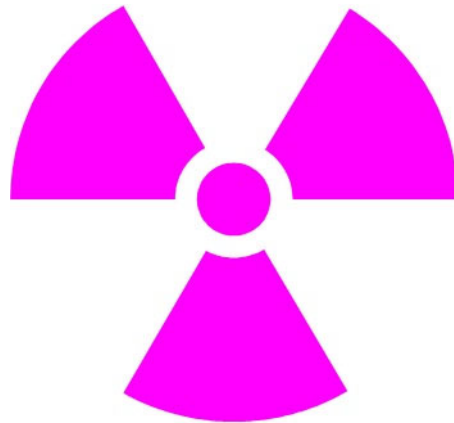


Radiation Safety Policy Manual

Georgia  **Environmental**
Tech **Health & Safety**

Office of Radiological Safety



Effective July 6, 2021

Revised December 9, 2021

1. RADIATION SAFETY PROGRAM.....	3
1.1 SCOPE.....	3
1.2 ALARA	3
1.3 DEFINITIONS.....	3
2. RADIATION SAFETY COMMITTEE.....	5
2.1 MEMBERSHIP.....	5
2.2 RESPONSIBILITIES	5
2.3 MEETINGS	6
2.4 AUTHORITY.....	7
3. RADIATION SAFETY OFFICER.....	8
3.1 APPOINTMENT	8
3.2 RESPONSIBILITIES	8
3.3 DUTIES	8
3.4 AUTHORITY.....	10
4. RADIATION WORKER.....	11
4.1 DEFINITION	11
4.2 ACQUISITION OF RADIATION WORKER STATUS.....	11
4.3 RESPONSIBILITIES	11
5. AUTHORIZED USER.....	12
5.1 DEFINITION	12
5.2 ACQUISITION OF AU STATUS	12
5.3 RESPONSIBILITIES	12
6. ROUTINE RADIATION SAFETY INSPECTIONS.....	14
6.1 INSPECTIONS OF RAM USE AREAS.....	14
6.2 INSPECTIONS OF RADIATION MACHINE USE AREAS	14
6.3 INSPECTION RESULTS AND CORRECTIVE ACTIONS	14
7. TRAINING.....	16
7.1 RESPONSIBILITIES	16
7.2 FREQUENCY OF TRAINING	16
7.3 GENERAL TRAINING TOPICS.....	16
7.4 CONDITIONAL TRAINING TOPICS.....	17
7.5 OTHER TRAINING REQUIREMENTS	17
8. PERMISSIBLE DOSE LIMITS	18
8.1 RADIATION DOSE LIMITS	18
8.2 ALARA LEVELS	18
8.3 INVESTIGATIONAL LEVELS.....	18
8.4 EMBRYO/FETUS DOSE LIMITS	19
8.5 RADIATION DOSE LIMITS OF MINORS.....	19
8.6 RADIATION DOSE TO MEMBERS OF THE PUBLIC.....	19
8.7 ASSESSING RADIATION DOSE.....	20
8.8 REPORTING RADIATION DOSE IN EXCESS OF LIMITS	20
9. PERSONNEL MONITORING.....	21

9.1	DOSIMETRY	21
9.2	SUPPLEMENTAL DOSIMETRY	22
9.3	BIOASSAY	22
9.4	RECORDS.....	22
10.	FACILITY REQUIREMENTS	24
10.1	FACILITY & POSTING REQUIREMENTS.....	24
11.	SAFE USE OF RADIOACTIVE MATERIAL	25
11.1	PROCUREMENT & RECEIPT OF RAM.....	25
11.2	USE OF RAM.....	25
11.3	DISPOSAL OF RAM	26
11.4	TRANSFER OF RAM	26
11.5	INSTRUMENTATION	26
11.6	LABORATORY CLOSEOUT.....	26
11.7	CONTRACTED RADIOACTIVE MATERIAL SERVICES.....	27
12.	SAFE USE OF RADIATION MACHINES	28
12.1	PROCUREMENT.....	28
12.2	RECEIPT	28
12.3	OPERATING PROCEDURES	28
12.4	CONTRACTED RADIATION MACHINE SERVICES.....	29
13.	EMERGENCY RESPONSE	30
13.1	SPILLS/RELEASES OF RAM.....	30
13.2	EVENTS REQUIRING NOTIFICATION.....	30
14.	BIBLIOGRAPHY	31
15.	LIST OF PROCEDURES REFERENCED IN THIS MANUAL	32

1. RADIATION SAFETY PROGRAM

1.1 Scope

- 1.1.1 The Georgia Institute of Technology (Georgia Tech) Radiation Safety Program encompasses the use of all ionizing radiation in the form of radiation machines and radioactive material (RAM) at Georgia Tech campus facilities and any field sites in Georgia.
- 1.1.2 The Radiation Safety Program is defined by the Radioactive Material License, this Manual, procedures, and other related documents approved by the Radiation Safety Committee (RSC) and/or the Radiation Safety Officer (RSO). This Manual and all related procedures are available from the Office of Radiological Safety (ORS).

