

FACT SHEET: Cleaning Radioactive Contamination Safety Guidelines



NEED TO KNOW:

TYPES OF CONTAMINATION:

- **Internal contamination:** occurs when people swallow or breathe in radioactive materials, or when radioactive materials enter the body through an open wound or are absorbed through the skin.
- **External contamination:** occurs when radioactive material, in the form of dust, powder, or liquid, comes into contact with a person's skin, hair, or clothing.
- **Radioactive contamination:** occurs when radioactive material is deposited on or in an object or a person.
- **Radiation exposure:** occurs when a person is exposed to radiation, and the energy penetrates the body (e.g., x-rays).

MORE INFO:



When working with radioactive materials (RAM) or hazardous materials, in general, an inadvertent spill may occur. Surfaces, equipment, and/or personnel become contaminated as a result. RAM users can clean minor spills and remove radioactive contamination as much as possible.

MAJOR RADIOACTIVE SPILL:

A major radioactive spill is defined by any or all of the following:

- Large surface area contaminated
- Any internal contamination of personnel (ingestion, injection, spill on open wound)
- Excessive external radiation exposure to personnel
- Serious delay in work procedures

Additionally, if more millicuries of an isotope are spilled than its limit number in this table, it is considered a major spill. For example, a 5 mCi spill of F-18 would be minor, but a 5 mCi spill of I-131 would be major.

Radionuclide	Millicurie Limit
Hydrogen-3 (Tritium)	100
Carbon-14	10
Fluorine-18	10
Phosphorous-32	10
Sulfur-35	10
Chromium-51	100
Iodine-123	10
Iodine-125	1
Iodine 131	1

CALL TULANE EMERGENCY DPS IMMEDIATELY AT (504)-865-5911 (Uptown) or (504)-988-5555 (Downtown) if a major radioactive spill occurs. Put stock vials behind their shields and place absorbent paper or pads on the spill, if it can be performed safely. **DO NOT** attempt to clean the major spill yourself. Notify OEHS at oehs@tulane.edu.

Use an emergency shower or eyewash station, if you were exposed to the spill. Seek medical attention, if necessary. Additionally, follow your lab's emergency procedures and refer to the Radiation Safety Manual, Section 11.0 Emergency Response and Radioactive Materials Safety and Emergency Procedures for more details.

MINOR RADIOACTIVE SPILL:

A minor radioactive spill is defined by any or all of the following:

- Small area of contamination
- No external or internal contamination of personnel
- No serious delay in work procedures



RAM users may clean minor spills by following the procedures outlined below. RAM users may also contact OEHS at oehs@tulane.edu for assistance if they lack spill remediation materials and/or training.

Category	Items
PPE	Disposable compatible gloves, lab coat, safety glasses/splash goggles, and disposable shoe covers
Clean-Up Materials	Paper towels, soap and water or cleaning solution, and solid radioactive waste container
Survey Equipment	Survey meter (GM Pancake Probe or Sodium Iodide crystal), and filter paper wipes

NOTE: Check gloved hands and shoe covers periodically for contamination using a survey meter. Change the glove/shoe cover if contamination is detected.

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PROCEDURE:

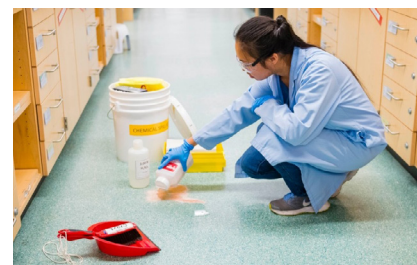
- Notify all persons in the area that a spill has occurred.
- Put on two layers of disposable gloves, a lab coat, safety glasses/splash goggles, and disposable shoe covers (plastic bags may be used to cover shoes).
- Cover the spill with absorbent paper or an absorbent pad. If solids are spilled, moisten the pad with water.
- Using a marker and the survey meter, carefully outline the surfaces that give a reading above background, so that the extent of contamination is clear.
- Rub the contaminated area from the perimeter towards the center with a rag or paper towel, using a clean portion of the rag for each application.
- Carefully fold the absorbent paper or pad, insert it in a plastic bag, and dispose of it in a radioactive waste container. Do the same for any rags used.
- Wash the contaminated area with soap and water and a new rag, working from the outside of the spill to the center. Place all contaminated cleaning rags in the plastic bag for the radioactive waste container.
- With the survey meter, check the area around the spill, hands, shoes, and clothing for contamination. Repeat step 7 until all areas give background readings.
- Once no contamination is detected, perform a wipe test of the spill area and analyze with a liquid scintillation counter. If the wipe is contaminated, continue to decontaminate and wipe test until the wipes come back clean.
- Ensure there is no contamination on personnel, personnel's shoes, clothing, or hands in the surrounding area.
- Document the incident and send to OEHS (oehs@tulane.edu) within 24 hours, and follow any additional guidance offered by OEHS.



If the spill involves tritium, it cannot be detected using a survey meter since it only emits low-energy beta particles. Clean the suspected areas as described above, and take wipe samples from all involved areas to verify successful decontamination. Review this [helpful video](#) walkthrough of decontamination after a minor spill.

DECONTAMINATING EQUIPMENT:

If research equipment is contaminated, it may be decontaminated using the same method as described above. If the device is energized, turn it off before decontaminating. Use the survey meter to detect areas of contamination and wipe using a cleaning solution until the survey meter measures the surface as background. Take wipe samples of the surface as a final check. If feasible, the equipment may be soaked in a cleaning solution to remove radioactive material.



DECONTAMINATING SKIN:

If contamination is found on your skin, wash the affected area with large amounts of lukewarm water and mild soap. Wash your skin gently. Do not scrub aggressively, as this may scrape the surface of your skin and cause abrasions, allowing the contamination to enter your body.

PERMANENTLY CONTAMINATED SURFACES:

If a surface cannot be sufficiently decontaminated to reduce radiation levels to background, it must be demarcated with tape labeled "RADIOACTIVE." Minimize activity of personnel in that area and employ shielding, if necessary. A good estimate for radioactive decay to background levels is the ten (10) half-lives rule. Also, periodic surveys of the contaminated area to monitor decay is an option. OEHS will need to be contacted to perform a final survey, and if it is deemed safe, the tape may be removed and the surface treated as normal.

ADDITIONAL RESOURCES:

- Princeton University Spills & Incidents: [Minor Spill](#); Virginia Tech [Radioactive Material Decontamination Procedures](#); Iowa State [Radiological Spills and Contaminations; Cleaning Up a Spill](#) (video); US NRC [Emergency Procedures](#); University of Nebraska, Omaha [Radiation Safety Manual](#), CDC [Contamination vs. Exposure](#)