Practical Hands-on Training/Evaluation - Drills targeted at proper spill response

Proper spill response is one of the least emphasized aspects of modern education and training programs. These practicums are designed to strengthen a User's knowledge and awareness of NIH radiation safety regulations and provide an opportunity for Users to demonstrate their knowledge and skill. Users will proceed through a spill scenario designed to be similar to the types of accidents that have occurred in their specific working environments.

Users intending to work with types and quantities of radioactive material requiring a DRS protocol MUST complete the Mandatory Hands-on Practicum PRIOR to conducting any procedure approved under an active DRS protocol. Your Area Health Physicist will assist you in determining your particular training requirements. Users who have successfully completed their Online training courses may choose to participate in an Optional Hands-on Practicum.

There are some differences between the two practicums. The Optional Hands-on Practicum is designed to enhance the User's training. To that end, Users are encouraged to ask questions and are not strictly evaluated and scored. The Mandatory Hands-on Practicum is a test. It is scored and Users are expected to demonstrate their ability to handle a spill response with little or no guidance. Users can fail the Mandatory Hands-on Practicum and be required to repeat the practicum until they are able to demonstrate a minimal spill response standard.

Mandatory Hands-on Practicum

These practical exercises are designed so that Users can demonstrate their ability to properly respond to any incident involving the unintended spread of contamination. Additionally, Users will be evaluated on their understanding of the applicable Standard Requirements governing procedures approved under a DRS Radiation Safety Protocol.

View sample scenarios.

Mandatory Hands-on Practicum Scenarios

Radiological PET SOP Training & Spill Drill Evaluation Scenarios:

Cerenkov luminescence imaging (CLI) - Use of Cerenkov radiation for the optical imaging of radiolabeled radiotracers in vivo or in vitro. CLI utilizes a large range of radionuclides including the positron emitters such as ^{18}F, ^{64}Cu, ^{89}Zr; beta emitters such as ^{124}I, ^{131}I; and alpha particle emitters like ^{225}Ac. This scenario is intended to test a groups understanding of three DRS Standard Requirements documents: PET radionuclide use in animals, Precautions for ^{11}C, ^{13}N, ^{15}O, ^{18}F, ^{68}Ga Protocols Production and Purifications, and Precautions for ^{64}Cu Protocols Laboratory Use. Depending on training requirements, HPs may choose one or both of the mock drills below.

Radiolabeling Scenario # 1:

$^{\#}$X-DFO-J591 preparation - Complexation of [$^{\#}$X]X-oxalate with DFO-J591. This radiolabeling reaction is conducted in accordance with the following procedure:

- A clear liquid labeled "[$^{\#}$X]X-oxalate (4.14 mCi) in 1.0 M oxalic acid (170 μL)" and a second liquid labeled "1.0 M Na2CO3(aq.)" are to be combined presumably to adjust to pH8.
  - Verify that proper PPE is used and mock task complete
- The participants will be cautioned: Acid neutralization releases CO_2 gas vapor.
  - Verify that ventilation is used to ensure that no radioactivity escapes and mock task complete.
  - If no ventilation is used
    - Mock hood and personnel contamination.
- After CO_2 gas evolution ceased, DFO-J591 is added and the reaction and mixed gently by aspirating with a pipette.
  - Mock hood liquid spill.
- The reaction is incubated at room temperature for between 1–2 h.
  - Mock timelapse and floor liquid spill.

CLI Animal Study Scenario # 2:

Mice are administered $^{\#}$X-DFO-J591 formulations (300 μCi), in 200 μL sterile saline for injection.

- Perform retro-orbital (r.o.) injection.

  - Verify dosimetry
  - Verify shielding
  - Mock task complete or liquid spill
- Approximately 5 min. prior to imaging, mice are anesthetized by inhalation of 1-2% isoflurane/oxygen gas mixture.
  - Verify proper animal containment
  - Verify proper waste handling procedures
  - Mock protocol complete and perform closeout survey of injection area.
- PET and CL cameras are in separate room. Images are recorded at various time-points between 24–96 hours post-injection.
  - Verify proper animal containment and transport
  - Mock corridor spill

Relevant Standard Procedures Document:

- Animal Studies Proposal (ASP) Requirements
- PET Radionuclide Production or Use in Laboratories
- PET Radionuclides in Animals (ASP)
- Alpha Emitters
- Iodinations
- I-125 and I-131 Labeled Compounds

Standard Requirements for Procedures Under a DRS Radiation Safety Protocol

Animal Studies Proposal (ASP) Requirements

Calcium-45

Chromium-51

I-125 and I-131 Labeled Compounds

Iodinations

PET Radionuclide Production or Use in Laboratories

PET Radionuclides in Animals (ASP)

Phosphorus-32

Sulfur-35

Bromine-76

Selenium-75

Sodium-22

Tritium (H-3)

Copper-64

Alpha Emitters

Optional Hands-on Practicum

This optional training is designed to enhance a new User's knowledge of current NIH radiation safety rules and build on the User's skills for dealing with a radiological spill. The training provides a systematic approach to solving common problems that may arise during a spill recovery. Emphasis is placed on specific actions and practices that lead to the successful management of minor incidents that don't warrant activation of emergency control responses or evacuations. A two-step process is introduced that focuses on contamination control and documentation of a simple spill scenario.

❖ Step 1:

- ∗ This step includes the reinforcement of applicable spill procedures needed to recover from a radiological contamination event and the relative priority of these procedures in progress. The relative priority emphasizes when a specific action is initiated during the contamination control process. This is particularly useful if the User finds themselves involved with multiple spill incidents simultaneously, e.g., spill, injury, etc., and competing priorities have to be assessed.

❖ Step 2:

- ∗ This step includes the execution of the spill procedures identified in Step 1, and the reason for each action. Execution includes both immediate and supplementary actions, e.g., documentation and reporting, that are required for handling a common spill incident.

View a sample spill scenario.

Optional Hands-on Practicum Sample Scenario

You have returned to your lab after a break and discover that an accident has occurred within the lab. As you open the door you see that some equipment and LSC vials are on the floor a few feet in front of the your hood. The floor appears to be contaminated. Since you were working in the hood with the equipment now on the floor, you know that the items are contaminated with H-3. How do you respond and clean up the spill?

Relevant Standard Procedures Document: Tritium (H-3)