1.2 ALARA

- 1.2.1 In keeping with currently accepted practices in radiation protection, and as mandated in OCGA 391-3-17.03(4)(b), exposure of all personnel and members of the public to radiation shall be maintained at the lowest level which can be practically, economically, and reasonably achieved.
- 1.2.2 This policy and practice is called ALARA (As Low As Reasonably Achievable) and shall be rigorously applied to all operations utilizing radiation at Georgia Tech.
- 1.2.3 The Administration of Georgia Tech is committed to the ALARA philosophy and to ensuring that work involving radiation is accomplished in a safe and controlled fashion.
- 1.2.4 ORS shall determine if radiation exposures are being maintained ALARA at Georgia Tech by conducting the routine inspections, radiation dose investigations, training and annual program reviews described in this Manual.

1.3 Definitions

1.3.1 Radiation

The term 'radiation' refers to ionizing radiation throughout this Manual.

1.3.2 Radiation Machines

A radiation machine is any device that is designed for the controlled

production of ionizing radiation or nuclear particles. This includes equipment designed to emit x-rays, equipment that may emit x-rays as a byproduct of electron acceleration (equipment that produces electron beams over 5 keV), particle accelerators, neutron generators, etc.

1.3.3 Radioactive Material

Radioactive material (RAM) is any solid, liquid, or gas that emits ionizing radiation spontaneously. RAM commonly emits radiation in the form of alpha particles, beta particles, neutrons, and gamma rays. Any RAM that exceeds the values stated in GA 391-3-17.02(21)(a) or (b) is part of the Georgia Tech Radiation Safety Program. The RSO has the authority to consider lesser activities as part of the program.

2. RADIATION SAFETY COMMITTEE

A Radiation Safety Committee (RSC) is required for Georgia Tech's Radioactive Materials License.

2.1 Membership

- 2.1.1 The RSC shall be composed of senior technical personnel who provide experience in radiological safety and radiation protection, including a representative of Georgia Tech Administration and representatives from various colleges, departments, groups, or activities that use ionizing radiation. The RSO is an ex-officio member of the RSC.
- 2.1.2 The Executive Vice President of Research at Georgia Tech (EVPR) shall appoint members to the RSC for periods of up to three years on staggered terms. Membership is limited to two consecutive terms. After two terms, a three year absence from committee membership is required. Appointments will be based on calendar years.
- 2.1.3 A quorum will consist of a simple majority of RSC members that must include the chairperson and the RSO or their designee.
- 2.1.4 The chairperson of the RSC and the RSO may not be the same person.
- 2.1.5 The number of Committee members is unlimited.

2.2 Responsibilities

- 2.2.1 The RSC is responsible for maintaining the health and safety standards associated with the use of RAM and radiation machines at Georgia Tech and conforming to applicable regulations.
- 2.2.2 The RSC shall review and approve or disapprove the following:
 - 2.2.2.1 Individual faculty or staff to be designated as Authorized Users of RAM or radiation machines;
 - 2.2.2.2 All applications for the possession and/or use of licensed RAM or radiation machines (Form A) taking into consideration the radiological hazards, the facilities and equipment used, the experience of the applicant, and the operating or handling procedures;

2.2.2.3 All proposed modifications to procedures approved in the radiation machine or RAM Form As listed above.

NOTE: Minor modifications may be approved by the RSO according to 3.4.3 without RSC review;

2.2.2.4 Any proposed changes to the ionizing radiation facilities (e.g. shielding, ventilation) that were used to limit the radiation dose to a worker or member of the general public.

2.2.2.5 All additions or revisions to the Radiation Safety Policy Manual.

2.2.2.6 All additions or revisions to ORS Procedures except those detailing calibration of radiation detection or measuring instruments.

NOTE: Minor modifications may be approved by the RSO according to 3.4.3 without RSC review;

2.2.2.7 Any other matter brought to its attention by the RSO.

2.2.3 The RSC shall review reportable occurrences and take appropriate action.

2.2.4 The RSC shall audit, on an annual basis, the Office of Radiological Safety (ORS) for the adequacy of operational records for compliance with internal rules, radiation safety equipment performance, procedures, regulations, and license conditions. The audit results will be sent to the EVPR at Georgia Tech.

2.3 Meetings

2.3.1 The RSC shall meet quarterly and more often when situations arise that need attention.

2.3.2 Approvals by the RSC are signified by the receipt of a simple majority vote of approval by the members of the RSC.

2.3.3 Minutes of the RSC meetings, including any recommendations or occurrences, shall be recorded and distributed to all committee members and the EVPR. RSC minutes will also be filed in the ORS office.

2.3.4 The RSC delegates authority to the Chair to act on its behalf between normal meeting dates in certain matters. In such a case, at the next meeting of the RSC, a quorum will review the action (e.g., authorization for a new AU to use radioactive materials) and provide any additional guidance as necessary.

