

BIOLOGICAL SPILL CLEAN UP

SCOPE

This document provides generic procedures (outlined in the Procedure section of this document) for biological spill containment and clean up. This procedure should be reviewed and revised as appropriate for your planned work. Local variation in biological agents used as well as operational procedures will influence the customization of the procedure used.

Disposal process for the waste generated will vary by facility.

PURPOSE

To provide a consistent, institutional guideline for containment and cleanup of a biological spill.

BACKGROUND

Every laboratory working with infectious biological agents must have written spill control and safety procedures appropriate to the hazards and characteristics of the agents in use. Spills or other accidental releases of biohazards can be large or small, confined within equipment such as centrifuges or biological safety cabinets, or unconfined, and they may be liquid or dried. Spills may also involve other hazards such as isotopes, chemical, electrical equipment and aerosol generation. These other hazards must be considered when planning spill response. Identification of all risks, both potential and actual, as well as the various factors listed above, must be taken into consideration before spill clean-up begins.

RESPONSIBILITY

Individual Biosafety Permit Holders bear responsibility for:

- ensuring personnel handling, receiving, packaging, documenting and/or transporting hazardous or potentially hazardous substances are adequately trained and supervised;
- ensuring to the best of their abilities, that all hazardous or potentially hazardous substances entering or leaving their inventories do so in accordance with applicable international, federal and provincial regulations and standards;
- ensuring all members of their study teams abide by the procedures outlined in section 8; and
- Procurement and use of materials, PPE and services listed in sections 6, 7 and 8 as necessary to comply with the procedures in section 8.

All UBC Members bear responsibility for:

- ensuring they are adequately trained prior to handling, storing, disposing and/or transporting hazardous or potentially hazardous substances;
- reporting all unsafe conditions including breaches of containment; and
- abiding by the procedures outlined in section 8.

REFERENCES AND DEFINITIONS

Biological Material: Pathogenic and non-pathogenic bacteria, viruses, fungi, prions, toxins, genetically engineered organisms, nucleic acids, tissue samples, toxins, diagnostic specimens, live vaccines and isolates.

Biological Safety Cabinet (BSC): A Primary Containment Device that provides protection for personnel, the environment and the product (depending on Class) when working with biological material.

Containment: The combination of physical space delineation and operational practices that protect personnel, the immediate work environment, and the community from exposure to biological material.

Contamination: the undesired presence of infectious material or toxins on a surface or within materials.

Decontamination: The process by which materials and surfaces are rendered safe to handle and reasonably free of microorganisms, toxins or prions; this may be accomplished through disinfection, inactivation, or sterilization.

Disinfectant: A chemical used for the decontamination of surfaces and equipment that cannot be autoclaved. Correct selection and use of disinfectants is critical for effective decontamination. Note: a table is provided in the Appendix of this document that outlines advantages and disadvantages of some common disinfectant classes.

Disinfection: Process that eliminates most forms of living microorganisms. The effectiveness of the disinfection process is affected by a number of factors including the nature and quantity of microorganisms, the amount of organic matter present, the type and state of items being disinfected, and the ambient temperature.

Exposure: Contact with, or close proximity to, infectious materials or toxins that may result in infection or intoxication, respectively. Routes of exposure include inhalation, ingestion, inoculation and absorption.

Gross Contamination: The accumulation of organic material on a surface that can be removed by physical methods such as scraping, wiping and brushing.

Infectious Substance: A substance known or reasonably believed to contain viable micro-organisms such as bacteria, viruses, rickettsia, parasites, fungi, and other agents such as prions that are known or reasonably believed to cause disease in humans or animals. The infectious substance might be contained in blood, tissue, organs, body fluids, vaccines or cultures.

Laboratory: An area within a facility or the facility itself where biological material is handled for scientific or teaching purposes.

Sterilization: Process that eliminates all living microorganisms, including spores.

