
GUIDELINES FOR HANDLING RADIOACTIVE SPILLS

1.0

PURPOSE

To provide guidelines to mitigate consequences and prevent the recurrence of a spill of radioactive material.

2.0

SCOPE

This procedure is applicable to any situation where liquid, solid, or sealed radioactive material has been removed from its proper storage container in an unanticipated manner (spill), leading to contamination of an area or personnel.

3.0

RESPONSIBILITIES

3.1

The Radiation Worker shall perform initial spill response procedures and notify the appropriate individuals as soon as possible.

3.2

The Office of Radiological Safety (ORS) shall train Radiation Workers in spill response procedures that minimize radiation exposure and the spread of contamination. ORS shall also respond to and lead decontamination efforts for any spills as required or requested.

3.3

The Authorized User (AU) shall provide a written report as requested, and implement any corrective action plan communicated by the Radiation Safety Officer (RSO).

3.4

The Radiation Safety Officer or designee (RSO) shall review the circumstances surrounding a spill, provide a corrective action plan to the AU, and ensure that the corrective action plan is implemented. The RSO shall make the appropriate notifications per Procedure 6100, and adjust dose history if applicable.

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.

4.2

Related Procedures

4.2.1

Procedure 6100, Emergency and Non-Emergency Notification

4.2.2

Procedure 9038, Bioassay Program

4.2.3

Procedure 9302, Personal Protective Equipment Requirements

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4.2.4 Procedure 9317, Routine Contamination Surveys for Open Source Radioactive Material Labs

4.3 **Equipment/Materials Required**

4.3.1 Spill kit

4.3.2 Geiger counter or other handheld radiation survey meter

4.3.3 Exposure rate or dose rate instrument

4.3.4 Smears and counting instrument

5.0 **PROCEDURAL STEPS**

5.1 **Initial response**

5.1.1 Notify any people nearby that a spill has occurred with instructions not to enter the contaminated area. If necessary, ask them to notify the individuals listed in section 5.4 of this procedure immediately.

5.1.2 Respond to any acute medical needs regardless of contamination. Do not decontaminate the individual or area before rendering aid. Examples include performing CPR, using an AED, or stopping profuse bleeding.

5.2 **Removal of Personal Contamination**

5.2.1 If radioactive material is suspected to have made contact with the eyes, use the eyewash and rinse eyes for 15 minutes.

5.2.2 If any clothing is suspected to be contaminated, step to the edge of the spill. Remove and discard contaminated apparel into a plastic bag or a trash can.

5.2.3 If radioactive material is suspected to have made contact with skin, wash the contaminated area with mild soap and lukewarm water. If the area cannot be washed in a sink, use the emergency shower.

5.2.4 If airborne or volatile radioactive material, step just outside the lab to fresh air. If the fume hood or room has an emergency exhaust setting, engage it.

5.3 **Assess Severity**

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- 5.3.1 A major spill shall be defined as any spill involving any of the following:
 - 5.3.1.1 Personal contamination
 - 5.3.1.2 Contamination above Action Level 2 in the appendices of Procedure 9317
 - 5.3.1.3 Multiple locations, or a location outside of a RAM lab
 - 5.3.1.4 Radiation Worker is not comfortable handling the spill
- 5.4 **Notification**
 - 5.4.1 If the spill is a major spill, call ORS at 404-894-3605.
 - 5.4.1.1 If no answer at ORS or if medical assistance is required, call the Georgia Tech Police Department (GTPD) at 404-894-2500 and ask them to contact ORS personnel.
 - 5.4.1.2 Call the AU and lab manager. Their contact information should be on the emergency contact card on the door or posted in the lab.
 - 5.4.2 If the spill is not a major spill, no notification is required; however the Radiation Worker is encouraged to contact ORS for assistance.
- 5.5 **Mitigate contamination**
 - 5.5.1 Secure the room or area through the use of any available barriers to prevent people from entering. If necessary, make simple signs that say “Do Not Enter – Radioactive Contamination” and post at entrances to the spill area.
 - 5.5.2 If the spill is a major spill:
 - 5.5.2.1 Step to the edge of the contaminated area, but do not leave the area, and wait for ORS.
 - 5.5.3 If the spill is not a major spill:
 - 5.5.3.1 Remove and dispose of any contaminated disposable personal protective equipment (PPE) in radioactive waste container. Don new PPE per Procedure 9302 prior to continuing decontamination efforts.
 - 5.5.3.2 Carefully remove any contaminated absorbent paper by folding the paper inward so that the contaminated area is kept to the inside of the paper wad and dispose of in a radioactive waste container.

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- 5.5.3.3 Decontaminate any other area or equipment by applying a cleaner and wiping from the edge of the spill inward so as to not spread the contamination.
- 5.5.3.4 Use smears to determine removable contamination levels.
- 5.5.3.5 Use a Geiger counter, or other appropriate handheld survey meter, to determine fixed contamination levels, if appropriate. This determination must account for any removable contamination present.
- 5.5.3.6 If contamination levels exceed Action Level 1 in Procedure 9317, continue to decontaminate until the contamination is below Action Level 1, or call ORS for assistance.
- 5.5.3.7 All personnel involved shall be surveyed before leaving the area.
- 5.5.3.8 Document final survey/wipe test measurements.
- 5.6 **ORS Response upon Arrival**
 - 5.6.1 Gather information about the incident including isotope, activity, spilled volume, and location of spill.
 - 5.6.2 Check people for contamination and immediately decontaminate as necessary.
 - 5.6.3 Determine the extent of the contamination.
 - 5.6.4 If contamination level is greater than 10 kcpm and the isotope spilled is a gamma or high energy beta emitter, measure radiation dose rates at various locations.
 - 5.6.5 Assess the possibility of personal intake either by inhalation (loose powder or vapor becoming airborne), ingestion (inadvertent intake by mouth) or injection (wound). For suspected inhalation or ingestion, smears or swabs of the mouth and nasal passages should be performed. Require bioassay samples as appropriate and as required by Procedure 9038.
 - 5.6.6 Develop and implement a plan for decontamination of the area and any contaminated equipment.
 - 5.6.7 Perform and document follow-up surveys and implement further decontamination as needed.

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- 5.6.8 Collect all radioactive waste generated during cleanup and dispose of according to Procedure 9290.
- 5.6.9 If necessary, collect dosimetry and send for processing.
- 5.6.10 Only the RSO shall make the decision to close the lab and restrict entry for any time period over 24 hours.
- 5.7 **Follow-up**
- 5.7.1 Following a major spill, the AU shall prepare a report detailing the cause of the contamination and steps taken to preclude a recurrence. The report shall be submitted to ORS.
- 5.7.2 The Radiation Safety Committee shall be informed of any major spill at their next meeting.
- 5.7.3 The RSO shall make the appropriate notifications per Procedure 6100.
- 6.0 **RECORDS**
- 6.1 Contamination surveys performed by ORS shall be written up as a Non-Routine Survey.
- 6.2 ORS shall write up a corrective action report describing the event, the cleanup actions taken and results, an assessment of personnel exposures, and corrective actions to preclude recurrence.
- 6.3 For any individual who accrued significant dose during the event or its cleanup, the appropriate amendments shall be made to that individual's personal dosimetry records if dose was received that was not fully recorded by the issued dosimetry.
- 6.4 Records generated as a result of implementation of this procedure shall be maintained for the life of the facility.