

Section 8. Biological Incidents

Biological Incidents include:

- spills and leaks of infectious material
- accidents with infectious agents where personal injury has occurred
- leakage of potentially contaminated liquid from any part of the IRF's effluent treatment area
- accidental inoculation such as from a needle, broken glass vessel or animal bite

The response to a Biological Incident will vary according to the Biological security and/or safety risk posed by the infectious agent, whether or not people are injured or are at risk of infection and the extent and location of the spill or leak.

Emergency Steps to Take in the Event of a Biological Incident

In considering the response to **ANY** incident, the first priority is the safety of people involved. Your immediate task is to ensure that appropriate action is taken to attend to any serious injuries or life-threatening situation, and to ensure that you and others are not exposed to liquid or aerosols from the leaked material.

The second priority is to take whatever immediate action is required to limit the spread of infectious material, **where this can be done without increasing the danger to yourself or others and where you are competent to do so**. Action will depend on the agent involved, the nature of the substance (e.g. liquid or aerosol), the type of incident and its location.

Third, the spilled or leaked material is to be cleaned up, disinfected and the area or equipment made safe again. Whether or not staff involved in the incident should do this themselves, or whether the incident is immediately reported to the Biosafety Officer for action will again depend upon what the material is and where the incident occurred (see Reporting section below).

Finally, all Biological incidents must be reported to the laboratory supervisor, the RML Biosafety Officer, and the RML Occupational Safety and Health Manager. As just indicated, reporting prior to attempting clean up may be warranted to determine if a specialized procedure can be adopted.

Most importantly, remember:

IF THE SITUATION IS BEYOND YOUR CONTROL LEAVE THE AREA IMMEDIATELY. CONTACT THE IRF SECURITY CONTROL DESK OR THE RML BIOSAFETY OFFICER AS SOON AS YOU ARE IN A SAFE LOCATION.

Biological Spills and Leaks

General Staff Response

Personnel who work in laboratories, animal facilities or in the effluent treatment rooms are expected to be familiar with the specific procedures detailed elsewhere in this Section. It is conceivable, however, that any member of staff may be the first on the scene where a leak or spill of potentially contaminated material has occurred, and quick action is required to prevent serious consequences. This particularly applies to Security Personnel conducting routine checks after hours, but is relevant to all staff.

Packages Containing Biological Specimens

Infectious material may be forwarded to The Integrated Research Facility from other institutions, and may leave The Integrated Research Facility under conditions specified by the Department of Transportation and the Select Agent Program. There is always potential for such material to leak, or to be spilled following an accident. Any leak from packaged material must **always** be considered hazardous until cleared by the Biosafety Officer or their delegate.

If leaking or spilled material occurs:

Do not touch the package. If you have already touched it, wash your hands in hot soapy water, taking care not to touch anything else on the way to the sink.

If a delivery vehicle may have been contaminated, hold the vehicle until inspected by the Biosafety Officer.

Contact the Biosafety Officer, Occupational Safety and Health Manager, or IRF Security Control Desk, and report the matter. Give as much information as possible (location, source of material, extent of obvious contamination, your telephone extension).

Keep others away from the immediate vicinity.

Await further advice from Biosafety/Safety personnel.

Leaks in Non-Containment Areas

Piped Services

- **Piped services into the Containment Area (all Floor Levels).** These cross the biocontainment barrier at a number of points, and carry water, gas, steam or compressed air. These will generally pose no Biological risk.
- **Ventilation piped services from the Containment Area.** These include filtered exhaust air and generally will pose no Biological risk.

If you discover a leak associated with a piped service, a containment penetration, or through a joint in the structure, you should:

- Move away from the immediate area, especially if there is dripping or splashing.
- Contact the RML Biosafety Officer, Occupational Safety and Health Manager, or IRF Security Control Desk, and report the matter. Give as much information as possible (location, nature of leak, your telephone extension).
- Keep other people away from the area.
- Await further advice from RML Biosafety/Safety personnel.

