



Standard Operating Procedure ***for Spills and Exposures in Clean Zone***

DOUCMENT PARTICULARS	
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Spills and Exposures in Clean Zone**Review History**

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01	09 Jan 2023	01 Feb 2023	01 Aug 2023	New SOP

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Spills and Exposures in Clean Zone

A) Objectives

This document describes the procedures used by *Centre for Regenerative Medicine and Health, Hong Kong Institute of Science & Innovation, Chinese Academy of Sciences Limited* (refer to CRMH below), staff, and students to handle spills and exposures inside clean zones.

B) Scope

This document applies to all incidents inside the clean zones.

C) Facility Covered

Clean zones in CRMH, 5/F, 15 Science Park West Avenue, Hong Kong Science Park, Pak Shek Kok, Hong Kong

D) Responsibilities

1. Team manager provides the training of this SOP to their members and to oversees if their members properly follow the spills and exposure procedures.
2. F&OC provides necessary support to the team managers (or their delegates) to implement this SOP.
3. Every member working in the clean zone should diligently adhere to the established clean room SOPs and inform the team manager if deviations occur.

E) References

1. International Organisation for Standardisation. *Cleanrooms and associated controlled environments – Part 5: Operations*. ISO 14644-5: 2004, 2004.
2. World Health Organisation. *Laboratory Biosafety Manual, 4th Ed.* 2020.

F) Definitions

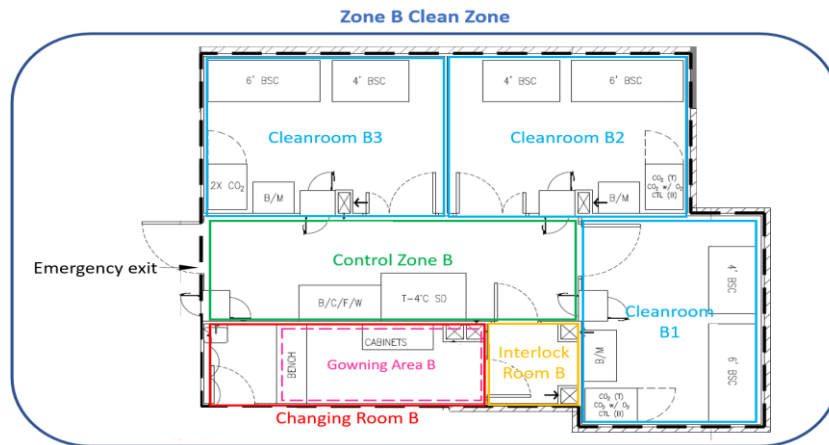
1. **Biohazardous spills** are spills that contain any biohazardous agents.
2. **Biohazardous agents** are any agents that are biological in nature and have the capacity to produce harmful effects upon other biological organisms. Biohazardous agents include, but not limited to:
 - 2.1. Bacteria
 - 2.2. Viruses
 - 2.3. Fungi
 - 2.4. Cell lines
 - 2.5. Animal tissues
 - 2.6. Clinical specimens
 - 2.7. Recombinant nucleic acid products
 - 2.8. Toxins of biological origin

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3. **Chemical spills** are waste that is derived from chemicals that have not been in touch with biological agents.
4. **Sharps wastes** are discarded articles that may cause punctures or cuts, including but not limited to needles, syringes, pipettes etc.

G) Nomenclature

Names of rooms/areas of a typical cleanroom complex in CRMH:



Floor plan of a typical Clean Zone in CRMH.

H) Procedures

1. *Biohazardous spills inside BSC*
 - 1.1 Stop work.
 - 1.2 Keep BSC running throughout the clean-up process.
 - 1.3 Spray or wipe all surfaces and equipment with appropriate disinfectant, such as freshly prepared 0.5% sodium hypochlorite solution (10-fold diluted household bleach) and 70% alcohol for appropriate contact time (e.g., 20 minutes).
 - 1.4 Lift the grills and trays. Spray the disinfectant as above, wipe all surfaces under the work surface.
 - 1.5 Wipe up the spill area with clean paper towels and dispose any waste into autoclave bags.
 - 1.6 Repeat Steps 1.4 to 1.6 once for disinfection.
 - 1.7 Disinfect the BSC with ultraviolet lights for 30 minutes before using.
 - 1.8 Remove the contaminated gloves and wear a new pair of gloves.
 - 1.9 If there was a chance of exposure, follow Section H 11 about "Incident reporting".

