

Institutional Biosafety Committee Policy: Responding to Personnel Exposures & Spills Involving Biological Materials

Biological materials used in research include microorganisms, viruses, body fluids and tissues, cells, recombinant or synthetic nucleic acid molecules, biological toxins and other biological materials that may be contaminated or otherwise capable of causing contamination or disease. All biological materials present a risk for cross-contamination in lab operations, and most can be an exposure risk for the personnel handling them. Therefore, it is essential that all lab personnel understand and are proficient and consistent in performing biosafety practices in accordance with applicable biosafety standards. In doing so, the potential for exposure incidents and spills of biological materials will be minimized.

Exposure Incident Response

A “**biological materials exposure incident**” occurs when biological materials enter the body through:

- a puncture, cut or abrasion of the skin involving a biologically-contaminated object (including animal bites/scratches);
- contact of biological contamination with compromised skin;
- contact of biological contamination with mucus membranes of eyes, nose or mouth.

It is important to note that most laboratory-acquired infections documented in the literature have no specific exposure incident associated with the infection. Incidental contact with contaminants followed by handling a personal item that comes in contact with your eyes, nose, mouth or broken skin can lead to an undetected exposure that could lead to infection. It is essential that you know the medical features of the biological agents that you work with in the lab. If you experience any symptoms that may be attributable to an agent you have been handling in the lab, notify your PI and the Occupational Health Clinic.

In the event that a **biological materials exposure incident** occurs, the exposed person should take the following actions immediately:

1. Proceed to the closest sink/eyewash. Remove impacted PPE and flush the exposure site.
2. If the exposure involved broken or compromised skin, use soap and water to thoroughly cleanse the wound. (Do not use bleach or other harsh chemicals that can degrade tissues.)
3. Flush/cleanse the exposure site for 15 minutes.
4. Cover the wound with a bandage (if applicable).
5. Report to the Occupational Health Clinic (or Adult Emergency if outside routine business hours).
 - Occupational Health Clinic hours are 7:00 am – 5:30 pm, Monday – Friday; 640 Medical Arts Building; 615-936-0955;
 - Take any information about the source material that you have readily available along with you.
6. Notify the LAB SUPERVISOR and Biosafety Officer (BSO) at 615-322-0927 as soon as possible once medical follow-up actions have been initiated.

Biological Spill Response

A spill is an unintended release of materials from a container. Biological material spills (aside from those involving materials requiring BSL-3 containment) present the greatest risk for personnel exposure when they involve:

- broken glass,
- large quantities (in excess of 50 mls per vessel), or
- occur in public or common use areas.

Labs that carry out operations that could generate these types of spills will need designated supplies and an established procedure for responding to such spills in a manner that ensures safety for all. This can be achieved by assembling a spill kit and training personnel on the response procedure.

OCRS Biosafety has prepared a spill response procedure appropriate for the spills previously described and this is available on Page 5 of this document. The necessary contents for a kit to be used in conjunction with that procedure includes:

- A supply of fluid-resistant disposable gloves
- A lab coat or disposable smock
- Safety glasses
- Shoe or boot covers
- Absorbent paper towels
- Autoclavable biohazard bags
- Appropriate disinfectant solution
- Expendable broom and dustpan
- Small brush with handle
- Laminated clean-up procedure card



Here is an example of an assembled kit using a bucket to store the kit contents. The bucket can be lined with the biohazard bag for collection of spill waste.