BSL-2 Laboratories

If you observe a leak or spilled material, follow the procedures as for Piped Services

Leaks in Containment Areas (BSL-3 Laboratories Only, Including Building 25)

Staff who discover a spill or leak in a part of the Contained Area that is not familiar to them or which is outside of their normal work area cannot be expected to know the significance of the spill or leak, and are therefore advised to consider any such incident as potentially hazardous until it can be investigated. Some general rules should be observed whenever a leak, spill or puddle of unknown origin is found:

BSL-3 Laboratories (includes Building 25)

Immediately contact the Biosafety Officer, or if anyone is injured contact the IRF Security Control Desk. Give all information possible (injuries, location of incident, size of spill or leak, your telephone extension).

Aid any injured personnel, but be aware of the possibility of personal contamination.

Avoid breathing in any aerosols.

Unless you are familiar with the equipment involved, **DO NOT** attempt to isolate the source of the leak or attempt equipment shut down.

Move away from the immediate area (preferably to an area where there is a barrier from the spill zone). If possible, advise anyone else in the vicinity to evacuate the area.

If you are contaminated, remove all contaminated clothing (this may include your street clothes), shower out of the area (if possible) and don the emergency scrubs supplied. You may have to delegate responsibility for contacting the Biosafety Officer to another person who can remain by the phone at the assembly point (the clean change area) while you shower out. Do not re-enter the spill zone.

Await further advice from the Biosafety Officer.

Laboratory Staff Response

The following procedures apply to Biological spills and other incidences within the BSL-2 and BSL-3 laboratories and are to be applied both during normal working hours and after hours. These procedures apply to staff that normally work in the BSL-2 and BSL-3 laboratories.

The basic rules for responding to spills in a laboratory are:

- **Tend the injured** - ensure receipt of immediate medical care
- **Isolate the spill** - evacuate the immediate spill area or the entire suite in the case of an aerosolizing spill
- **Contain the spill** - place absorbent material around, on, or in the flow path of the spilled material if it can be done safely.
- **Clean up the spill** – if indicated, allowing time for disinfectants to act
- **Report the spill** – if indicated, wait for assistance to proceed with cleanup

Designated BSL-2 Laboratories

In Laboratories where BSL-2 agents are in use, spills inside and outside of biological safety cabinets may be attended to by the staff involved **EXCEPT WHERE OTHERWISE INDICATED.**

In ALL cases, you must report the incident to the Biosafety Officer or Occupational Safety and Health Manager if someone is injured or potentially exposed to the BSL-2 agent! Also, tell the Biosafety Officer if you feel that it occurred as the result of poor practice or equipment failure.

Spills inside biological safety cabinets (BSCs):

- **Small** spills should be immediately wiped up using disinfectant-soaked paper towels or other absorbent material while the cabinet is still running. Allow the disinfectant to act before discarding waste into an autoclave bag for disposal. Do not let the material dry onto the BSC work surface.
- **Larger** spills (e.g. broken culture flasks) are similarly treated, but may require you to stop your work and clean all contaminated surfaces of the cabinet. Leave the cabinet running. Pools of liquid may be covered with disinfectant-soaked paper towelling to absorb the bulk. If your gloves/gown are contaminated, remove these and discard in separate biohazard container for autoclaving. Wash hands and arms thoroughly.

- Discard waste as above, taking care with broken glass.
- Large spills inside BSCs will run into the sump of the cabinet and must not be allowed to dry out. With the cabinet running, lift the work floor and clean its under-surface and the sump floor with disinfectant. Dry with towelling before re-assembly.
- **NOTE: DO NOT USE HYPOCHLORITE-BASED DISINFECTANTS IN BIOLOGICAL SAFETY CABINETS. HYPOCHLORITE IS CORROSIVE TO STAINLESS STEEL.**
- **Report spills of large volumes of infectious material directly to the Biosafety Officer at your earliest convenience. An inspection or re-certification of the BSC may be necessary.**

Spills outside a biological safety cabinet:

