

Office of Radiological Safety

Georgia Institute of Technology

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CONTROL AND ACCOUNTABILITY OF RADIOACTIVE MATERIALS

1.0

PURPOSE

To provide instructions for the procurement, use, storage, disposal, control and accountability of radioactive sources at the Georgia Institute of Technology (Georgia Tech).

2.0

SCOPE

This procedure is applicable to Georgia Tech covering all operations involving radioactive materials including work at temporary job sites within the state of Georgia.

3.0

RESPONSIBILITIES

3.1

The Radiation Safety Committee (RSC) is responsible for reviewing and enforcing policies governing the procurement, use, storage, disposal, control, and accountability of radioactive materials. The RSC is also responsible for acting on an Application for Use of Radioactive Materials (Form A) submitted by the prospective Authorized User (AU) for the use of radioactive materials. Any Form A for use of these materials must be approved by the RSC before the radioactive material is acquired or used. The RSC can modify, suspend, or revoke any Form A. The Radiation Safety Officer (RSO) is responsible for the Georgia Tech Radiation Safety Program including determining compliance with rules and regulations of the State of Georgia, license conditions, the Georgia Tech Radiation Safety Policy Manual, and the conditions under which the AU obtained approval from the RSC.

3.2

The Office of Radiological Safety (ORS) is responsible for providing radiation protection services such as personnel monitoring, waste disposal, periodic laboratory surveys, maintenance of records required by the State of Georgia, and consultation on the safe use of radioactive materials. ORS is authorized to enter any room housing radioactive material at any time for the purpose of determining compliance with the State of Georgia regulations for personnel health and safety.

3.3

The Authorized User (AU) is responsible for using radioactive materials in accordance with the requirements of this procedure, the Georgia Tech Radiation Safety Policy Manual, any related procedures, and the conditions of their approved Form A. The AU is also responsible for ensuring that any individual using their radioactive materials does the same.

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- 4.0 **REFERENCES/REQUIREMENTS**
- 4.1 Requirements and Specifications
 - 4.1.1 Radiation Safety Policy Manual, Georgia Institute of Technology
 - 4.1.2 State of Georgia Rules and Regulations for Radioactive Materials, Chapter 391-3-17
- 4.2 Related Procedures
 - 4.2.1 Procedure 9251, Procedure for Receiving and Opening Radioactive Packages
 - 4.2.2 Procedure 9280, Personnel Surveys
 - 4.2.3 Procedure 9290, Radioactive Waste Management and Disposal
 - 4.2.4 Procedure 9300, Facility Requirements & Guidelines for Radioactive Material or Radiation Generating Equipment Laboratories
 - 4.2.5 Procedure 9303, Guidelines for Handling Radioactive Spills
 - 4.2.6 Procedure 9310, Posting and Labeling for Radioactive Materials and Radiation Machines
 - 4.2.7 Procedure 9316, Personnel Dosimetry
 - 4.2.8 Procedure 9317, Routine Surveys for Open Source Radioactive Material Labs
 - 4.2.9 Procedure 9318, Radioactive Material Laboratory Closeout
- 4.3 Equipment/Materials Required (available at www.ehs.gatech.edu/radiation/ram/forms)
 - 4.3.1 Form A (RS-019a) - Application for Use of Radioactive Materials (Form A)
 - 4.3.2 Form B (RS-019b) - Radiation Worker Registration Form
 - 4.3.3 Form C (RS-019c) - Certification of Current Inventory for Acquisition of Radioactive Materials
 - 4.3.4 Form E (RS-019e) - Radioactive Material Use and Waste Log
 - 4.3.5 Radiation Work Permit (RS-23)

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4.3.6 Radiation Safety Training Matrix (RS-190)

5.0 **DEFINITIONS**

5.1.1 Radiation Worker – individual who has successfully completed all requirements of 6.1.

5.1.2 Authorized User (AU) - Georgia Tech faculty or staff member whose use of radioactive material has been approved by the RSC. The AU is normally in charge of a research project involving radiation or is responsible for a course with laboratory or field exercises in which radiation is involved. An AU is also considered to be a Radiation Worker who has completed all requirements of 6.1 and 6.2.

