
**POSTING AND LABELING FOR RADIOACTIVE MATERIALS
AND RADIATION MACHINES**

1.0 **PURPOSE**

To describe posting and labeling requirements for areas and items containing radioactive material or a radiation machine.

2.0 **SCOPE**

This procedure applies to any room where radioactive material (RAM) is used or stored at Georgia Institute of Technology (Georgia Tech). It also applies to the areas within a room that RAM is used or stored, and any container or equipment that contains or could contain RAM or radioactive contamination.

This procedure applies to any room where a radiation machine is used at Georgia Tech and the radiation machine itself.

3.0 **RESPONSIBILITIES**

3.1 It is the responsibility of the Office of Radiological Safety (ORS) to post areas meeting the conditions specified in this procedure, and to provide any postings or labels required.

3.2 It is the responsibility of the Radiation Worker to ensure that postings and labels remain current and in good condition, and to notify the ORS if replacement postings or labels are required.

4.0 **REFERENCES/REQUIREMENTS**

4.1 Requirements and Specifications

4.1.1 State of Georgia, Rules and Regulations for Radioactive Materials, Chapter 391-3-17

4.1.2 State of Georgia, Rules and Regulations for X-Ray Machines, Chapter 111-8-90

4.1.3 10 CFR 20, "Standards for Protection Against Radiation"

4.2 Equipment/Materials Required

4.2.1 Postings and Labels in Appendix A

5.0 **DEFINITIONS**

5.1 Radiation Area – an area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose in excess of 5 mrem in one hour at 30 centimeters from any source of radiation or from any

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surface that the radiation penetrates or anywhere an individual could receive a dose of 100 mrem or greater in any 5 consecutive days. See Appendix A, Table 1 for image.

- 5.2 High Radiation Area – an area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 100 mrem in one hour at 30 centimeters from any source of radiation or from any surface that the radiation penetrates. See Appendix A, Table 1 for image.

NOTE: Rooms or areas in which diagnostic x-ray systems are used for healing arts purposes are not considered High Radiation Areas.

- 5.3 Very High Radiation Area – an area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads in one hour at one meter from a radiation source or from any surface that the radiation penetrates. See Appendix A, Table 1 for image.

- 5.4 Airborne Radioactivity Area – a room, enclosure, or operating area in which airborne radioactive materials, composed wholly or partly of licensed materials, exist in concentrations:

- 5.4.1 In excess of the derived air concentrations (DACs) specified in Appendix B to 10 CFR 20.1001-20.2401, or
- 5.4.2 To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6% of the annual limit on intake (ALI) or 12 DAC-hours
- 5.4.3 See Appendix A, Table 2 for image.

6.0 **PROCEDURAL STEPS**

6.1 Posting of Rooms or Areas

- 6.1.1 For any area meeting the specifications of Radiation Area, High Radiation Area, Very High Radiation Area, or Airborne Radioactivity Area, the appropriate sign shall be posted on the door to the room or entry to the area.

- 6.1.2 If the locations within the room or area meeting the specifications of Radiation Area, High Radiation Area, or Very High Radiation Area are subject to change, a map indicating dose rates shall be posted on the door to the room or entry to the area.

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- 6.1.3 Every door to a room or area that contains or may contain RAM shall also be posted with “Caution, Radioactive Materials”, “No Eating, Drinking, or Smoking”, and “Notice to Employees”. See Appendix A, Tables 2 and 4 for images.
- NOTE: For a neighborhood laboratory, each door that leads to the area with the neighborhood laboratory shall be posted with all required postings.
- 6.1.3.1 Exceptions: Rooms or areas containing RAM are not required to be posted per 6.1.3 in the following situations:
- 6.1.3.1.1 A room only contains a sealed source (or sources) provided that the radiation level at 30 centimeters from the surface of the source(s) container or housing does not exceed 0.005 rem (0.05 mSv) per hour, or
- 6.1.3.1.2 The amount of licensed material used or stored in the room does not exceed ten times the quantity of such material specified in Appendix C of 10 CFR Part 20 (see Appendix B of this Procedure)
- 6.1.4 Any radiation machine not otherwise covered in this procedure shall be posted according to appropriate State of Georgia regulations.
- 6.1.5 All designated entryways at and within the Radiological Science and Engineering Laboratory in the Boggs Building shall have the current Emergency Telephone Roster posted. The current version of this roster is available from ORS.
- 6.2 Labels
- 6.2.1 RAM Labels
- 6.2.1.1 Any location within a room where RAM may be used or stored shall be labeled with “Caution Radioactive Materials”.
- Examples: fume hood, freezer, refrigerator, centrifuge, lab bench
- 6.2.1.2 Neighborhood RAM labs shall label RAM use areas within the lab.
- Examples: RAM tape on the floor or bench, use of caution cones
- 6.2.1.3 Unattended containers of RAM not in the original source vial shall be labeled with the isotope, activity, date, and chemical components or other hazards.