2.4 Authority

- 2.4.1 The RSC has the authority to impose additional radiation safety measures on any use of RAM or radiation machine or to suspend or revoke approved Form As for use of RAM or radiation machines.

3. RADIATION SAFETY OFFICER

3.1 Appointment

The Radiation Safety Officer (RSO) is appointed by the Director of Environmental Health and Safety. The RSO is qualified to advise others on safety matters pertaining to radiation due to their level of education, training and experience. The RSO is supported by Health Physicists in ORS who assist in the implementation of the Georgia Tech Radiation Safety Program.

3.2 Responsibilities

- 3.2.1 The RSO shall implement a radiation survey program for the Georgia Tech campus as deemed appropriate in the interest of radiation safety and in compliance with regulatory requirements and license conditions.
- 3.2.2 The RSO shall act in a supervisory/administrative capacity in all aspects of Georgia Tech's radiation measurement and radiation protection activities including personnel monitoring, maintenance of exposure records, survey methods, waste disposal, decontamination, and radiological safety practices.
- 3.2.3 The RSO shall review and make recommendations for all activities and procedures which involve actual or potential exposure of personnel to radiation or the release of radioactive materials to the environment.
- 3.2.4 The RSO shall support research at Georgia Tech by being available to consult with all users of radiation in radiological safety matters.
- 3.2.5 The RSO shall communicate regularly with the Georgia Tech Administration regarding program implementation and compliance status.

3.3 Duties

- 3.3.1 The RSO shall maintain the RAM license and amend or renew it when necessary.
- 3.3.2 The RSO shall ensure that all RAM receipts, deliveries, and shipments are performed properly.
- 3.3.3 The RSO shall manage the radioactive waste disposal program, including effluent monitoring and recordkeeping.

- 3.3.4 The RSO shall maintain an inventory of all RAM and radiation machines on the Georgia Tech campus and ensure that all licensed RAM is limited to the kinds and quantities listed on the RAM license.
- 3.3.5 The RSO shall maintain records of radiation surveys and exposures of personnel to radiation as may be required to demonstrate compliance with state and federal regulations and other industry good practices.
- 3.3.6 The RSO shall obtain, issue, collect, review, and record the results of all personnel monitoring devices deemed necessary to determine the level of personnel exposure to radiation and ensure that these devices are used correctly. (See Section 8 “Permissible Dose Limits”)
- 3.3.7 The RSO shall investigate and report radiation exposures at or above ALARA levels to the individual and to the RSC in accordance with Policy 8.3.
- 3.3.8 The RSO shall assist Authorized Users in the training of users of RAM and radiation machines. The ORS shall provide initial and periodic general radiation safety training, while the Authorized User shall provide specific on-the-job training for each person working under their direction. (See Section 7 “Training”)
- 3.3.9 The RSO shall review work to be performed under a Radiation Work Permit described by [Procedure 9306](#), “Preparation & Maintenance of Radiation Work Permits (RWP)”.
- 3.3.10 The RSO shall report to the RSC any radiation hazards, serious infractions of rules, or other radiological incidents. The RSO shall initiate, recommend, provide and verify the corrective actions and implementation of corrective actions.
- 3.3.11 The RSO shall require that RAM is secured against unauthorized removal or use.
- 3.3.12 RSO shall evaluate the shielding requirements for any areas proposed for RAM or radiation machine use.
- 3.3.13 RSO shall ensure that an initial inspection of all proposed radiation machine or RAM use areas is performed, and that these areas are inspected periodically, as stated in Section 6, “Routine Radiation Safety Inspections.”

- 3.3.14 ORS shall notify the Georgia Department of Natural Resources or the Department of Community Health of the occurrence of any instances listed in Procedure 6100, "Emergency and Non-Emergency Notification."
- 3.3.15 The RSO shall review the content and implementation of the Radiation Safety Program in order to determine their effectiveness and adherence to the ALARA concept at least annually. This review shall be documented.

3.4 Authority

- 3.4.1 The RSO has the authority and responsibility to interrupt or suspend any activity that involves the use of radiation if the methods and/or procedures used in such experiments in their professional opinion are deemed to be unsafe and/or contrary to regulations. Such interruption/suspension shall remain in effect until resolved by the RSC.
- 3.4.2 The RSO has the authority and responsibility to review proposed experiments and tests utilizing exempt quantities and exempt concentrations of radioactive material as defined in OCGA 391-3-17.02(21)(a) and (b).
- 3.4.3 The RSO has the authority to review and approve minor changes in ORS procedures and Authorized User Form A approvals (e.g., room changes, minor changes in procedure, addition of isotopes, minor possession limit increases, etc.) provided the change does not diminish radiation safety.
- 3.4.4 The RSO has the authority to designate and delegate duties to an Associate Radiation Safety Officer (ARSO). An ARSO must be a Health Physicist.

4. RADIATION WORKER

4.1 Definition

A Radiation Worker (RW) is a Georgia Tech faculty member, staff member, student, or an external visitor that has completed radiation training provided by ORS and has been designated by an AU to work with radiation machines/RAM.