6.0 **PROCEDURAL STEPS**

6.1 Obtaining and Maintaining Radiation Worker Status

6.1.1 Each individual who handles radioactive material must obtain Radiation Worker status prior to handling the radioactive material. Other individuals working in the proximity of radioactive material may be required to obtain Radiation Worker status at the discretion of the RSO.

6.1.2 Complete the Radioactive Material Safety Training required according to ORS Form RS-190 or as required on the Form A under which the individual will be performing RAM work.

6.1.3 Submit a completed Form B to ORS.

6.1.4 Refresher Radioactive Material Safety Training is required every 2 years.

6.1.5 If a Radiation Worker does not complete refresher training by the expiration date, the worker may not handle radioactive materials until they have completed the refresher training.

6.2 Obtaining and Maintaining Authorized User Status

6.2.1 The prospective AU shall complete and submit a Form A. The RSO shall review the Form A, and if necessary, consult with the prospective AU to discuss the Form A (e.g., facilities available, training and experience of the applicant, survey equipment available, and the details of the work to be performed). Facility requirements and guidelines are found in Procedure 9300.

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- 6.2.2 Upon review and concurrence with the Form A by the RSO, the Form A shall be forwarded to the RSC for review.
- 6.2.3 Since the RSC may meet only once per quarter, the Chair of the RSC is empowered to signify an interim approval of the Form A. In such instances, the Form A will be presented to the RSC for review at the next meeting.
- 6.2.4 The RSC may require further data for the Form A, change the conditions of use of the Form A, or return the Form A to the prospective AU without approval.
- 6.2.5 RSC approval will be signified by the signature of the Chair and the RSO on the Form A.
- 6.2.6 Upon the approval of a Form A, the AU shall also grant ORS access (or provide a key) to the room(s) where the radioactive material will be used and/or stored.
- 6.2.7 The radiation safety training specified in 6.1.2 will be documented by the RSO.
- 6.2.8 The procedure as described in the approved Form A, the required training, and any modifications incorporated during the review process, shall become the conditions under which the AU and their personnel are authorized to use the radioactive materials.
- 6.2.9 If individuals are observed to be using radioactive materials in a manner or under conditions other than that approved by the RSC, the radioactive material may be retrieved and returned to ORS.
- 6.2.10 An AU who wishes to make any change to the approved Form A, including but not limited to changes in the use procedure, to the storage or use location, the methods of storage or disposal, adding isotopes of the same physical form with similar activity, etc. shall request the change in writing to the RSO and wait for approval of the amendment before instituting any change. The RSO may require a new Form A if the changes are deemed significant.
- 6.2.11 All approved Form As shall be reviewed by the AU and the RSO every 5 years. Upon review, the Form A may be renewed, with any changes noted, or terminated. If the RSO determines that the changes requested are significant, a new Form A may be required to be submitted and approved.
- 6.3 Acquisition of Radioactive Materials