- **Small** spills (e.g. drips) occurring within the laboratory and where there has been **NO** significant splashing or personnel contamination should be dealt with as follows –
 - Wearing the appropriate protective equipment (gloves, lab coat, etc.) cover the spill with disinfectant-soaked absorbent toweling or other material.
 - Be careful to avoid cuts with broken glass. To eliminate the potential for cuts use tongs, dust pan or some other device for pickup and carefully discard into an approved sharps container.
 - Using paper toweling, wipe up the spill working from the outside edges toward the center.
 - Clean the spill area again with fresh disinfectant.
 - Place all used materials into Biohazard bags and autoclave.
- **Larger** spills, or any spill which has caused extensive splashing or personnel contamination, should be dealt with as follows –
 - Avoid breathing in any aerosols, remove contaminated PPE, and immediately evacuate the laboratory.
 - Prevent others from entering the laboratory by placing a "**DO NOT ENTER-BIOLOGICAL SPILL**" sign on the door. The sign should include the date and time of posting and directions to contact the RML Biosafety Officer. No one may return to the spill area unless approved by the BSO.
 - **Report the spill to the Biosafety Officer and give as much information as possible (nature of incident, agent involved, location, approximate volume of spill if known, your telephone extension).**
 - Depending upon the agent involved and the nature of the incident, the Biosafety Officer may elect to inspect the spill and to arrange

clean-up or may direct you to attend to it.

- If approved by the Biosafety Officer, and after at least 30 minutes have elapsed (to allow aerosols to disperse), don protective clothing (gowns, tyvek booties, N95 respirator (if aerosol concern), and gloves), enter the laboratory and cover the bulk of the spill with disinfectant-soaked towels to assist in decontaminating the fluid. Pour disinfectant onto the towel and leave 30 minutes to neutralize the infectious material.
- Mop up the spill using absorbent paper (try to avoid walking in the liquid) by working from the outside edge to the center. Carefully pick up any broken glass or other equipment. Place the waste into appropriate containers (sharps disposal containers, autoclave bags or tote-boxes) for autoclaving. Finally, decontaminate splashed equipment and furniture with disinfectant and paper towels.
- The DO NOT ENTER sign may not be removed, and no work may resume until approved by the Biosafety Officer.

Designated BSL-3 Laboratories

In the BSL-3 laboratories, any spill that results in overt or potential exposure to infectious materials must be reported to the laboratory supervisor, the Biosafety Officer, the Occupational Safety and Health Manager and, if applicable, the RML Select Agent Responsible Official. A written report must be prepared and maintained. More specific details are included in the Standard Operating Procedures developed for laboratory module.

An emergency spill kit must be available within the laboratory. This spill kit shall contain at a minimum: 2 gal of disinfectant; towels; 2 emergency Tyvek suits; rubber gloves; autoclave bags; warning signs and tape; written instructions on procedures for a spill. The spill response section will be posted next to the spill kit.

Racal hoods, warning signs, and tape are to be readily accessible in the anteroom.

Spills inside biological safety cabinets (BSCs):

- When a spill occurs, the operator should immediately cover the affected area with absorbent pads, tissues or towels to contain the incident and prevent further aerosolization.
- The absorbent material should then be soaked with disinfectant.
- No work should then proceed within the cabinet for at least 15 minutes to allow the cabinet exhaust system to remove aerosols and give sufficient contact time for the germicide to act.
- At the end of this period, the operator should don a second pair of gloves

and place all clean up materials (broken tubes, plates, absorbent towels, etc.) into a biohazard bag. All sharp objects or broken materials should be placed in Sharps receptacle prior to bagging.

- Any disposable plastic-ware or tubes that were within the cabinet at the time of the incident should be disposed of as above.
- Any other non-disposable items should be carefully decontaminated with disinfectant followed by 70% ethanol.
- The entire cabinet interior (including grills at front and rear) should be wiped down with disinfectant.
- All biohazard bags should then be autoclaved.