Small-scale spills

When working with small containers of biological materials at the bench or in the biosafety cabinet, disinfectant, paper towels, and a biohazardous waste receptacle should be readily available in order to clean and disinfect the area at the end of the procedure. In most cases, you should have everything you need to clean up a spill. The basic steps for cleaning up this kind of spill safely include:

1. Stop your procedure and assess the scene. Determine what was spilled and where the contamination went. (If the spill ended up on the floor, outside the BSC, or involved broken glass, use the procedure on Page 5.)
2. Assess your gloves and lab coat for contamination. If these items became contaminated, replace them before proceeding with cleanup.
3. Wet a paper towel with disinfectant and then carefully blot up the visible contamination. Discard towel as biohazardous waste.
4. Discard contaminated items that cannot be effectively surface-disinfected as biohazardous waste.
5. Apply disinfectant to all surfaces impacted by the spill; wait the prescribed contact time before removing disinfectant residues and resuming procedure.
6. If the spill enters the grille of the BSC, this will require cleaning and disinfection of the containment pan underneath the work surface. This procedure does not need to be done immediately but generally requires 2 people and some amount of cabinet disassembly. Contact OCRS Biosafety for guidance and assistance in performing this cleanup.

All biological spills, regardless of scale or exposure potential need to be reported to the Lab Supervisor or Principal Investigator (PI). Any biological spill that occurs outside the lab or a biological spill resulting in a personnel exposure needs to be reported to the BSO at 615-322-0927 as soon as possible once medical follow-up actions have been initiated.

Spills Occurring Inside Processing Equipment (Shakers & Centrifuges)

To reduce spill potential associated with processing equipment, inspect all components (including vessels) for signs of degradation that could lead to equipment malfunction. The processing equipment should be used only in accordance with the manufacturer's equipment manual. If during the processing operation, there is any visible or audible sign of equipment malfunction (i.e., knocking, rattling, visibly damaged components, etc.), immediately de-energize the device and notify your lab supervisor or PI and the Biosafety Officer (615-322-0927). Do not open the device for 30 minutes to allow sufficient time for aerosols to settle. If the device is leaking, close off the lab area. The BSO will provide assistance in managing the spill and will assess the event for potential biological exposure.

Toxin, Select Agent and BSL-3 Spills

Laboratories using these materials have specific spill response plans that address the unique requirements for managing these spills safely. However, the reporting requirements related to potential exposure are the same as described in this document.

Spill Response Considerations

The following considerations will aid in assuring that spill response is effectively completed:

- Assure that disinfectant is not expired and is properly prepared. A ready-to-use, EPA-rated tuberculocidal product is a good choice for a broad spectrum of spills. These products tend to have a longer shelf-life, shorter contact time, and are generally safer to handle because there is no preparation required. **NOTE: If you use bleach, and your spill wastes are heavily saturated with bleach, do NOT autoclave the waste as this can be hazardous to both personnel and equipment. Contact OCRS Biosafety for assistance with disposal.**
- Place the spill kit in a well-identified and accessible location and assure that it is routinely checked to make sure components have not degraded or been removed.
- Labs should identify their most likely spill scenario and perform a mock response/cleanup exercise to reinforce the procedure to be followed as it relates to that scenario.
- Contact the BSO for assistance with assembling lab-specific kits, procedures and spill drills.

Spill Prevention Considerations

Biological material spill cleanup procedures present a greater exposure risk than most standard bench procedures, because they put the responder in direct contact with contamination. It is important to note that consistent adherence to spill prevention measures as outlined below can reduce the frequency of spills occurring and further drive down the exposure potential for all:

- Select primary containers constructed of non-breakable materials whenever possible.
- Store primary containers in an upright position, preferably in a rack.
- Where possible, eliminate the use of wet ice. Wet items are difficult to handle and melting ice contributes to the size of a spill.
- Assure that lids of containers are properly installed. Avoid picking up or carrying primary containers by lids.
- When transporting primary containers outside of the lab, place containers in a secondary container with the following features necessary to effectively contain a spill:
 - rigid, non-breakable & leak-proof
 - constructed of material capable of being disinfected
 - has a lid that can be securely closed

NOTE: Secondary containers for transporting materials requiring BSL-2 containment need to be marked with the biohazard symbol and lab contact information.

- When transporting materials out of the lab, use elevators instead of stairs to reduce the potential for a trip hazard and resulting spill.
- When transporting multiple items, use a cart and avoid stacking materials to prevent a “tip over” event.
- Assure that waste bags (including bagged tissues and carcasses) are always stored in a leak-proof container to capture any leakage if the bag gets punctured.
- Sharps containers do not have leak-proof lids. Do not store sharps containers on their sides.