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- 6.3.1 Prior to ordering radioactive materials, the AU or designee shall confirm with ORS that an initial inspection of all proposed RAM use areas has been performed.
- 6.3.2 Prior to ordering radioactive materials, the AU or designee shall submit an electronic Form C to ORS for approval. The paper version of Form C (available from ORS) is to be used for any transfers of RAM between AUs at Georgia Tech.
- 6.3.3 The requisition shall be checked to determine:
 - 6.3.3.1 That the requestor is authorized to receive the quantity of radioactive material in the requested physical and chemical form being ordered,
 - 6.3.3.2 That the radioactive material being ordered, when added to the AU's current inventory, will not cause the AU's authorized inventory limits to be exceeded.
- 6.3.4 Form C approval may be delayed until the current inventory has been submitted (6.5.2.2).
- 6.4 Receipt of Radioactive Materials
 - 6.4.1 ORS shall receive, open, inventory, and transfer to the AU all radioactive materials sent to Georgia Tech according to Procedure 9251.
- 6.5 Inventory
 - 6.5.1 ORS shall maintain the master radioactive materials inventory for Georgia Tech.
 - 6.5.2 The AU shall maintain accurate records of the receipt, use, transfer, and disposal of radioactive materials under their control. The EHSA database and a quarterly inventory verification are the two methods to be used by the AU to maintain these records. These records are then used by ORS to maintain the master inventory.
 - 6.5.2.1 EHSA Database
 - 6.5.2.1.1 The Form E, or RSO-approved equivalent, shall be used to track activity removals from unsealed sources until the information can be recorded in the EHSA database.
 - 6.5.2.1.1.1 The Form E shall contain at least the following: isotope, quantity used, date removed, description of use (e.g. samples), quantity left, initials, indication of the use/removal recorded in EHSA, disposal date, disposal volume, waste container id numbers, waste description, initials, and an indication that the waste information has been recorded in

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EHSA. The Form E header shall identify at least the AU, isotope, source number, chemical compound, receipt date, assay activity, unit of measure and assay date, and the volume/mass and unit of measure as appropriate to the form of the source.

- 6.5.2.1.2 Each time an aliquot is removed from an unsealed source, an entry shall be made to show that the source has been decreased by removal and where the removed aliquot was transferred (e.g., sample, solid waste, liquid waste, LSC vials, etc.).
- 6.5.2.1.3 The information from the Form E shall be recorded in EHSA before any request for waste pickup and/or not less frequently than quarterly (for example, at the time of the quarterly inventory). AUs should update EHSA more frequently.
- 6.5.2.2 Radioactive Materials Inventory Verification Report
 - 6.5.2.2.1 On a quarterly basis, ORS shall send a Radioactive Materials Inventory Verification Report to each AU.
 - 6.5.2.2.2 The AU shall confirm the current activity and location of the sources on their inventory. Verification of the location shall be confirmed by physically viewing the source (not just the outer vial or storage container). If any information is incorrect, indicate this in the “Incorrect” column and provide details at the end of the report.
 - 6.5.2.2.3 The AU shall sign and date the inventory form.
 - 6.5.2.2.4 The AU shall return the completed Radioactive Materials Inventory Record form to ORS in a timely manner.
- 6.5.2.3 ORS shall conduct an inventory verification for a minimum of 5% of the radioactive material AUs per quarter.
- 6.5.3 Inventory records shall be readily available for periodic review by ORS or State of Georgia Radioactive Material Program inspectors.
- 6.6 Transfer of Radioactive Material
 - 6.6.1 If an AU wishes to transfer a source (or part of a source) to another AU:
 - 6.6.1.1 The AU receiving the source must be in good standing (i.e., all unsatisfactory inspection items have been corrected; all training is current, etc.)

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- 6.6.1.2 The AU receiving the source must be authorized for the isotope, activity, and type of source
- 6.6.1.3 The AU receiving the source must submit a paper Form C to ORS requesting the transfer. The transfer must be approved by the RSO before the transfer occurs.
- 6.6.1.4 ORS shall process the transfer per Procedure 9251.
- 6.6.1.5 The AU transferring the source shall note the transfer on the Form E.
- 6.7 Loaning of Sources
 - 6.7.1 If an AU wishes to borrow a source from another AU, the borrowing AU must:
 - 6.7.1.1 Be in good standing (i.e., all unsatisfactory inspection items have been corrected; all training is current, etc.), and either
 - 6.7.1.2 Be authorized for the isotope, activity, and type of source, and receive written approval from the loaning AU and the RSO, OR
 - 6.7.1.3 Submit a Radiation Work Permit to the loaning AU and RSO for approval.
 - 6.7.1.3.1 The borrowing AU shall be the RWP requester.
 - 6.7.1.3.2 The borrowing AU and their Radiation Workers are not required to submit a Form B for the loaning AU.
 - 6.7.2 Unsealed sources that will be removed from their container and incorporated into a sample (or similar) may not be loaned. These sources must be transferred according to 6.6.