4.2 Acquisition of Radiation Worker Status

4.2.1 RW status must be obtained to work under the supervision of an Authorized User (AU)

4.2.1.1 [Procedure 9501](#), "Control and Accountability of Radioactive Materials", specifies the requirements to obtain Radiation Worker status for the use of RAM.

4.2.1.2 [Procedure 9502](#), "Control and Accountability of Radiation Machines", specifies the requirements to obtain Radiation Worker status for the use of radiation machines.

4.3 Responsibilities

4.3.1 The Radiation Worker shall:

4.3.1.1 Adhere to the policies set forth in the Manual, the procedures referenced herein, the procedures approved in the AU's Form A, and any applicable RWP.

4.3.1.2 Be familiar with and use established emergency procedures when necessary.

4.3.1.3 Independently use radiation sources after completing source specific operational training.

4.3.1.4 Properly wear any issued dosimetry according to [Procedure 9316](#), "Personnel Dosimetry".

4.3.1.5 Promptly report any event listed in section 13.2.

5. AUTHORIZED USER

5.1 Definition

An Authorized User (AU) is a Georgia Tech faculty or staff person who obtains written authorization from the RSO and the Radiation Safety Committee to use RAM and/or radiation machines for any reason at Georgia Tech.

5.2 Acquisition of AU Status

5.2.1 AUs must obtain Radiation Worker status.

5.2.2 AU status must be obtained prior to procuring RAM or a radiation machine.

5.2.2.1 [Procedure 9501](#) specifies the requirements to obtain AU status for the use of RAM.

5.2.2.2 [Procedure 9502](#) specifies the requirements to obtain AU status for the use of radiation machines.

5.3 Responsibilities

The AU is responsible for:

5.3.1 Following the procedures listed in this Manual and only using radiation according to their procedures approved in their Form A.

5.3.2 Ensuring that anyone using radiation under their supervision adheres to the requirements of this Policy Manual is familiar with the terms of their Form A, as approved by the RSC.

5.3.3 Ensuring that anyone using radiation under their supervision completes the requirements of the Training section of this Manual prior to permitting them to use radiation machines or RAM.

5.3.4 Keeping the ORS informed of the RAM or radiation machine inventory for which they are responsible.

5.3.5 Maintaining records of any required periodic survey results of the work areas.

5.3.6 The preparation and holding of RAM waste designated for disposal and providing the appropriate paperwork at the time of waste pickup.

- 5.3.7 Posting appropriate radiation signs and labeling containers of RAM with the standard radiation warning symbol in their laboratory area where the RAM is used.
- 5.3.8 Posting in the laboratory area emergency contact information for responsible parties should an abnormal situation arise.
- 5.3.9 Notifying ORS prior to leaving Georgia Tech, or relocating or vacating a laboratory approved for RAM or radiation machines.

6. ROUTINE RADIATION SAFETY INSPECTIONS

Routine radiation safety inspections shall be performed by ORS in order to validate radiation safety practices, and confirm compliance with established policies and procedures.

6.1 Inspections of RAM Use Areas

6.1.1 ORS shall inspect all areas where unsealed sources of RAM is used or stored at least quarterly.

6.1.1.1 Items to be inspected include, but are not limited to, postings, completion of weekly surveys, security and consistency with the AU's approved Form A for use of RAM.

6.1.1.2 ORS shall also survey areas for radiation levels and/or removable contamination during inspections, as appropriate.

6.1.2 ORS shall inspect biennially all areas where sealed sources capable of producing a radiation area under normal use are stored.

6.1.2.1 Items to be inspected include proper storage, labels, postings, security, and an assessment of radiation dose rates.

6.1.3 ORS shall inspect all other areas where RAM is stored every three years.

6.1.4 The RSO may perform inspections in any RAM use or storage area more frequently as necessary.

6.2 Inspections of Radiation Machine Use Areas

6.2.1 ORS shall inspect all areas at least annually where radiation machines are used or stored. Equipment that emits x-rays as a byproduct may be inspected at a lesser frequency.

6.2.2 Items to be inspected include, but are not limited to, postings, completion of surveys, security, and consistency with the AU's approved Form A for use of a radiation machine.

6.2.3 ORS shall also perform leakage and/or radiation level measurements during inspections, as appropriate.

6.3 Inspection Results and Corrective Actions

6.3.1 All ORS inspection results are documented and reported to the RSO and the AU.

- 6.3.2 The AU shall respond to any items of concern found during the inspection within 10 business days. The response shall include corrective actions to prevent a recurrence of the item. The RSO shall review the corrective action and may recommend further corrective actions.
- 6.3.3 The RSO may require the AU to report directly to the RSC. Such occasions include any finding that could have led to an exposure in excess of an ALARA level; any violation reportable to the State of Georgia; or any item of concern that is repeated continuously and the corrective actions are not followed.
- 6.3.4 The RSO is authorized to terminate the AU's approved Form A for use of radiation machines or RAM. A new Form A would need to be prepared and approved by the RSC before activities may be resumed.
- 6.3.5 Records of ORS surveys shall be maintained and shall be made available for review by the AU upon request. Official records may not leave the ORS at any time.