Spills outside a biological safety cabinet:

- When any quantity of potentially infectious aerosol is generated outside the BSC (e.g., by breaking a tube or flask of liquid culture), immediately inform all others working in the suite to leave. (Note that rendering of immediate first aid for life-threatening injuries may take precedence over total, immediate evacuation.)
- Once all individuals have entered the anteroom, all disposable safety clothing is removed and disposed of in a biohazard container.
- Once outside the laboratory, the person responsible for the spill will place a "**DO NOT ENTER-BIOLOGICAL SPILL**" sign on the laboratory door. The sign should include the date and time of posting and directions to contact the RML Biosafety Officer. No one may return to the spill area unless approved by the BSO.
- If overt contamination of body, shower thoroughly.
- Decontamination and Clean Up
 - Personnel assigned to effect decontamination/clean-up (spill responders) will follow these procedural guidelines under the direction of the suite supervisor and/or Biosafety Officer:
 - After initial evacuation, allow a minimum of 2 hours elapsed time after spill to permit settlement and elimination of aerosolized particles.
 - Put on Racal hood and appropriate PPE and reenter the suite.
 - Place disinfectant-soaked absorbent toweling over affected area. Gently flood entire spill area (extend beyond affected area) with disinfectant and allow sufficient contact time. Wipe down floor, walls, sink, and other exposed surfaces with disinfectant. Collect all contaminated materials in appropriate biohazard containers. Place containers in autoclave and start cycle before exiting suite.
 - Proceed to anteroom and remove clothing and equipment. All

material used for cleanup will be decontaminated or transferred to the autoclave and sterilized. Shower thoroughly.

- In consultation with the Biocontainment Exposure Assessment Program (BEAP) the Biosafety Officer may order additional decontamination procedures. At a minimum, after cleanup of the spill area, a minimum of 4 hours must elapse before resuming work in the suite.
- The DO NOT ENTER sign may not be removed, and no work may resume until approved by the Biosafety Officer.
- The BSL3 logbook record of the incident will be updated with details of all remedial actions undertaken.

Spills in laboratory centrifuges

Failure of tubes and rotors during centrifugation can be the cause of significant aerosol production. If a failure is suspected **during** a centrifuge run –

- Immediately switch the machine off and allow the rotor to come to rest.
- **DO NOT OPEN THE CENTRIFUGE.**
- Avoid breathing any aerosols and evacuate the immediate area.
- Proceed as above for spills outside of a BSC.

If a spill is discovered **after** opening the centrifuge, or is visible through a transparent lid:

- Avoid breathing any aerosols and immediately close the centrifuge if open.
- Evacuate the immediate area and proceed as above for spills outside of a BSC.

Spills and Leaks involving Effluent Treatment

A Biological incident involving effluent is defined as any leak of potentially contaminated liquid waste or gases vented from that waste which has escaped from the contained effluent treatment facility.

Such leaks may occur in any part of the treatment facility on Level 1, the collection and venting systems on Level 3, or, less commonly, from drains in the containment area on Level 2. Very rarely leaks may be associated with the HEPA filters that service effluent vent systems on Level 3 (e.g. condensation problems in filter housings).

The Effluent Treatment facility is normally operated following BSL-2 protocols. The rooms are designed to protect the environment in case of a large spill. All waste directed to these tanks has been pre-treated in some way prior to entering the effluent treatment system.

Before entering these areas after a reported spill it is important to use the security cameras to survey the area.

The following procedures apply to staff working in the **Operations and Maintenance Group**.

Level 1 Leaks (Effluent Treatment Room)

Leaks on Level 1 may be from areas containing unprocessed or processed (i.e. heat-treated) effluent, steam condensate or heat exchange water. A leak may range from a small, intermittent drip to a free running or spraying (pressurized) leak. Unless the nature of the leak can be **immediately** identified as non-contaminated (e.g. condensate from a steam line, non-contaminated water or processed effluent) by the O & M supervisor or their deputy, the leak must be reported to the Biosafety Officer. **Any leak not immediately identified as non-contaminated shall be considered potentially hazardous until investigated by the Biosafety Officer.**

IF THERE ARE INJURIES TO PERSONNEL, GIVE IMMEDIATE ASSISTANCE AND CONTACT THE IRF SECURITY CONTROL DESK.