MATERIALS/EQUIPMENT

Basic Biological Spill Cleanup Kit Contents

- Written spill clean-up procedure
- Gloves, protective clothing, and safety goggles
- Tape or marking pencil to mark off spill area
- Biohazard Spill Notice (Keep out) sign
- Appropriate chemical disinfectant (check expiry date and dilution)
- Absorbent material (paper towel, incontinent pads, cloth rags or absorbent carbon pads)
- Disposal bags – leak proof, autoclavable, and labeled (biohazard tags)
- Sharps collector and forceps for picking up broken glass or sharps
- Paper, Incident/Accident Report form and pencil to document the spill and any possible personnel exposure.

Addition Contents Recommended

- Scrubs
- Towel
- Rubber boots or disposable shoe cover
- Privacy curtain for if someone needs to use the emergency shower.
- Bar of soap (because the soap from the dispenser is awkward in an emergency)

Personal Protective Equipment (PPE)

Protective clothing (lab coat or isolation gown)

Gloves (double gloving recommended for Risk Group 2 agents)

Eye/face protection – goggles or face shield

Rubber boots or shoe covers recommended

PROCEDURE

Generic Procedure for Larger (over 100 ml)

1. If there is any hazard associated with aerosol release, everyone should immediately leave the area.
2. If necessary, block access to the area and mark each entry point with a Biohazard Spill Notice sign. Allow at least 30 minutes for the aerosols to settle before re-entering.
3. Notify the supervisor and Risk Management Services at [604 822 2029 Vancouver] or [Okanagan 250 575 4079]. If the spill is greater than 1 litre notify [local security] or call 911 for assistance.
4. Individuals involved in the spill should check for contamination of clothing, footwear, and skin and take the appropriate action according to their specific spill control protocol prior to attempting spill clean-up.
5. Put on the appropriate personal protective equipment.

6. Define the area requiring clean-up and decontamination, allowing sufficient area for any splattering or drying which may have occurred.
7. Set up a disposal bag to allow easy discarding of contaminated clean-up materials.
8. Move slowly and carefully while gently covering the spill with absorbent materials (rags, shop towel or paper towels). This will avoid the creation of new aerosols.
9. Gently pour fresh disinfectant over the absorbent material until it is completely saturated.
10. Let stand for the appropriate contact time for the disinfection reaction to complete.
11. Gather absorbent to the centre of the spill and place in disposal bag.
12. Working from the outside in, use fresh absorbent to absorb any remaining liquid. Place used materials in disposal bag.
13. Carefully remove gloves and place in bag for disposal.
14. Dispose of waste bag. **DO NOT** autoclave bags containing organic matter and oxidizing agents such as bleach before allowing 48 hours for oxidation.
15. If contaminated, put lab coat/isolation gown in laundry.
16. Wash hands thoroughly (90 seconds) with mild soap and water.
17. Complete an incident report online at www.cairs.ubc.ca.

Generic Procedure for Small Spills (under 100 ml)

1. If there is any hazard associated with aerosol release, everyone should immediately leave the area.
2. If necessary, block access to the area and mark each entry point with a Biohazard Spill Notice sign. Allow at least 30 minutes for the aerosols to settle before re-entering.
3. Notify the supervisor and Risk Management Services.
4. Individuals involved in the spill should check for contamination of clothing, footwear, and skin and take the appropriate action according to their specific spill control protocol prior to attempting spill clean-up.
5. Put on the appropriate personal protective equipment.
6. Define the area requiring clean-up and decontamination, allowing sufficient area for any splattering or drying which may have occurred.
7. Set up a disposal bag to allow easy discarding of contaminated clean-up materials.
8. Set up a tray of fresh disinfectant and stack of rags or paper towels.
9. Saturate each rag/paper towel with disinfectant and then very gently place over the spill area:
 - Start with the heart of the spill – this will prevent spread or further aerosols.
 - Move to the outer edge of the defined area and cover the area working from outside to centre until entire area is covered.
10. Let stand for the appropriate contact time for the disinfection reaction to complete.
11. Gather absorbent to the centre of the spill and place in disposal bag.
12. Working from the outside in, use fresh absorbent to absorb any remaining liquid. Place used materials in disposal bag.
13. Carefully remove gloves and place in bag for disposal.
14. Dispose of waste bag. **DO NOT** autoclave bags containing organic matter and oxidizing agents such as bleach before allowing 48 hours for oxidation.
15. If contaminated, put lab coat/isolation gown in laundry.
16. Wash hands thoroughly (90 seconds) with mild soap and water.
17. Complete an incident report online at www.cairs.ubc.ca.