7. TRAINING

7.1 Responsibilities

- 7.1.1 The ORS shall be responsible for providing general training on a periodic basis in the basic principles of radiation and radiation safety.
- 7.1.2 The AU is responsible for providing laboratory specific training for individuals who work under their authority or students in teaching laboratories.
 - 7.1.2.1 For AUs of radiation machines, this includes device specific training covering written operating procedures to ensure that the health and safety of others in the lab will be safeguarded.
 - 7.1.2.2 Laboratory specific training should be documented by the AU or their designee.
- 7.1.3 Non-compliance with RAM training requirements by an AU may result in suspension of all Form As under the AU by the RSC. Radioactive material under the affected Form A will be retrieved by ORS until the Form A is reinstated by the RSC.

7.2 Frequency of Training

- 7.2.1 Radiation safety training is required for all RWs prior to the use of RAM or radiation machines.
- 7.2.2 Refresher training is required at intervals specified in [Procedures 9501](#) and [9502](#).
- 7.2.3 Retraining is also required whenever there is a significant change in regulations, policy or procedures that would affect an AU's use of RAM/radiation machines.
- 7.2.4 Non-compliance with initial or refresher training will result in RW suspension by ORS.

7.3 General Training Topics

- 7.3.1.1 At a minimum, training for RWs using RAM licensed on GT's broad scope license shall include:

- 7.3.1.1.1 Storage, inventory and security of RAM and/or radiation machines
- 7.3.1.1.2 Federal and/or State regulations under which work is being performed
- 7.3.1.1.3 Georgia Tech Radiation Safety Policy Manual, License conditions (for RAM users), ALARA policy, and relevant procedures
- 7.3.1.1.4 Reporting violations or unsafe work conditions
- 7.3.1.1.5 Basic radiation characteristics, terminology, and units
- 7.3.1.1.6 Biological effects of ionizing radiation
- 7.3.1.1.7 Radiation detection equipment
- 7.3.1.1.8 Protective measures
- 7.3.1.1.9 Accident, incident, and emergency guidelines
- 7.3.1.1.10 Personnel dose monitoring program
- 7.3.1.1.11 Case histories of accidents involving radiation machines (radiation machine training only).

7.4 Conditional Training Topics

- 7.4.1 For access to the NRE/MP Radiological Science and Engineering Laboratory (RSEL), RWs must receive additional training according to Procedure 0155, "Training Requirements for Unescorted Access to the Radiological Science and Engineering Laboratory".
- 7.4.2 Certain types of RAM use that pose an increased risk of internal exposure requires additional training in the use of protective equipment or procedures (e.g., respirators, bioassays, etc.).

7.5 Other Training Requirements

- 7.5.1 ORS staff responsible for shipping radioactive material shall be trained in applicable shipping regulations.
- 7.5.2 The Georgia Tech Police Department shall receive radiation emergency preparedness training annually.
- 7.5.3 Users of generally licensed radioactive material and exempt radioactive sources shall receive radiation safety training appropriate for their use of RAM.
- 7.5.4 Non-radiation workers in laboratories where radiation hazards are low are not required to attend radiation safety training, although radiation hazards awareness training will be provided to them if requested.

8. PERMISSIBLE DOSE LIMITS

In accordance with the ALARA policy, all unnecessary radiation exposure of personnel shall be considered undesirable and shall be maintained at the lowest reasonably achievable level. In no case shall an occupationally exposed person be purposefully allowed to exceed the permissible dose limits.

8.1 Radiation Dose Limits

8.1.1 RAM workers shall not exceed the following limits during a calendar year:

8.1.1.1 5 rem for the Total Effective Dose Equivalent (TEDE).

8.1.1.2 50 rem for the sum of the Deep Dose Equivalent and the Committed Dose Equivalent to any individual organ or tissue (other than the eye).

8.1.1.3 15 rem to the lens of the eye.

8.1.1.4 50 rem to the skin and extremities (shallow dose equivalent).

8.1.2 Workers using radiation machines shall not exceed the following limits during a calendar quarter

8.1.2.1 1.25 rem to the whole body, head and trunk, lens of the eyes, active blood forming organs or gonads

8.1.2.2 18.75 rem to the hands, forearms, feet or ankles

8.1.2.3 7.5 rem to the skin of the whole body

8.2 ALARA Levels

8.2.1 It is the goal of Georgia Tech to limit any RW's occupational radiation exposure to 20% of the Annual Dose Limits listed in section 8.1 above.

8.3 Investigational Levels

8.3.1 Investigation Levels of radiation exposures have been set at 100 mrem per quarter or 40 mrem per month. Any exposure in excess of these will initiate an investigation by ORS.