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2. *Biohazardous spills outside BSC*

- 2.1 Stop work.
- 2.2 If you are splashed by the material, dispose the contaminated PPE.
- 2.3 If you are exposed to the material, wash the affected site with IV-grade saline and follow Section H 6.
- 2.4 For small spill:
 - 2.4.1 Cover the spill with paper towels to avoid splashes.
 - 2.4.2 Spray or pour sufficient amount of an appropriate disinfectant, such as freshly prepared 0.5% sodium hypochlorite solution (10-fold diluted household bleach) onto the absorbent material and incubate with the spill for appropriate contact time (e.g., 30 minutes).
 - 2.4.3 Wipe up the spill area with clean paper towels and dispose all waste materials into an autoclave bag.
 - 2.4.4 Work concentrically to clean up absorbent material, always work from the outer edge of the spill toward the centre.
 - 2.4.5 Repeat Steps 2.8-2.10 once more for thorough disinfection.
 - 2.4.6 Spray spill area with 70% alcohol, allow to air dry.
- 2.5 For large spill (volume >300 mL):
 - 2.5.1 Ensure that other people nearby are notified of the spill and the room should be evacuated.
 - 2.5.2 Post "Do Not Enter" notice on the room door.
 - 2.5.3 Notify team manager and F&OC when the situation allows.
 - 2.5.4 If there is a risk to the rest of the floor/building, press the emergency call button and evacuate the floor/building.
 - 2.5.5 If aerosols are a concern, wait for 30 minutes to allow aerosols to settle before cleaning up the spill.
 - 2.5.6 Bring Biohazard Spill Kit from control zone to the affected area. The kit may need to transfer through a passbox.



- 2.5.7 Sprinkle the SoChlor Granules over the spill and allow incubation for at least 5 minutes.

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- 2.5.8 During the incubation period, add 7 tablets from SoChlor TAB into SoChlor Diluter bottle. Fill with 1 litre of water to the dotted line and let the tablets be fully dissolved without shaking the bottle.
- 2.5.9 Once the SoChlor Granules have absorbed the spill, collect the granules using the scoop and scraper into a white waste bag.
- 2.5.10 Use paper towels and SoChlor TAB solution to clean the area of spillage.
- 2.5.11 Dispose the scoop and scraper, towel, and gloves into the waste bag. Tie the bag to seal and dispose it to an autoclave bag.
- 2.5.12 Decontaminate reusable equipment (e.g., goggles, lab coat) if it was contaminated in the clean-up process.
- 2.5.13 Remove the "Do Not Enter" sign and inform others it is safe to re-enter the room.
- 2.6 Remove PPE, discard non-reusable PPE as biohazardous wastes. Follow the de-gowning procedure according to CRMH-SOP-004: SOP for Gowning/ De-gowning in clean zone.
- 2.7 Wash your hands thoroughly with soap and water after removal of gloves upon completion of clean-up.
- 2.8 Follow Section H 11 about "Incident reporting".

3. *Spills inside centrifuge*

- 3.1 If breakage is suspected during operation, switch off the centrifuge and allow 30 minutes for aerosols to settle before opening the centrifuge.
- 3.2 If a breakage is discovered after opening the equipment, immediately close the lid and leave for 30 minutes.
- 3.3 Put up a "Biohazardous Spill Inside" sign to notify others about the spill.
- 3.4 Notify the team manager and F&OC.
- 3.5 After 30 minutes, remove the microcentrifuge from the power supply, or the rotor/bucket from the main centrifuge. Transfer the whole compartment unit into a functional BSC before opening it.
- 3.6 Disinfect the exterior of microcentrifuge / rotor / bucket by spraying with freshly prepared 5% sodium hypochlorite solution (10% household bleach), 70% ethanol or appropriate disinfectant and incubate for 20 minutes inside BSC.
- 3.7 Carefully open the lid of microcentrifuge / bucket Inside BSC and spray the interior of rotor/bucket with freshly prepared 10% bleach solution, 70% ethanol or appropriate disinfectant and incubate for 20 minutes.
- 3.8 Dispose any broken tubes from the microcentrifuge/rotor/bucket into autoclave bags. Use a mechanical device to remove sharp pieces, if any, and place them directly into a sharps container.
- 3.9 Remove the contaminated gloves and wear a new pair of gloves.