Examples: sources pipetted for use, powder sources incorporated into solutions, etc.
 - 6.7.3 The loaning AU shall keep a log sheet showing any sources loaned. The log shall record:
 - 6.7.3.1 Source number, isotope, borrower's use location, printed and signed name of individual checking out the source(s), date checked out, name of the person checking the source back in, and date checked back in.
- 6.8 Disposal of Radioactive Waste

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- 6.8.1 Disposal of radioactive waste into containers in the lab is recorded in the EHSA database.
- 6.8.2 The Form E, or RSO-approved equivalent, must be used to track activity disposed into waste containers until the information can be recorded in the EHSA database, as long as the information is recorded in EHSA at least once a quarter.
- 6.8.3 Waste handling, storage, and disposal shall be performed per Procedure 9290.
- 6.9 Inactivity/Termination of Authorization
- 6.9.1 When the Authorized User has notified ORS that their work with RAM is complete, ORS shall remove all remaining RAM and radioactive waste and perform a radiation and contamination survey.
- 6.9.2 If the AU notifies ORS that their authorization can be terminated, and no other RAM work is performed in the AU's authorized laboratories (i.e., by another AU), then the survey in 6.9.1 will be performed according to Procedure 9318.
- 6.9.3 At its discretion, and with concurrence of the AU, ORS may perform a final laboratory closeout on RAM-approved laboratories that have been inactive (no RAM used or stored) for a significant period of time. The AU will notify ORS, per 6.3.1, prior to resuming use of RAM.
- 6.10 Use and Handling of Radioactive Materials
- 6.10.1 Use adequate (appropriate thickness) shielding for the experiment (Lucite or plexi-glass for beta particles and lead for x-rays and gamma rays).
- 6.10.2 Potentially volatile radionuclides should only be used in an approved fume hood. Keep hood face as far down as practical.
- 6.10.3 Posting and labelling requirements for radioactive material use or storage areas are found in Procedure 9310.
- 6.10.4 All radiation experiments in neighborhood laboratories must be secured when unattended.
- 6.10.5 All radioactive material must be secured when unattended.

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- 6.10.5.1 Each laboratory must have an appropriate survey meter as designated in the AU's Form A.
- 6.10.6 When working with loose radioactive material, at a minimum, a laboratory coat, gloves, and safety eyewear shall be worn. Remove gloves and lab coat when contaminated or leaving the work area. Disposable gloves are required when handling sealed sources.
- 6.10.7 Always handle radioactive material in a manner that minimizes exposure (the ALARA principle). For example, use tongs, tweezers, or hemostats of the appropriate length.
- 6.10.8 Unsealed radioactive material work should be done in or over a tray lined with absorbent material to control potential contamination.
- 6.10.9 Do not work alone in the laboratory unless with sealed sources or if there is a telephone present.
- 6.10.10 All persons shall monitor themselves (hands, feet, laboratory coat, etc.) for contamination after each experiment and before leaving a laboratory where loose radioactivity is in use per Procedure 9280.
- 6.10.11 When required, personnel monitoring devices shall be worn at all times when working with or near sources of radiation per Procedure 9316.
- 6.10.12 For unsealed source labs, conduct routine surveys per Procedure 9317.
- 6.10.13 Spill response shall be conducted per Procedure 9303.
- 7.0 **RECORDS**
- 7.1 All records generated as a result of this procedure shall be maintained as permanent records of Georgia Tech.

REV.	REASON FOR CHANGE	EFFECTIVE DATE
0-9	Prior revisions prior to 2016	
10	Changes made for consistency with 2016 Radiation Safety Policy revision	04/21/2016
11	RAM inventory tracking procedure changed	03/12/2020
12	Refresher training requirements for RAM use amended	07/06/2021

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13	Remove Inactive status. Add steps for terminating authorization.	12/8/2022
14	Edit training requirements	12/7/2023