8.3.2 The investigation shall attempt to determine the cause and accuracy of the exposure and assessment of measures, if any, that can be employed to limit and prevent future recurrence of the exposure.

- 8.3.3 All radiation exposures equal to or in excess of Investigation Levels and the results of the respective investigations shall be reported at the next RSC meeting.

8.4 Embryo/Fetus Dose Limits

- 8.4.1 Female RWs who become pregnant and declare the pregnancy in writing to the RSO shall be limited to an embryo/fetus dose of 500 mrem for the duration of the pregnancy and 50 mrem in any one month.
- 8.4.2 The GT ALARA level is 100 mrem for the duration of the pregnancy.
- 8.4.3 The female RW who chooses to declare her pregnancy shall inform her supervisor (AU) and the RSO. Appropriate steps to limit exposures and to ensure that the dose to the embryo/fetus shall not exceed 500 mrem during the pregnancy will be determined cooperatively by the AU and the RSO. Based upon the work activity of the declared pregnant worker, the RSO has the authority and responsibility to restrict work activities of the declared pregnant worker to ensure that no dose limits are exceeded.

8.5 Radiation Dose Limits of Minors

- 8.5.1 A minor cannot be employed in any setting involving exposure to radioactive substances.
- 8.5.2 Labs wishing to employ minors in settings using radiation machines must first receive authorization from the RSO and Georgia Tech Environmental Health & Safety.
- 8.5.3 Radiation doses to minors shall not exceed 10% of the annual limits listed in 8.1.

8.6 Radiation Dose to Members of the Public

- 8.6.1 The total effective dose equivalent to any individual member of the public shall not exceed 100 mrem in a year, exclusive of the dose contributions from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material, from voluntary participation in medical research, and from the licensee's disposal of radioactive material into sanitary sewerage.
- 8.6.2 The dose to any individual member of the public must also not exceed 2 mrem in any one hour.

8.7 Assessing Radiation Dose

- 8.7.1 ORS shall issue personnel dosimeters and/or require bioassays in order to demonstrate compliance with the limits in this section according to Section 9.
- 8.7.2 Results of surveys of areas where RAM or radiation machines are used or use of area dosimeters may be used to demonstrate compliance with the limits in this section.

8.8 Reporting Radiation Dose in Excess of Limits

- 8.8.1 If it is determined that a dose in excess of the limits in this section was received, the State of Georgia will be notified as indicated in Procedure 6100.

9. PERSONNEL MONITORING

To help ensure that the permissible occupational dose limits in Section 8 are not exceeded, Georgia Tech monitors RWs with dosimetry and bioassays according to the requirements of OCGA 391-3-17-.03. Georgia Tech also uses dosimetry and bioassay as an ALARA tool as needed.

9.1 Dosimetry

9.1.1 Permanent dosimetry shall be issued to a Radiation Worker that meets at least one of the following criteria:

9.1.1.1 As evaluated by the RSO, is likely to receive a dose in excess of 10% of the limits specified in 8.1 "Radiation Dose Limits."

9.1.1.2 Enters a High Radiation Area or Very High Radiation Area

9.1.2 Permanent dosimetry may be issued according to [Procedure 9316](#).

9.1.3 RWs who have been issued dosimetry shall follow the rules for care and use in [Procedure 9316](#).

9.1.4 The RSO may use area dosimetry to evaluate radiation exposure levels to an area over a period of time.

9.1.5 ORS will exchange dosimeters when required. The default exchange frequency for permanent dosimetry is quarterly.

9.1.5.1 Permanent dosimetry issued to minors and declared pregnant workers is exchanged monthly.

9.1.5.2 Dosimeters in use during an incident may be returned for processing immediately.

9.1.6 Dosimeters issued by ORS are only to be used for measuring a Radiation Worker's radiation exposure from their work at Georgia Tech. That is, they are not to be used for measuring personal non-occupational exposures (e.g., during medical procedures or air travel).

9.1.7 ORS shall use dosimetry that meets the guidelines found in [Procedure 9316](#), "Personnel Dosimetry."

9.2 Supplemental Dosimetry

- 9.2.1 When both a permanent dosimeter and a supplemental dosimeter are worn, the reading from the permanent dosimeter will be the dose of record for the Worker.

9.3 Bioassay

- 9.3.1 Persons who may be exposed to loose radioactive materials such that the potential exists for significant intake shall participate in a bioassay program.

- 9.3.1.1 Participation in a bioassay program shall be determined by the RSO after evaluation of the work/activities of the individual.

- 9.3.1.2 Bioassays are for the purpose of regulatory compliance, not health assessment.

- 9.3.2 Guidelines for the use of bioassay and the communication of bioassay records to Radiation Workers at Georgia Tech are provided in Procedure 9038, "Bioassay Program".

- 9.3.3 Participation requirements for each individual in the bioassay program shall be sent to the responsible AU.

- 9.3.3.1 Individuals may also be requested to participate in the bioassay program when an event has occurred.

