

2. GENERAL CHEMICAL SPILL PROCEDURES

All UBC personnel who work with or in proximity to chemicals or other harmful substances must be prepared to respond to an accidental release or spill. Four components are required for effective response to a spill:

1. written safe work procedures,
2. clean-up material (i.e. spill kit),
3. personal protective equipment (PPE) and
4. knowledgeable, well-trained staff.

These requirements are consistent with the requirements of the BC Worker's Compensation Act, Occupational Health and Safety Regulation, 1999, s. 5.101 – 5.103. Individuals working with hazardous materials are required to take the Workplace Hazardous Materials Information System (WHMIS) course, offered by Health Safety and Environment, which trains personnel on how to effectively respond to a spill. Spill clean-up procedures and a spill-kit checklist are provided below to aid in the development of departmental procedures and kits. For further information, contact Health Safety and Environment at (250) 807-8624.

PRELIMINARY PROCEDURES

- Ensure own personal safety and that of other personnel in the vicinity of the spill.
- Ask yourself:
 - “Can the spill be controlled or cleaned up by on-site personnel (i.e., the appropriate equipment, personal protective equipment and trained personnel are available)?”
- If **NO, EVACUATE and CALL Campus Security at 250-807-8111. For large spills and releases contact 911** (Kelowna Fire Department).
- If **YES,**
 - Control any risk of injuries before taking action
 - The “responsible person” (person who had possession, charge or control of a substance immediately before it spilled [BC-Environmental Management Act, Spill Reporting Regulation]) must act quickly to:
 - CONTAIN
 - CONTROL
 - CLEAN UP the spill
 - DECONTAMINATE the spill area
 - DETERMINE whether spill is reportable to an external agency (contact Health Safety and Environment at (250)-807-8624)
- Spill may be cleaned up and the area decontaminated using the following procedures.

GENERAL PROCEDURES

Once the risk of injuries has been controlled, the spill may be cleaned up and the area decontaminated using the following general procedures:

1. **Notify:** all personnel and the supervisor in the vicinity of the spill, of any flammable, highly toxic or volatile material is spilled. Evacuate and post warnings in the area if necessary.
2. **Respond to Human Exposure:** If clothing has become contaminated, remove and enter emergency shower, if eyes have been affected, flush eyes until 1st Aid arrives. **BE SURE CHEMICAL IS NOT WATER REACTIVE PRIOR TO CONTACTING WATER.**
3. **Gather Information:** Before responding to any spill the following information must be obtained:
 - Name of the chemical(s) involved.
 - Approximate quantity.
 - Hazards of the chemical (review MSDS if available):
 - Flammability: flash point; vapour pressure
 - Toxicity – TLV
 - Corrosiveness – pH

4. **Assess:** Perform clean-up procedures only if:
 - a. The appropriate spill control material, equipment and protective clothing are available.
 - b. Personnel are familiar with equipment and clean-up procedures.
 - c. More than one person is in the lab and available to participate. Work in teams. One person cleans the spill; the other should remain outside of the contaminated area and hand supplies to person cleaning.
 - d. There are no ignition sources present (for flammable spills).
5. **Choose:**
 - a. After reviewing the MSDS and assessing the hazards posed by the spill, establish the appropriate clean-up procedure.
 - b. Determine the extent of evacuation required.
 - c. For spills greater than 1L, and for highly flammable solvents, highly toxic or corrosive materials, Contact the Kelowna Fire Department through Campus Security for stand-by support.
6. **Gather:** the required equipment and materials. If the appropriate materials are not available, call Campus Security (to contact HSE) or the Kelowna Fire Department for assistance.
7. **Protect:** Put on appropriate protective clothing, a minimum of appropriate gloves, eye protection and lab coat. The MSDS will help you to determine the type of PPE required.
 - a. Toxic, corrosive or irritating volatile materials will require the use of a respirator. Ensure appropriate type of respirator and cartridges are used. A full-face respirator is the minimum requirement for volatile irritating, toxic or corrosive materials; if SCBA is required, call 911.
 - b. Turn off any device, instrument, or machine that could exacerbate the spill.
8. **Clean-up:** For flammable solvents, mercury, acids, bases, hydrofluoric acid, and perchloric acids, follow the "Specific Procedures" in the sections below for step 8; otherwise, use these general procedures:
 - a. Use a spill control material (unreactive, neutral, compatible material) to make a dike to contain the spill and prevent it from spreading into a drain or under furniture or equipment.
 - b. Mix the spill control compound with the spill. Wait for any neutralizing/absorbent reactions to be complete, and scoop the material into an impervious container.
 - c. Wash the affected area and PPE with an appropriate cleaning solution (soap and water).
9. **Follow-up:**
 - a. Bag all spill clean-up materials and dispose according to the disposal criteria for the chemical spilled.
 - b. Report the spill to your supervisor (if not already done).
 - c. Contact Health, Safety and Environment (250-807-8624) to determine if the spill is reportable to regulatory bodies.
 - d. Complete Incident/Accident forms and send to Health, Safety and Environment (HSE), the Department Head and Local Safety Committee.

SPECIFIC PROCEDURES

FLAMMABLE SOLVENTS

DO NOT attempt to clean up a solvent spill if there is an ignition source present.

1. Turn off any device, instrument, or machine that could exacerbate the spill. Use caution if any device is not spark-proof.
2. Follow General Procedures to step 7.
3. Apply solvent absorbent (Spill X-S, Solusorb or equivalent product) from the perimeter inward, covering the total spill area.
4. Mix thoroughly with *plastic* scoops until material is dry and no evidence of free liquid remains.
5. Transfer the absorbed solvent to an appropriate disposal container that is compatible with the spilled solvents and seal the container.
6. Return to step 9 in the General Procedures.