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- 3.10 After drying from disinfectant, take out the microcentrifuge / rotor / bucket from the BSC and put back to original location.
 - 3.11 Take away the “Biohazardous Spill Inside” sign.
 - 3.12 Disinfect the BSC with ultraviolet lights for 30 minutes before using.
 - 3.13 Upon completion of clean-up, remove your gloves and wash your hands thoroughly with soap and water.
 - 3.14 Report the spillage incident according to Section H 11.
4. Spills inside CO₂ incubator
- 4.1 Small Spills
 - 4.1.1 Soak up the spill using absorbent material.
 - 4.1.2 Wet the clean room wiper with 70% ethanol, and wipe the spilled area.
 - 4.1.3 Repeat step 4.2 again
 - 4.1.4 Check if the spill contaminated another area(s) e.g., the tray under the spilled area. If other area is contaminated, repeat step 4.1.2 to 4.1.3. If more than three areas are contaminated, it is recommended to treat the spillage as large spills and follow the steps starting from 5.3(below).
 - 4.2 Large Spills
 - 4.2.1 Close the incubator’s door immediately if spillage occurs inside incubator
 - 4.2.2 Keep it close for 30 mins to allow aerosols to settle.
 - 4.2.3 Alert lab manager and F&OC.
 - 4.2.4 Place a “Biohazardous Spill Inside” sign to notify others about the spill.
 - 4.2.5 Turn off the gas supplies which connect to that incubator
 - 4.2.6 Dispose broken culture ware and other contaminated materials using mechanical tools and place in an autoclave bag.
 - 4.2.7 Soak up the spill using absorbent material.
 - 4.2.8 Remove all cell culture inside the incubator.
 - 4.2.9 Place the un-affected cell culture in another incubator for temporary storage.
 - 4.2.10 Remove shelves and HEPA filter according to user manual provided by the manufacturer of the incubator if necessary.
 - 4.2.11 Wipe disinfectant onto the surfaces of the incubator and removed parts and allow for sufficient contact time (e.g., 30 minutes).

Caution: Beware of water sensitive components such as CO₂ sensor.
 - 4.2.12 Dispose all clean up materials as biohazardous wastes.

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4.2.13 Change gloves.

4.2.14 Follow “Steri-Run” heating cycle decontamination procedures according to user manual provided by the manufacturer of the incubator.

4.2.15 Report the spillage incident according to Section H11.

5. *Spills involving chemicals*

5.1 Transfer the “Spill & Go Chemical Spill Kit” from Safety Station into clean zone following the procedures stated in CRMH-SOP-003: SOP for Material Entry & Exit of Clean Zone.



5.2 Clean up the spill according to the CRMH-SOP-009: SOP for General Handling Chemical Spill.

6. *Exposure to skin or clothing*

6.1 Stop work.

6.2 Take off contaminated clothing & gloves and wash affected area with 1 bag of IV grade saline.

6.3 Report the accident to team manager & F&OC when possible.

6.4 De-gown and exit clean zone by following the de-gowning procedure according to CRMH-SOP-004: SOP for Gowning/ De-gowning in clean zone

6.5 Rinse affected area with water for 15 mins.

6.6 Report the spillage incident according to Section H 11.

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7. *Penetrating wound*

- 7.1 Stop work.
- 7.2 Wash the affected area with 1 bag of IV-grade saline.
- 7.3 Report the accident to team manager & F&OC when possible.
- 7.4 De-gown and exit clean zone by following the de-gowning procedure according to CRMH-SOP-004: SOP for Gowning/ De-gowning in clean zone.
- 7.5 Wash affected area with water for 15 mins.
- 7.6 Alert your lab manager and F&OC staff verbally if the situation allows.
- 7.7 Seek medical attention immediately, call emergency services (999) or press the emergency call button to call the HKSTP if necessary. Locations of emergency call button are labelled in Appendix 2. If possible, obtain the MSDS and provide it to physician.
- 7.8 Report the spillage incident according to Section H 11.