Small leaks (drip or weep e.g. from effluent line)

- Without risking personal contamination, place orange cones so that other staff will not inadvertently walk in the leaking material, breathe in aerosols or otherwise are contaminated by the leaked material.
- Move away from the immediate area and report the matter to the Biosafety Officer, giving as much information as possible (exact location, size of leak, possible/probable source, your telephone extension).
- If possible, **and without risking further contamination by liquid or aerosol**, attempt to isolate the source of the leak and shut down any

equipment as necessary.

- If directed to do so by the Biosafety Officer, and wearing appropriate PPE, cover the spill with the absorbent material provided, then saturate the area with 10% hypochlorite. Wait at least 20 minutes before shovelling the material into a biohazard waste bucket for disposal.
- Dispose of PPE in biohazard waste.
- Await further advice from Biosafety/safety personnel.

Large leaks (free running liquid, spraying leak)

- **Under these conditions BSL-3 practices are to be followed.** The area will remain in BSL-3 operations until the Biosafety Officer notifies O & M staff.
- If possible, **and without risking further contamination by liquid or aerosol**, attempt to isolate the source of the leak and shut down any equipment as necessary.
- If this is not possible, move away from the immediate area, and assemble in the Effluent Treatment Control Room. Advise other staff in the vicinity to keep clear.
- Contact the Biosafety Officer or the IRF Security Control Desk, giving as much information as possible (injuries, location and size of leak, possible/probable source, action already taken, personnel contamination, your telephone extension).
- **Contaminated personnel** should remain in the Effluent Treatment Control Room. They should remove all contaminated clothing, place it in a designated biohazard container, and don emergency scrubs provided. When directed by the Biosafety Officer, they should shower using a containment shower as soon as possible. After showering, don fresh clothing. Do not go back into Level 1 area and do not leave the area until cleared by the Biosafety Officer.
- Await advice from the Biosafety Officer, who will arrange inspection and determine further action.

Level 1 Leaks (Outside of Effluent Treatment)

Leaks on Level 1 may arise from the effluent collection piping system (unprocessed effluent), steam condensate, or water. Leaking effluent collection pipes and associated systems resulting from pipe or joint failure should be extremely uncommon. Level 1 leaks may range from small, intermittent drips or weeps to a free running or spraying leak.

Unless the nature of the leak can be **immediately** identified as non-contaminated (e.g. condensate from a steam line or non-contaminated water) by the O & M supervisor or their deputy, the leak must be reported to the Biosafety Officer without delay. **Any leak**

not immediately identified as non-contaminated by the Operations and Maintenance Supervisor or another competent person shall be considered potentially hazardous until investigated by OHS, or his delegate.

Small leaks (drip, weep or gaseous leak, e.g. from vent systems)

- Treat as for small leaks in Effluent Treatment Room

Large leaks (free running liquid, spraying leak)

- If possible, **and without risking further contamination by liquid or aerosol** attempt to isolate the source of the leak and shut down any equipment as necessary.
- Give immediate assistance to any injured personnel. **IF THERE ARE INJURIES TO PERSONNEL, CONTACT THE IRF SECURITY CONTROL DESK.**
- Move away from the immediate area and advise other staff in the vicinity to keep clear and to assemble in an area on Level 1 remote from the leak.
- Use the assembly point to phone the Biosafety Officer, giving as much information as possible (injuries, location and size of leak, possible/probable source, action already taken, personnel contamination, your telephone extension).
- Await advice from the Biosafety Officer, who will arrange inspection and determine further action.

Accidental Inoculations

These are most commonly caused by broken glass and needle-stick. If you or someone else in the laboratory is injured, proceed as follows:

Needlestick and sharps injuries of all depths and types

- Expose the affected area sufficiently to determine the size of injury and to render additional care
- If the wound has penetrated intact skin, attempt to express blood from the wound **while proceeding to a wash station** and again **after** washing.
- Wash the area immediately with copious amounts of antibacterial soap or povidone iodine solution (such as Betadine) and water
- Place an antiseptic ointment over the affected area.
- Do not use caustics such as bleach etc. on any open wound as they may damage the skin and increase chances of infection as well as delay wound healing.
- Report the incident to the Occupational Safety and Health Manager or Biosafety Officer (refer to Section 11 “Exposure Reporting and Management” for additional information).

