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Prepared by	Approved By	Issue Date

1. OBJECTIVE

The purpose of this SOP is to outline the procedures of cleaning up chemical spills. It will provide guidance on how to handle possible emergency situations that may arise in any laboratory of Department of Medicine working with chemical hazards.

2. SCOPE

This SOP is applicable to trained staff and students in the event of a chemical spill.

3. RESPONSIBILITY AND ACCOUNTABILITY

3.1 It is the responsibility of the Principal Investigator (PI) to ensure the following:

- Review of Safety Data Sheets (SDS) for all chemicals used in the laboratory.
- Prepare a chemical spill kit based on the potential chemical spills and the hazards associated with chemicals used in his/her laboratory.
- Ensure all laboratory users receive appropriate chemical safety training and familiarise with the spill response plan.

3.2 It is the responsibility of all laboratory users to acquire sufficient knowledge in chemical safety, always wear personal protective equipment available in the chemical spill kit and to follow this SOP in case of emergency.

4. CHEMICAL SAFETY TRAINING

All individuals who handle chemical spill are required to complete Chemical Safety and Chemical Spill Response via IVLE @ https://ivle.nus.edu.sg/.

5. SAFETY PRECAUTION

- Eye wash stations and emergency showers are available and not obstructed.
- Know the location of chemical spill kit
- Contents in the chemical spill kit are to be checked monthly to ensure that they will function properly when needed.

6. FIRST AID PROCEDURE

- Splashes on the skin
  Remove contaminated clothing and flush with water for at least 15 minutes. Get medical help.

- Splashes in the eye
  Flush the eyes with water for 15 minutes. Seek medical treatment.

- Inhalation of gases or vapours
  Remove casualty to a safe area. Apply cardiac pulmonary resuscitation (CPR) if breathing has stopped. Send for medical aid immediately.

- Ingestion of poisonous chemicals
  Wash the mouth with water. Do not induce vomiting. Seek medical treatment immediately.

7. SPILL HANDLING PROCEDURES

7.1 Basics

a. Worker injury (if any) must be taken care of FIRST and spill clean up SECOND.
b. Assess the spill, its hazards, and the danger to people in the vicinity quickly before taking action.
c. In the event the spilled chemical is unknown, assume the worst and evacuate. The safety of those in the vicinity is top priority.
d. Immediately alert area occupants, PI and safety lead. Evacuate the area if spill control resources are insufficient to effectively contain the spill. Inform Campus Security (Tel: 68741616), Department safety officer (Dr Zhou Lei, Tel: 66015195), Faculty safety officer (Dr Doreen Tan, Tel: 67727559) and OSHE safety officer (Dr Vernon Seow, Tel: 67726977) as necessary.

7.2 Spill Response Kit (See Appendix I and II)

To effectively contain and clean up any chemical spills, each laboratory should purchase and maintain suitable chemical spill materials to the requirements stipulated in the SDS. The contents of the spill kit should contain, at minimal, the following:

7.2.1 Personal Protective Equipment
a) Chemical resistant gloves each for Size S, M and L
b) Chemical resistant boots (or shoe wraps)
c) Chemical resistant suit (or Apron)
d) Safety goggles
e) Respirator with filter cartridges for protection against hazardous fumes or vapors (responder must undergo fit test before use of full face and/or half face respirator)

7.2.2 Absorption Materials
a) Chemical absorbent pads (or booms)

7.2.3 Neutralizing Materials
a) Acid Neutralizer
b) Base Neutralizer
c) Solvent Solidifier

7.2.4 Clean-up Tools
a) Polypropylene scoop or dust pan
b) Chemical resistant waste disposal bags
c) Waste labels
d) Paper towels

e) Cable ties (or sealing tape)
f) Warning signage and labels
g) Tongs to put up sharps such as glass pieces
h) Dust pan and broom for removal of sharps

7.3 Response for Minor Chemical Spill (Work in buddy system):

Chemical type and quantity are not an immediate threat to health and does not result in contamination to body.