8. *Exposure to eyes or mucous membrane*

- 8.1 Stop work.
- 8.2 Immediately flush eyes / mucous membrane with Eyewash kit.



- 8.3 De-gown and exit clean zone by following the de-gowning procedure according to CRMH-SOP-004: SOP for Gowning/ De-gowning in clean zone
- 8.4 Rinse exposed area with water for 15 minutes at eye wash station.
- 8.5 Seek medical attention immediately, call emergency services (999) or press the emergency call button to call the HKSTP if necessary. Locations of emergency call button are labelled in Appendix 2. If possible, obtain the MSDS and provide it to physician.
- 8.6 Alert your team manager and F&OC verbally if the situation allows.
- 8.7 Report the spillage incident according to Section H 11.

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9. *Environmental risk*

- 9.1 Stop work.
- 9.2 Ensure other people nearby are notified of the spill and the room should be evacuated.
- 9.3 Post a “Do Not Enter” sign on the door
- 9.4 Alert team manager and F&OC verbally if the situation allows.
- 9.5 If there is a potential threat to public health, the management shall take appropriate actions and notify the Department of Health without delay
- 9.6 Report the spillage incident according to Section H 11.

10. *First aid treatment*

- 10.1 Call emergency service (999) or press the emergency call button to call the HKSTP if necessary.
- 10.2 Stabilize the individual and provide first aid for injuries that require immediate medical care (e.g. bleeding).
- 10.3 Notify the team manager and F&OC after the individual has been stabilized.

11. *Incident reporting*

- 11.1 After an accident or incident, you (either the injured in an accident or the witness of an incident) are required to complete the Accident & Incident Report Form (**Appendix 1**) within 48 hours of accident or incident.
- 11.2 F&OC staff shall assist you to complete the Accident & Incident Report Form and send to your supervisor and lab manager of your research team. For large volume of biohazardous spill, the Accident/ Incident Report Form will also be sent to the Director and Deputy Director of the Centre. Finally, F&OC will send the scanned copy of the completed form to SHE Office of HKSTP by email she_office@hksto.org within 72 hours of accident or incident.
- 11.3 In addition to the reporting of accidents or incidents to HKSTP by completion of the Accident & Incident Report Form (**Appendix 1**), CRMH are required to inform the Labour Department, Hong Kong Special Administrative Region Government of any serious accidents in accordance with local legislations, i.e. the Occupational Safety and Health Ordinance (Cap. 509) and Employees' Compensation Ordinance (Cap. 282).
- 11.4 Details of the Accident and Incident Reporting Procedures can be referred to the Section B02 of the *HKSTP SHE Handbook (Part II)- Laboratory & Research Safety Requirements*.

I) **Contact Numbers**

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For life threatening situations, contact the local emergency hotline by calling 999. For other situations, call the following parties for assistance.

1. Team manager and the first aider of the corresponding research team
2. F&OC Department: 2621 0608 / 2621 0676
3. HKSTP 24-hour Customer Services Hotline: 2639 8008

J) Abbreviations


1. BSC: Biosafety cabinet
2. CO₂: Carbon dioxide
3. F&OC: Facilities and Operations Compliance
4. IV grade: Intravenous grade
5. PPE: Personal protective equipment
6. SOP: Standard operating procedure

K) Appendixes

1. Appendix 1: Accident/ Incident reporting form from HKSTP
2. Appendix 2: Locations of Emergency Call Buttons and Emergency Ventilation Buttons in CRMH

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Appendix 1

	Safety, Health and Environment Office Accident & Incident Report Form		SHE Form L02
			(Official use only) Reference No.:

Note: This report form should be completed and sent to the Safety, Health & Environment (SHE) Office of HKSTP within 72 hours of the accident or incident. The information provided herein will be used for investigation and compiling accident statistics.
 In case of work-related accident to employee resulting in death or partial incapacity, the concerned unit of HKSTP or the client should fill in the relevant form provided by the Labor Department of Hong Kong and return it in duplicate to the Commissioner for Labor within the statutory required period.