Reporting Other “Releases” of Biological Materials Containing Recombinant or Synthetic Nucleic Acid Molecules

Because genetically-modified materials present an environmental release risk, the following events must also be reported to the Biosafety Officer (615-322-0927) in order to meet reporting requirements under the NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules:

- **Loss or release of transgenic animal (dead or alive) outside the institution**
- **Loss or release of viable materials containing recombinant or synthetic nucleic acid molecules outside the institution**

Policy Endorsement & Revision

This policy was originally reviewed and approved by the Vanderbilt University (VU) IBC and Vanderbilt University Medical Center (MC) Institutional Biosafety Committees (IBCs) on July 26, 2016 for adoption and endorsement.

This policy was subsequently reviewed and minor edits approved by the VU and MC IBC on April 23, 2019.

The VU and MC IBCs approved revision of the document to reflect the current name of the Biosafety Program’s home department (OCRS) on October 27, 2020.

The MC IBC approved revision of the document to remove references to Vanderbilt University and to update contact information on December 12, 2023.

The policy will be reviewed periodically when determined appropriate by the Biosafety Officer for purposes of compliance with regulatory requirements.

Cleanup Procedure for Bio-Spills outside a BSC

**Personal protective equipment for spill cleanup should include:
2 pairs fluid-resistant disposable gloves, safety glasses, shoe covers and a lab coat!**

1. Step back from the spill zone at least 2 steps, then examine your feet. If your shoes are visibly contaminated, or there is visible spill contamination where you are standing, your shoes need to be considered part of the “spill” and decontaminate or discard as appropriate.
2. Notify others in the lab of the event and have someone post the lab as “do not enter”.
3. When spills occur in the open lab, the best response is carried out by a small team, not an individual. Have one person perform cleanup-others should retrieve supplies & reviews procedure.
4. When treating the spill area, go at least 3 feet beyond the visible contamination area; don't forget walls and anything that was within the “splash zone”.

If a spill occurs in a public area, the following basics apply:

1. Stay with the spill and keep others away from it. Send someone to the lab to retrieve spill response supplies and LAB SUPERVISOR or PI if feasible.
2. Contact OCRS Biosafety (2-2057) for assistance with spill and scene management.

Spills & exposure incidents must be reported!

- Report all spills to LAB SUPERVISOR. (NOTE: Biological material spills that occur outside the lab or a biological spill resulting in a personnel exposure needs to be reported to the Biosafety Officer (BSO) at 2-0927 as soon as possible.)
- If any biological material from the lab enters your body through:
 - A break in the skin or
 - Contact with your eyes, nose or mouth**YOU MUST FLUSH, FLUSH, FLUSH!... get to the sink and flush the exposure site for 15 minutes with water! Soap and water should be used if the exposure involved broken skin.**

After flushing the exposure site, you must report to Occupational Health (or Adult Emergency if outside routine business hours and exposure involved human or non-human primate derived materials) for post-exposure follow-up. Then, notify the LAB SUPERVISOR/PI and BSO.

The 1-2-3 for Spill Cleanup

1. **Remove the breached container.** If breached container was glass, use tongs or disposable broom/dust pan. Place glass in sharps container for disposal. If container was not glass, place it in a biohazard bag for disposal or appropriate secondary container.
2. **Treat, absorb and remove the spill contamination.** Cover spill with disinfectant saturated towel and allow to treat spill for several minutes. Absorb and remove spill contamination. Place absorbed spill materials and associated wastes in biohazard bag. Repeat this process if any evidence of contamination is still remaining.
3. **Disinfect all impacted surfaces.** Apply disinfectant to all surfaces impacted by the spill (including those in the “splash zone”); wait the prescribed contact time before removing disinfectant residues. **Use care to limit contact with contaminated surfaces when removing PPE! Place all used spill response materials (including mechanical tools and disposable PPE) in the biohazard bag for treatment as biohazardous waste.**