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6.2.1.4 RAM packaged and labeled for transport in accordance with the regulations of the Department of Transportation (DOT) and/or International Air Transport Association (IATA) are not required to have additional markings or labels.

6.2.1.5 Empty uncontaminated containers that previously held RAM shall have all radioactive labels or markings removed or defaced prior to being removed from a Radioactive Material Area.

6.2.2 X-Ray Machine Labels

6.2.2.1 Each x-ray machine or control panel shall be labeled with “Caution X-Ray This Equipment Produces X-Rays When Energized”. See Appendix A, Table 3 for image.

NOTE: Diagnostic x-ray machines used for healing arts purposes shall instead bear the following statement: “Warning: This x-ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed”.

6.2.2.2 The tube head of each analytical x-ray machine shall be labeled with “High Intensity X-Ray Beam”. If the tube head is not accessible, the closest accessible surface shall be labeled. See Appendix A, Table 3 for image.

6.2.3 Other Radiation Machines

6.2.3.1 Any radiation machine not otherwise covered in this procedure shall be labeled according to appropriate State of Georgia regulations.

7.0 **RECORDS**

7.1 It is not anticipated that records will be generated as a result of implementation of this procedure. However, should records be generated, they shall be maintained for the life of the facility.




REV.	REASON FOR CHANGE	EFFECTIVE DATE
0-3	revisions made prior to 2016	
4	Allow exceptions for posting of RAM areas. Remove requirement for posting X-Ray rooms	12/08/2022

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Appendix A – Sample Postings and Labels




Equivalent postings or labels may be used instead of the version shown.

Table 1 – Dose Rate Areas

Description	Section Reference	Image
Radiation Area	5.1	
High Radiation Area	5.2	
Very High Radiation Area	5.3	


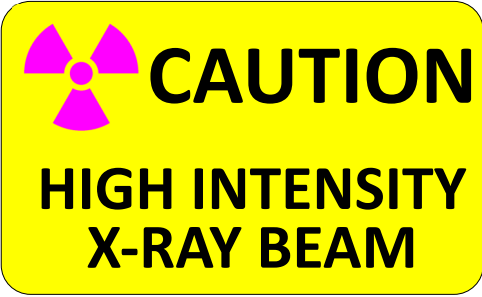
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Table 2 – RAM

Description	Section Reference	Image
Airborne Radioactivity	5.4	
No Eating, Drinking, or Smoking	6.1.3	
Radioactive Material	6.1.3	

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Table 3 – X-Ray Machines

Description	Section Reference	Image
This Equipment Produces X-Rays When Energized	6.2.2.1	
High Intensity X-Ray Beam	6.2.2.2	

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Table 4 – Notice to Employees

The following documents are on file with the GT Office of Radiological Safety (404-894-3605) and can be viewed upon request:
1) OCGA 391-3-17-.03 – Standards for Protection Against Radiation;
2) OCGA 391-3-17-.07 – Notices, Instructions, and Reports to Workers; Inspections, Amended;
3) The Georgia Tech Radioactive Materials License, conditions and documents incorporated into the license by reference and amendments thereto;
4) Any notice of violation involving radiological working conditions, proposed imposition of civil penalty, or Order issued pursuant to OCGA 391-3-17, and responses from the licensee.

Georgia Department of Natural Resources



NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION

YOUR EMPLOYER'S RESPONSIBILITY

Your Employer is required to:

1. Apply the Rules of this Chapter (391-3-17) and the conditions of the Employer's Radioactive Materials license to all work under the license.
2. Post or otherwise make available to you a copy of the Georgia Department of Natural Resources rules entitled, "Radioactive Materials", licenses, and operating procedures which apply to work you are engaged in, and explain the provisions to you.
3. Post any Notices of Violation and Orders involving radiological working conditions.

YOUR RESPONSIBILITY AS A WORKER

You should familiarize yourself with those provisions of the Georgia Department of Natural Resources rules entitled, "Radioactive Materials," and the operating procedures that apply to the work you are engaged in. You should observe these provisions for your own protection and the protection of your co-workers.

