant methods you will employ in your research.

Section 9: **Annual Training of Approved User:** The annual training program is a license requirement.

The Approved Supervisor is required to provide this training to all new users of radioactive materials prior to their use of materials, and annually to all users as part of the one-year renewal process with Radiation Safety. You are required to cover, as a minimum, the topics outline in section 9 of the RS-1 Form. Please provide a description of the training content for section 9.D – site-specific laboratory techniques. Please indicate who will be responsible for the training. You must incorporate **performance-based training and evaluation** into the provided curriculum. Performance-based training is defined as demonstrations and walk-through of experimental and safety techniques and methods. Examples of performance-based training include demonstrations of the correct operation of laboratory equipment or demonstration of a contamination survey. Examples of a performance-based evaluation include testing on how to take a smear wipe, use a survey meter, or clean-up of a mock spill.

Training records must be maintained by the Approved Supervisor and must contain, as a minimum, the topics discussed, results of evaluation(s), the trainer(s), dates and names of attendees. Documentation of the annual training is required for this application and will be required as part of the one-year renewal process (see RS-6 Form for documentation of annual in-laboratory training). Failure to perform the training may result in a violation of the safety standards.

Section 10: Radionuclide Risk and Levels of Security and Training: To be completed by RS. During the pre-review process, the radionuclide risk category will be assigned (i.e. No Significant Risk, Low Risk, Intermediate Risk, or High Risk). Based on the assigned risk category, all applicable security and training requirements will be identified by RS.

Section 11: **Supervisor Evaluation Conference:** To be completed by Radiation Safety.

Section 12: Applicant's Acknowledgment of Responsibility: The applicant must sign the form acknowledging his/her responsibilities as itemized.

The completed (and pre-reviewed) final application should be returned to Radiation Safety for submission to the University Radiation Safety Committee (URSC).

All Completed forms should be e-mailed to radiation.safety@osu.edu or to your Laboratory Compliance Officer.