- Immediately inform PI, safety lead and all personnel in the area and evacuate if necessary.
- Turn off open flames and heat sources if the spilled chemical is flammable.
- Attend to personnel who may have been contaminated
- Refer to the safety data sheet
- Follow the procedure given in the Spill Kit Treatment Guide.
  Put on personal protective equipment in the correct order: Chemical resistant suit (suit over boots and inner gloves) → Chemical resistant boots → Respirator → Safety googles (not required if wearing full face respirator) → Gloves (inner layer) → Gloves (outer layer) → Shoe covers.
- Avoid inhaling any vapors emitted from the spill.
- Confine and contain spill with appropriate absorbent material.
- If acid or base chemical, neutralize by pouring reagent around spill to encircle and dike its perimeter. Taking care to avoid splashing, continue to apply agent evenly onto the spill.
- Using scraper provided, carefully mix reagent into spill for the most complete reaction.
- If spill is corrosive, any neutralization reaction will subside after a few minutes leaving a paste-like residue.
- If spill is a solvent, agent adsorption is indicated by the disappearance of free liquid. Final spill residue should be dry and powdery.
- After treatment reaction cools, use provided scraper and pan to pick up residue and place into labeled bag. Seal and label. Dispose plastic bag as chemical waste.
- If broken glass is present, use the scoop to place it in an appropriate plastic container and label.
- Clean and mop spill area with soap and water.
- Remove protective personnel equipment in the correct order: Gloves (outer layer) → Chemical resistant suit (inside out) → chemical resistant boots → Safety goggles (handle by head band) → Respirator (handle by straps) → Gloves (inner layer).
- Label and seal the hazardous waste bag. Hold bag in secondary containment until date of disposal through licensed waste collector.
- Decontaminate any equipment after clean-up.
- Notify PI, safety lead, Department Safety Officer, Faculty Safety & Health Officer, Dean Office Research Facilities Management team (MD1 and MD6 labs).
- Report the incident to OSHE via the NUS Accident/Incident Reporting System (AIRS) within 24 hours.
- Replenish Chemical Spill Kit contents.

7.4 Response to Major Chemical Spill or Spills of hazardous or toxic chemicals:

- Immediately inform PI, safety lead, Department Safety Officer and all personnel in the affected area to evacuate and close the doors.

- Turn off open flames and heat sources if the spilled chemical is flammable.
- Cordon off affected area and post a warning sign at the entrance of the site to warn others while trained personnel arrive to clean up the spill.
- Inform Campus Security (68741616) who will inform SCDF and lead them to the site of the accident.
- Post notices on all doors to warn personnel and keep them out of the affected area until the area has been clean-up and notice is given to return.

8. Accident/Incident Reporting and Investigation

Accidents resulting in injuries or spill incidents must be reported to the PI and/or laboratory safety lead immediately after first aid is applied.

Seek medical attention when necessary at the University Health Centre or proceed to the Accident & Emergency units of National University Hospital after office hours.

All incidents or accidents have to be notified to OSHE within 24 hours via the online NUS Accident and Incident Management System (AIMS) @https://inetapps.nus.edu.sg/osh/portal/eServices/ehs360_aims.html. The AIMS report can be submitted by the injured staff/student, safety leads, his or her supervisor/representative if the staff or student is unfit/unable to do the initial report.

9. REFERENCE

NUS Laboratory Chemical Safety Manual
https://share.nus.edu.sg/corporate/procedures/safety_and_health/Chemical-Safety-Manuals/Manual-chemical-safety.pdf

10. REVISION HISTORY

Date Revised	Version No.	Author	Summary of Revisions
28-03-2016	001	Yeo Soh Bee	
18-10-2016	002	Yeo Soh Bee	Section 8: Revised Accident and Incident Reporting System (AIRS) to Accident and Incident Management System (AIMS) Section 11: Appendix III-“Chemical Spill Clean-up Procedure” by YLL SoM Safety Committee is added

11. APPENDIX

Appendix I - Contents of Chemical Spill Kit

Picture downloaded from OSHE Add-on module “Chemical Spill Response”

Appendix II - Examples of Personal Protective Equipment

Safety Goggles

Respirator with filter cartridges

Body Protection: Tyvek coveralls / Safety Apron

Boots / Shoe Wrap

Chemical Resistant Gloves

Appendix III - Chemical Spill Clean-up Procedure

CHEMICAL SPILL CLEAN-UP PROCEDURE

SPILL EVALUATION

(Risk assessment by Principal Investigator & lab personnel)

MINOR SPILL

Spill volume manageable
&
Poses no immediate danger to personnel

RESTRICT ACCESS TO CLEAN-UP AREA

CLEAN-UP PROCEDURE

- Wear Personal Protective Equipment (PPE)
- Turn off all flames (if used)
- Trace splatters

Liquid Spill	Solid Spill
• Lay absorbents around parameter of spill • Pick up sharps & dispose in a sharps bin • Cover spill with absorbents	• Pick up sharps & dispose it in a sharps bin • Use a plastic scoop or broom and dustpan to collect the spilled solids

- Dispose used absorbents/spilled solids in a chemical-resistant bag
- Clean spill surface
- Remove & dispose PPE appropriately
- Label the waste bag
- Wash hands

MAJOR SPILL

Spill volume NOT manageable
OR
Poses immediate/potential danger
OR
Unknown chemicals
OR
Explosion or fire risk
OR
Air or water reactive chemicals
OR
Mercury ≥ µL volume or near heated surface

LAB EVACUATION

RESTRICT ALL LAB ENTRY POINTS

IMMEDIATE RESPONSE

- Call SCDF (995) and Campus Security (6874 1616)
- Activate fire alarm for building evacuation

REPORT

Report lab accident/incident to AIMS (OSHE) within 24hrs

https://inetapps.nus.edu.sg/osh/portal/eServices/ehs360_aims.html