WHAT IS COVERED BY THESE REGULATIONS?

1. Limits on exposure to radiation and radioactive materials in controlled and uncontrolled areas;
2. Measures to be taken after accidental exposure;
3. Personnel monitoring, surveys, and equipment;
4. Caution signs, labels, and safety interlock equipment;
5. Exposure records and reports;
6. Options for workers regarding inspections; and
7. Related matters.

INQUIRIES

Inquiries dealing with these matters can be sent to:
Georgia Department of Natural Resources, EPD
Radioactive Materials Program
4244 International Parkway, Suite 120
Atlanta, Georgia 30354
(404) 363-7000

REPORTS ON YOUR RADIATION EXPOSURE HISTORY

1. The Georgia Department of Natural Resources rules entitled, "Radioactive Materials," require that your Employer give you a written report if you receive any exposure in excess of any applicable limit, as set forth in Chapter 391-3-17 or in the Employer's Radioactive Materials license. The basic limits for exposure to employees are set forth in Rule 391-3-17-.03 (5) (a), (b), (c), (d), (e), (f), (g), and (h). These paragraphs specify limits on exposure to radiation and exposure to concentrations of radioactive materials in air and water.
2. If you work where personnel monitoring is required, and if you request information on your radiation exposure:
 - a. Your Employer must advise you annually of your exposure to radiation; and
 - b. Your Employer must furnish you a complete personnel exposure record, detailing any overexposures to radiation; and
 - c. Your Employer must give you a written report, upon termination of your employment, of your radiation exposure.

INSPECTIONS

All activities under the Employer's Radioactive Materials license are subject to inspection by representatives of the Georgia Department of Natural Resources, EPD. In addition, any worker, or representative of workers, who believes that there is a violation of the State law, Rules or the Employer's Radioactive Materials license with regard to radiological working conditions in which the worker is engaged, may request an inspection by sending a notice of alleged violation to Georgia Department of Natural Resources, EPD. The request must set forth the specific grounds for the notice and must be signed by the worker or by the representative of the workers. During inspections, agency inspectors may confer privately with workers, and any worker may bring to the attention of the inspectors any past or present condition which is believed contributed to or caused any violation as described above.

POSTING REQUIREMENT

Copies of this notice must be posted in a sufficient number of places in every establishment where employees are employed in activities licensed pursuant to Georgia Department of Natural Resources' Rule 391-3-17-.02. This posting permits employees working in or frequenting any portion of a controlled area to observe a copy on the way to or from their place of employment.

LEGAL AUTHORITY: Official Code of Georgia Annotated (O.C.G.A.) § 31-13

Revised: September 2018

Minor Change
Number:
By:
Date:

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Appendix B – 10CFR20 Appendix C values

Isotope	Appendix C Value (uCi)	Appendix C X10	unit
Am-241	0.001	0.01	uCi
Ba-133	100	1000	uCi
C-14	100	1000	uCi
Cd-109	1	10	uCi
Cf-252	0.001	1.80E-05	ug
Cl-36	10	100	uCi
Cm-244	0.001	0.01	uCi
Co-57	100	1000	uCi
Co-60	1	10	uCi
Cs-137	10	100	uCi
Eu-152	1	10	uCi
Eu-155	10	100	uCi
H-3	1000	10000	uCi
Hg-203	100	1000	uCi
I-125	1	10	uCi
I-129	1	10	uCi
Kr-85	1000	10000	uCi
Mn-54	100	1000	uCi
MxGamma	0.01	0.1	uCi
Na-22	10	100	uCi
Ni-63	100	1000	uCi
Np-237	0.001	14.5	ug
P-32	10	100	uCi
Pb-210	0.01	0.1	uCi
Pm-147	10	100	uCi
Po-210	0.1	1	uCi
Pu-239	0.001	0.16	ug
Pu-242	0.001	2.56	ug
Ra-226	0.1	1	uCi
Si-32	1	10	uCi
Sn-113	100	1000	uCi
Sr-90	0.1	1	uCi
Tc-99	100	1000	uCi

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Th-229	0.001	0.01	uCi
Th-230	0.001	0.01	uCi
Th-232	100	0.0435	ug
U-233	0.001	0.01	uCi
U-235	0.001	4.76	g
U-238	100	3	kg
U-Nat	100	1.4	kg
Xe-133	1000	10000	uCi
Zn-65	10	100	uCi

Specific activities used in uCi/g calculations taken from <http://www.iem-inc.com/information/tools/specific-activities>