REVIEW AND RETENTION

This Guideline is reviewed annually or whenever deemed necessary by the UBC Biosafety Committee or the UBC Biosafety Office.

APPENDIX A: Disinfectant Information

CLASS	USES	MECHANISM	CONSIDERATIONS	EXAMPLES
ALCOHOLS	Surfacing cleaning of instruments, work surfaces, biosafety cabinets	Cell surface proteins are denatured, leading to cell lysis in the presence of water.	<ul style="list-style-type: none"> • 70-90% is optimum concentration • Quick evaporation necessitates reapplication for effective contact time • Limited effectiveness in the presence of organic matter • Highly flammable 	Ethanol Isopropanol (ineffective against non-enveloped viruses) Hand sanitizers
ALDEHYDES	As a fumigant Used as a fixative	Denatures proteins in the presence of water vapor	<ul style="list-style-type: none"> • Extremely toxic; requires the use of engineering controls and special personal protective equipment • Effective against the full range of biohazards 	Formaldehyde Formalin Paraformaldehyde Glutaraldehyde Cidex 7 Sporociden
ALKALIS	Building fumigation	Saponifies the lipids in the envelopes of microorganisms	<ul style="list-style-type: none"> • Varied in spectrum • Extremely Corrosive • Requires the use of engineering controls and special personal protective equipment 	Sodium hydroxide Sodium carbonate Calcium oxide
PHENOLICS	Surface disinfectant	Denatures proteins and inactivates membrane-bound enzymes, compromising cell membrane	<ul style="list-style-type: none"> • Broad spectrum • Corrosive • Highly toxic to animals • Strong Odor 	Pheno-kill Phenola Mikro-Bac TekTrol Pheno-Tek II
QUATERNARY AMMONIUM COMPOUNDS	Surface disinfectant	Cationic detergent irreversibly finds phospholipids in cellular membranes.	<ul style="list-style-type: none"> • Very effective against Gram positive bacteria, • Effective against Gram negative bacteria, fungi and enveloped viruses. • Ineffective against non-enveloped viruses and mycobacteria • Sporostatic but not sporocidal 	Roccal Zepharin DiQuat D-256 Tor Mikro-Quat

			<ul style="list-style-type: none"> Easily inactivated by organic load, detergents and hard water 	
HALOGEN COMPOUNDS	Surface disinfectant Culture Decontamination	Denatures proteins through electronegativity	<ul style="list-style-type: none"> Lose potency over time, at elevated temperatures, in sunlight, and in the presence of some metals and organic load. Broad spectrum 	Sodium hypochlorite Iodine compounds Bleach Presept Alcide Iodophors Wescodyne Mikroclene
BIGUANIDES	Surface disinfectant	Alters cell permeability by binding with negatively charged groups on cell membrane	<ul style="list-style-type: none"> Functional in a limited pH range Toxic to fish – don't dispose by drain Broad antibacterial spectrum Limited effectiveness against viruses Ineffective against spores, mycobacteria and fungi 	Chlorhexidine
OXIDIZERS	Surface disinfectant	Denaturation of proteins and lipids	<ul style="list-style-type: none"> Broad spectrum that varies by reagent – not all are effective against mycobacteria 	Hydrogen peroxide Peracetic acid Virkon-S