- 9.3.4 Failure to participate as requested may result in suspension of privileges to work with radioactive materials on the Georgia Tech campus.

9.4 Records

- 9.4.1 Dosimetry and bioassay records shall be maintained as permanent records of Georgia Tech.

- 9.4.2 Annual dose records shall be mailed to the individual utilizing an NRC Form 5 or equivalent. Individuals may request to view their own dose record at any time.

- 9.4.3 If an organization requests the dosimetry record of a current or former Radiation Worker, Georgia Tech shall provide this record only after receiving a copy of the request containing the signature of the Radiation Worker giving permission for Georgia Tech to release the record to that organization.

- 9.4.4 If a Radiation Worker is issued dosimetry and that Radiation Worker has been monitored for radiation dose at another organization within the past calendar year, ORS shall attempt to obtain the Radiation Worker's prior dose history by sending a Form RS-114, Request for Previous Occupational Radiation Exposure. The RW's annual limit will be adjusted accordingly.

10. FACILITY REQUIREMENTS

10.1 Facility & Posting Requirements

- 10.1.1 Laboratories where RAM or radiation machines are to be used shall meet the minimum requirements listed in [Procedure 9300](#), “Facility Requirements & Guidelines for Radioactive Material or Radiation Generating Equipment Laboratories”.
- 10.1.2 Rooms and areas authorized for the use of RAM or radiation machines shall be posted according to [Procedure 9310](#), “Posting and Labeling for Radioactive Materials and Radiation Machines”.
- 10.1.3 ORS must be informed of any changes to facilities that might affect radiation safety (e.g., an alteration to a shielded wall)

11. SAFE USE OF RADIOACTIVE MATERIAL

11.1 Procurement & Receipt of RAM

- 11.1.1 ORS shall be informed of all shipments of RAM onto Georgia Tech campus. In order to purchase, borrow or otherwise acquire RAM, the AU shall follow [Procedure 9501](#).
- 11.1.2 All RAM sent to Georgia Tech shall be shipped to and received by ORS for an initial survey to ensure that leakage did not occur during transportation and that the new radioactive material is added to the inventory database.
- 11.1.3 When RAM shipments are received at Georgia Tech, ORS shall follow Procedure 9251, "Procedure for Receiving and Opening Radioactive Packages".

11.2 Use of RAM

- 11.2.1 Only persons who have obtained RW status according to [Procedure 9501](#) may work with RAM.
- 11.2.2 RWs shall follow the steps in [Procedure 9501](#) for personal protective equipment, safe use of RAM and maintaining an inventory of RAM.
- 11.2.3 Eating, drinking, smoking, or applying cosmetics is prohibited in areas where radioactive materials are used or stored.
- 11.2.4 All RAM must be secured to prevent unauthorized removal when unattended. Doors to radioisotope laboratories must be closed and locked when personnel are not present.
- 11.2.5 All unattended sources of radioactive materials must be labeled with [Procedure 9310](#). Waste must be labelled according to [Procedure 9290](#), "Radioactive Waste Management and Disposal".
- 11.2.6 RWs shall survey areas where RAM is used for contamination and dose rates according to [Procedure 9317](#), "Routine Contamination Surveys for Open Source Radioactive Material Labs"
- 11.2.7 Sealed radioactive sources shall be tested for leakage or contamination on a routine basis by the ORS staff according to Procedure 9312, "Sealed Sources Leak Test".

11.3 Disposal of RAM

- 11.3.1 ORS is responsible for the final disposal of all RAM.
- 11.3.2 Radioactive waste shall be stored in the lab until picked up by ORS in appropriate containers according to [Procedure 9290](#).
- 11.3.3 Radioactive materials shall not be discarded down the sink or sewer without written authorization from the RSO.

11.4 Transfer of RAM

- 11.4.1 Within the Institute, RAM shall be transferred to another AU by following the transfer process outlined in [Procedure 9501](#).
- 11.4.2 For transferring to an entity outside the Institute, RAM shall only be shipped from campus by ORS. The RSO must approve all shipments, sale, surplus, or loaning of RAM. Procedure 9510, "Radioactive Material Shipment", details the requirements for the shipment of RAM.

11.5 Instrumentation

- 11.5.1 The AU shall purchase an appropriate radiation survey instrument if deemed necessary by ORS.
- 11.5.2 Calibration
 - 11.5.2.1 The calibration frequency for all survey instruments shall be annual. Annual means once every 12 months or no later than the last day of the same calendar month of the following year.
 - 11.5.2.2 Calibration services are provided for most radiation survey instruments by ORS.

11.6 Laboratory Closeout

- 11.6.1 AUs are required to notify ORS prior to relocating or leaving a laboratory approved for RAM.
- 11.6.2 Once all RAM has been removed from the lab, ORS will conduct surveys according to Procedure 9318, "Radioactive Material Laboratory Closeout".