As part of the incident review, a sharps injury log will be maintained for the recording of percutaneous injuries and mucous membrane exposures. The log contains information on the type and brand of device involved in the incident; the department and work area where the incident occurred; and an explanation of how the incident occurred. The log will be maintained by the Occupational Safety and Health Manager and used to gather information that may aid in the implementation of safer technologies. The information in the sharps injury log shall be recorded and maintained in such manner as to protect the confidentiality of the injured employee.

All work-related needlestick injuries and cuts from sharp objects that are contaminated with another person’s blood or other potential infectious material (as defined by 29 CFR 1910.1030) will be entered in the OSHA 300 Log as an injury using the OSHA 301 Injury and Illness Incident Report

Mucous membrane splash

- Contaminated eyes and mucous membranes should be irrigated for 15 minutes using normal saline or water.

Biological Incidents in Animal Rooms (ABSL-3 Only)

Generally, Biological spills in Small Animal Rooms are of less significance than in laboratory or common areas because the level of containment is higher and because staff working in these rooms has more specialized knowledge of the agents they are working with and have appropriate personal protective equipment.

On the other hand the possibility of direct inoculation (needle stick, animal bite) is increased due to the nature of the work.

Bite from an infected animal

- Expose the affected area sufficiently to determine the size of injury and to render additional care
- If the wound has penetrated intact skin attempt to express blood from the wound **while proceeding to a washing station** and **after** washing.
- Wash the area immediately with copious amounts of antibacterial soap and water
- Place an antiseptic ointment over the affected area.
- Do not use caustics such as bleach etc. on any open wound as they may damage the skin and increase the chances of infection as well as delay wound healing.
- Laboratory animals carry their own indigenous flora, which has the potential to cause infection after a bite. At least 85% of wounds from animal bites harbor bacteria, and one cannot reliably predict which wound will become infected. For this reason **antibiotic prophylaxis is indicated for any bite**.
- While Asian macaque monkeys have been identified as natural carriers of Herpesvirus simiae (B virus), which has the potential to be a devastating human pathogen, the macaque colony at RML is unique in being B virus free. Thus monkey bites will be treated as above.
- All laboratory workers should have their tetanus immunization status reviewed at the time of the bite, and updated if indicated.
- Report the incident to the Occupational Safety and Health Manager or Biosafety Officer (refer to Section 11 "Exposure Reporting and Management" for additional information).

Scratch from an infected animal

- Expose the affected area sufficiently to determine the size of injury and to render additional care.
- If the wound has penetrated intact skin attempt to express blood from the wound **while proceeding to a washing station** and **after** washing
- Wash the area immediately with copious amounts of antibacterial soap and

water

- Place an antiseptic ointment over the affected area.
- Do not use caustics such as bleach etc. on any open wound as they may damage the skin and increase the chances of infection as well as delay wound healing.
- All but the most superficial of scratches should receive a course of antimicrobials
- Report the incident to the Occupational Safety and Health Manager or Biosafety Officer (refer to Section 11 “Exposure Reporting and Management” for additional information).

Biological Spills in Animal Facility

In the ABSL-3 laboratories, any spill that results in overt or potential exposure to infectious materials must be reported to the laboratory supervisor, the Biosafety Officer, and the Occupational Safety and Health Manager

IF SOMEONE IS INJURED CONTACT THE IRF SECURITY CONTROL DESK OR THE BIOSAFETY OFFICER

- Contain the spread of spilled, infectious liquid using paper towels and disinfectant.
- Dispose of clean-up materials in biohazard waste.
- Place all contaminated PPE in biohazard waste. Replace with clean PPE.
- If the amount of contamination on the body is considerable (e.g. splashing from broken container), remove contaminated clothing, place in a designated biohazard container, leave the room as soon as possible and shower in the change room shower. Contact the Biosafety Officer and await their instructions. Do not leave the facility.