

# Spill Response in a Biological Lab

Spills are the most common incidents with the potential for exposure of personnel to pathogens or toxins, or their release from containment. Spills can contaminate surfaces, equipment, samples, and workers. The decontamination protocol used depends on where the spill occurred and its size (volume).

When a spill occurs outside a BSC, the potential exists for all those present in the work area to be exposed to infectious aerosols or aerosolized toxins. Personal safety is the top priority, but it is also important to prevent the spread of contamination outside the immediate area and the containment zone. Having a pre-assembled biological spill kit on hand that contains all items needed to contain and clean up a spill (e.g., gloves, disposable gowns and shoe covers, respirator, effective disinfecting agent, paper towels or spill pillows, dustpan, broom, tongs, waste bags, and a waterproof copy of spill clean-up standard operating procedures [SOPs]) will facilitate timely and effective spill response. It is important that personnel are adequately trained to follow spill response procedures. A disinfectant that is effective to the pathogen manipulated and stored in the lab is selected and available to personnel prior to starting work. **The spill clean-up procedure outlined below must be customized to the specific hazards present in your laboratory.**

## General Spill Clean-Up Procedure

After the risk of injury has been controlled, the following steps are recommended to contain a spill of infectious material and decontaminate the area affected by a spill:

1. Remove any contaminated or potentially contaminated clothing and personal protective equipment (PPE).
2. Contaminated personnel doff their outer layer of PPE and any contaminated or potentially contaminated clothing and follow normal exit procedure, including handwashing. In the case of a large spill, personnel remove the outer layer of protection in proximity to the spill. Depending on a local risk assessment (LRA) and SOPs, personnel may proceed to a change room to remove the inner layer of PPE, which is placed into an autoclave bag for decontamination. Personnel proceed to wash any other potentially contaminated parts of their body.
3. Notify all staff in the immediate vicinity that a spill has occurred and to leave the area.
4. Exposed persons should be referred for medical attention. The **laboratory supervisor or responsible authority** should be informed without delay.
5. Allow aerosols to settle (e.g., for 30 minutes) before re-entering the area. If the laboratory does not have a central air exhaust, entry should be delayed (e.g. for 24 hours) to allow sufficient air exchanges to exhaust any aerosols and to allow heavier particles to settle. Signs should be posted indicating that entry is forbidden.
6. Don fresh PPE appropriate to the risk, which may include gloves, protective clothing, face and eye protection, and a respirator.
7. Assemble required clean-up materials (e.g., biological spill kit) and bring them to the site of the spill.
8. Cover the spill with cloth or paper towels to contain it.
9. Pour an **appropriate disinfectant** (i.e., sufficient concentration, effective against the pathogen(s) spilled, freshly prepared) starting at the outer margin of the spill area, and



concentrically working toward the center, over the cloth or paper towels and the immediately surrounding area.

10. After the **appropriate contact time** (i.e., for the pathogen and disinfectant), clear away the towels and debris. If there is broken glass or other sharps involved, use a dustpan or pieces of stiff cardboard to collect and deposit the material into a puncture-resistant container for disposal. Glass fragments should be handled with forceps. Dustpans can be autoclaved or placed in an effective disinfectant.
11. Clean and disinfect the area of the spillage. If necessary, repeat the previous steps.
12. Dispose of contaminated materials in a leak-proof, puncture-resistant waste disposal container.
13. Once the spill clean-up is complete, as per the general spill clean-up procedure, personnel doff contaminated PPE and don clean PPE prior to returning to work in the laboratory.
14. After disinfection, inform the appropriate internal authority (e.g., lab manager, PI, or BSO) that the site has been decontaminated.
15. Depending on the nature and size of the spill, a complete room decontamination may be warranted.

### Spill Inside a Biological Safety Cabinet

The size of the spill is determined by how far it spreads, and less by its volume. When a small spill occurs inside a BSC, the worker is not considered contaminated unless a splash or spillage has escaped the BSC; however, the gloves and sleeves may be contaminated. A large spill in a BSC may result in material escaping the BSC and the worker becoming contaminated. In this case, the outer layer of PPE is considered potentially contaminated and should be removed at the BSC. The following general procedure is recommended for spills inside a BSC:

1. Remove gloves and discard within the BSC. If two pairs are worn, discard the outermost layer. If sleeves are potentially contaminated, the lab coat or gown should also be removed. Fresh gloves should be donned and if necessary, also a fresh lab coat or gown.
2. Leave the BSC blower on and the sash at the appropriate level.
3. Follow the instructions for general spill clean-up, keeping head outside the BSC at all times.
4. Surface disinfect all objects before removing them from the BSC, or place them into bags for autoclaving. Remove contaminated gloves and dispose of them inside the cabinet.
5. Place PPE into bags for autoclaving.
6. If material has spilled through the grill of the BSC, pour disinfectant through the grill to flood the catch tray underneath.
7. Wipe all inside surfaces with disinfectant.
8. Raise the work surface, clean the catch tray, and then replace the work surface.
9. Allow BSC to run for at least 10 minutes before resuming work or shutting down.

## Spill Inside a Centrifuge

If a breakage occurs or is suspected while a centrifuge is running, the motor should be switched off and the centrifuge left closed (e.g., for 30 minutes) to allow aerosols to settle. Should a breakage be discovered only after the centrifuge has been opened, the lid should be replaced immediately and left closed (e.g., for 30 minutes).

1. Inform the appropriate internal authority (lab manager, PI).
2. Follow the instructions outlined in general spill clean-up.
3. If possible, use a non-corrosive disinfectant known to be effective against the pathogen concerned. Whenever possible, consult the centrifuge manufacturer's specifications on the unit to confirm the chemical compatibilities.
4. All broken tubes, glass fragments, buckets, trunnions, and the rotor should be placed in a non-corrosive disinfectant (forceps are to be used to handle and retrieve glass and other sharps debris). Unbroken sealed safety cups may be placed in disinfectant and carried to a BSC to be unloaded.
5. The centrifuge bowl should be swabbed with the same disinfectant, at the appropriate dilution, and then swabbed again, washed with water, and dried.

Principal investigator: \_\_\_\_\_

Emergency contact number: \_\_\_\_\_

Biological hazards in the lab: \_\_\_\_\_

Appropriate disinfectant: \_\_\_\_\_

Minimum contact time: \_\_\_\_\_

The list of personnel and students below have read and understood the SOP for cleaning up biological spills outlined above.

NAME	DATE	SIGNATURE

Guidelines taken from <https://www.canada.ca/en/public-health/services/canadian-biosafety-standards-guidelines/handbook-second-edition/chapter-16-20.html#s173>