11.7 Contracted Radioactive Material Services

11.7.1 Contracted services utilizing gamma imagers, lead paint analyzers, etc. should, prior to use, notify ORS with a copy of each of the following:

- State of GA license or equivalent
- Policy and Procedures
- Training Records

11.7.2 Contractors using their own radioactive sources are responsible for their own personnel dosimetry and training.

11.7.3 The Radiation Safety Officer may do an on-site survey where ionizing radiation is being used or suspected of use.

12. SAFE USE OF RADIATION MACHINES

12.1 Procurement

The AU shall inform ORS prior to acquiring any radiation machine. Georgia Tech Procurement may not process requisitions for radiation machines without RSO approval. The procedure for radiation machine acquisition is described in [Procedure 9502](#).

12.2 Receipt

12.2.1 ORS shall register all x-ray units with the State of Georgia Department of Community Health.

12.2.2 After installation, but prior to the first use of a radiation machine, ORS shall perform an initial inspection of the unit.

12.3 Operating Procedures

12.3.1 Only persons who have obtained RW status may work with radiation machines.

12.3.2 Only RWs who have been trained in the operating procedures of the particular unit may operate the unit.

12.3.3 All operators of radiation machines shall follow the requirements found in [Procedure 9502](#). This procedure includes requirements for the following:

12.3.3.1 General Safety Provisions

12.3.3.2 Safety Systems and Interlocks

12.3.3.3 Signs, Labels, and Signals

12.3.3.4 Radiation Exposure Control

12.3.3.5 Barriers and Shielding

12.3.3.6 Radiation Surveys

12.3.3.7 Maintenance Requirements

12.3.3.8 Security

12.3.3.9 Disposal

12.3.4 All radiation machines must be secured to prevent unauthorized use when unattended.

12.4 Contracted Radiation Machine Services

12.4.1 Contracted services utilizing mobile x-ray imagers, lead paint analyzers, etc. should, prior to use, notify ORS with a copy of each of the following:

- State of GA registration or equivalent
- Policy and Procedures
- Training Records

12.4.2 Contractors using their own radiation machines are responsible for their own personnel dosimetry and training.

12.4.3 The Radiation Safety Officer may do an on-site survey where ionizing radiation is being used or suspected of use.

13. EMERGENCY RESPONSE

13.1 Spills/Releases of RAM

- 13.1.1 In the event of a spill of RAM, all RWs shall follow [Procedure 9303](#), “Guidelines for Handling Radioactive Spills”.
- 13.1.2 ORS shall assist in any incident involving personal contamination, contamination exceeding levels specified in [Procedure 9317](#), or if the RW requests assistance.

13.2 Events Requiring Notification

The RW shall notify ORS upon discovery or suspicion of any of the following:

- 13.2.1 Accidental radiation exposure from radiation machines.
- 13.2.2 RAM contamination of the skin
- 13.2.3 Ingestion or inhalation of RAM.
- 13.2.4 Any incident where significant, unexpected radiation exposure is suspected.
- 13.2.5 Any spill of RAM involving personal contamination or contamination levels exceeding levels specified in [Procedure 9317](#).
- 13.2.6 Any missing source of RAM.
- 13.2.7 Any incident in a RAM laboratory involving fire, flood, theft or other abnormal occurrence.
- 13.2.8 Any dosimeter that has been contaminated or left in an area where it was exposed to radiation that would not be representative of its owner’s occupational exposure.

14. BIBLIOGRAPHY

Georgia Department of Community Health, Rules and Regulations for X-ray,
Chapter 290-5-22

Georgia Department of Natural Resources, Rules and Regulations for Radioactive
Materials, Chapter 391-3-17

University System of Georgia, Human Resources Administrative Practice Manual:
Employment

15. LIST OF PROCEDURES REFERENCED IN THIS MANUAL

Procedure Number	Found in Section	Procedure Title
0155	7.4	Training Requirements for Unescorted Access to the Radiological Science and Engineering Laboratory
6100	3.3, 8.8	Emergency and Non-Emergency Notification
9038	9.3	Bioassay Program
9251	11.1	Procedure for Receiving and Opening Radioactive Packages
9290	11.2, 11.3	Radioactive Waste Management and Disposal
9300	10.1	Facility Requirements & Guidelines for Radioactive Material or Radiation Machine Laboratories
9303	13.1	Guidelines for Handling Radioactive Spills
9306	3.3	Preparation & Maintenance of Radiation Work Permits (RWP)
9310	10.1, 11.2	Posting and Labeling for Radioactive Materials and Radiation Machines
9312	11.2	Sealed Sources Leak Test
9316	4.3, 9.1	Personnel Dosimetry
9317	11.2, 13.1, 13.2	Routine Surveys for Open Source Radioactive Material Labs
9318	11.6	Radioactive Material Laboratory Closeout
9501	4.2, 5.2, 7.2, 11.1-4	Control and Accountability of Radioactive Materials
9502	4.2, 5.2, 7.2, 12.1-3	Control and Accountability of Radiation Machines
9510	11.4	Radioactive Material Shipment