1. Accident / Incident Information		
Date:	Time:	Location:
Type of Area: <input type="checkbox"/> Office <input type="checkbox"/> Laboratory / Workshop <input type="checkbox"/> Others (Please specify):		
2. Nature of Accident / Incident		
<input type="checkbox"/> Personal injury	<input type="checkbox"/> Fire / Explosion	<input type="checkbox"/> Spillage of hazardous substances
<input type="checkbox"/> Flooding	<input type="checkbox"/> Unpleasant smell	<input type="checkbox"/> Damage to property / equipment
<input type="checkbox"/> Others (Please specify):		
3. Personal Details (For the injured or person concerned)		
Name:		Sex: <input type="checkbox"/> Male <input type="checkbox"/> Female
Post Title:		Phone No.:
Division / Company Name:		
Company Address:		
Nature of Injury: <input type="checkbox"/> Amputation <input type="checkbox"/> Burn <input type="checkbox"/> Contusion <input type="checkbox"/> Fracture <input type="checkbox"/> Laceration <input type="checkbox"/> Sprain <input type="checkbox"/> Others (Please specify):		
Part of Body Injured: <input type="checkbox"/> Hand <input type="checkbox"/> Leg <input type="checkbox"/> Head / Face <input type="checkbox"/> Eye <input type="checkbox"/> Others (Please specify):		
The injured received medical treatment: <input type="checkbox"/> Yes <input type="checkbox"/> No		
The injured was hospitalized: <input type="checkbox"/> Yes <input type="checkbox"/> No		
The injured took sick leave: <input type="checkbox"/> Yes (No. of days:) <input type="checkbox"/> No		
4. Accident / Incident Reported By		
Name:		Signature:
Post Title:		Date:
5. Accident / Incident Report Endorsed By		
Name:		Signature:
Post Title:		Date:

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	Safety, Health and Environment Office Accident & Incident Report Form	SHE Form L02
		(Official use only) Reference No.:

Please fill in details about the accident / incident in the next page.

6. Brief Description of Accident / Incident
7. Causes of Accident / Incident
8. Recommendation for Prevention of Recurrence

For Internal Use by SHE Office of HKSTP	
Further investigation required: <input type="checkbox"/> Yes <input type="checkbox"/> No	Investigation Report No.:
Accident / Incident Classification Code:	
Accident / Incident Cause Code:	
Remark:	

Appendix 2: Locations of Emergency Call Buttons and Emergency Ventilation Buttons in CRMH



EV: Emergency Ventilation Button

The floor plan illustrates the layout of the BSL-3 laboratory, which is designed for high-containment work. The central corridor provides access to various specialized rooms, each equipped with appropriate safety and containment features. The plan includes a detailed view of the clean rooms, control rooms, and support areas, ensuring that all safety protocols are clearly defined and accessible.

The floor plan illustrates the layout of the BSL-3 laboratory, which is divided into several functional areas:

- Top Section:** Includes a **CHIMNEY SHAFT**, **10X GENOMICS** room, **FC-1** and **FC-2** fume hoods, **BENCH** areas, and **SW-14 EQUIPMENT ROOM 2** and **SW-09 EQUIPMENT ROOM**. Two red circles labeled **EV** are located near the fume hoods.
- Middle Section:** Features **SW-12 LABORATORY 1**, **SW-08 IMAGING ROOM**, and **SW-13c C-CLEAN ROOMS**. A red circle labeled **EV** is located near the laboratory entrance.
- Bottom Section:** Contains **SW-13d CLEAN ROOM C2**, **SW-13b CONTROL ROOM (C)**, **SW-13a ANTEROOM**, **SW-10a ANTEROOM**, **SW-10b CONTROL ROOM (A)**, **SW-10c CLEAN ROOM A1**, and **SW-10d CLEAN ROOM A2**. Red circles labeled **EV** are located near the control rooms. A red circle labeled **EV** is also located near the **EXIT** door.
- Other Features:** The plan includes **CHANGING ROOM (C)**, **ZONE A-CLEAN ROOMS**, **EMERGENCY EXIT**, **EXIT**, **CRYO-PLUS3**, **HS-C**, **B**, **80°C** storage areas, **TANK**, **SC** (shower cabinet), **WC** (water closet), **100% HEPA** filtration, and **100% HEPA** filtration.