BASES (CAUSTICS)

- 1) Follow General Procedures to step 7.
- 2) Slowly apply neutraliser to caustics (Spill X-C, Neutrakit-2 or equivalent product) from the perimeter of the spill, inward. **Note:** The quantity of neutraliser will vary with the concentration of the caustic.
- 3) Carefully mix with brushes and scoops to obtain homogenous mixture.
- 4) When foaming subsides, check pH of a homogeneous sample of the mixture.
 - a) Add a scoopful (about 5 mL) of the treated material to about 100-mL of water.
 - b) Test pH with pH paper.
- 5) If pH is not between 3 and 10, add more neutraliser. When the caustic has been sufficiently neutralized, pick up treated material with scoops and transfer to a disposal bag container. Seal container appropriately and label.
- 6) Decontaminate and wash spill area surfaces with water and wet sponge.
- 7) Return to step 9 in the General Procedures.

ACIDS

Except Hydrofluoric and Perchloric Acids (see below)

- 1) Follow General Procedures to step 7.
- 2) **Slowly** apply acid neutraliser (Spill X-A, Neutrasorb or equivalent product) from the perimeter of the spill, inward. **Note:** *The quantity of neutraliser will vary with the concentration of the acid.*
- 3) Carefully mix with brushes and scoops to obtain homogenous mixture.
- 4) When foaming subsides, check pH of a **homogeneous** sample of the mixture
- 5) Add a scoopful (about 5 mL) of the treated material to about 100 mL of water.
 - a) Test pH with pH paper.
 - b) If pH is not between 4 and 10, add more neutraliser. When the acid has been sufficiently neutralized, pick up treated material with scoops and transfer to a disposal container.
- 6) Seal container appropriately and label.
- 7) Decontaminate and wash spill site surfaces with soapy water and wet sponge.
- 8) Return to step 9 in the General Procedures.

HYDROFLUORIC ACID

- 1) Follow General Procedures to step 7.
- 2) Wear protective clothing (lab coat, gloves and goggles) including HF respirator.
- 3) **Slowly** apply solid calcium carbonate from the perimeter of the spill, inward. When the hydrofluoric acid has been absorbed, mix thoroughly with a plastic scoop. **Note:** The quantity of neutraliser will vary with the concentration of the acid.
- 4) Test the pH with pH paper.
 - a) Add a scoopful (about 5 mL) of the mixture to about 100mL of water.
 - b) Test pH with pH paper.
- 5) When the pH is between 7 and 10, scoop the neutralised material into a plastic container of water. Let stand until the white solid settles out of solution. Decant the solution to the drain with at least 50 volumes of water.
- 6) Package the solid residue in a plastic bag, seal and label.
- 7) Return to step 9 in the General Procedures.

PERCHLORIC ACID

- 1) Follow General Procedures to step 7.
- 2) **Slowly** apply acid neutraliser (Spill X-A, Neutrasorb or equivalent product) from the perimeter of the spill, inward. **Note:** The quantity of neutraliser will vary with the concentration of the acid.
- 3) Mop up with wet rags or paper towels. Contaminated paper or rags (combustibles) must be kept wet to prevent combustion upon drying.
- 4) Wipe up spill site with wet rags.
- 5) Place wet rags or towels in a plastic bag, seal and put into a flammable waste disposal can (non-metal).
- 6) Return to step 9 in the General Procedures.

MERCURY

Report the spill to a supervisor. If necessary, contact the Health Safety and Environment Office for further assistance.

- 1) Evacuate all personnel from area if spill is (1) extensive, (2) widespread or (3) in a small space with poor ventilation.
- 2) Wear appropriate personal protective equipment such as lab coat; rubber, latex or vinyl gloves; plastic boot protectors; splash goggles; and half-mask respirator with approved cartridge for mercury vapours (self-contained breathing apparatus may be required if spill is large, temperature is elevated, and/or site of spill is in a confined space with poor ventilation).
- 3) Ventilate area as much as possible. Mark off spill area with signs, barriers or tape.
- 4) If using Mercon spray, spray into the ambient air starting at eye level and work down towards the floor including the visible spill. Mercon spray reduces the production of mercury vapour.
- 5) Pool mercury using stiff paper or plastic sheet to carefully manoeuvre beads of mercury into one large pool. Avoid cracks, if possible.
- 6) Pick up mercury using:
 - a) a glass pipette with a rubber bulb, OR
 - b) a glass filter flask equipped with a trap and a vacuum source such as a large rubber bulb, water aspirator, vacuum tap or vacuum pump, OR
 - c) a Mercon Aspirator.
- 7) Transfer liquid mercury to glass (preferable) or plastic bottle of the smallest size possible equipped with a tight fitting lid. Label "Waste Mercury".
- 8) For picking up tiny droplets on uneven surfaces, use Merconvap wipes.
- 9) Decontaminate spill area by using one of the following methods:
 - a) Dust area of spill with sulphur powder, then sweep mercury/sulphur mixture into wide-mouth jar equipped with tight fitting lid,

OR

 - b) Use Zinc pieces (pre-rinsed in dilute hydrochloric acid) to act as magnets to pick up mercury droplets, then place zinc/mercury pieces into wide-mouth jar with a tight fitting lid. Label the jar, "Mercury Clean-up Materials".

OR

 - c) Use Mercon Vap liquid or wipes to clean surface.
- 10) The final clean-up steps include:
 - a) Cracks - spread Sulphur or spray MERCONVAP® solution into cracks or under low cabinets and leave as a cover to inhibit evaporation of any mercury that is not visible or accessible.
 - b) Monitoring of Spill Area – Contact the Health Safety and Environment Office to determine whether monitoring of the spill area is required. (Mercury levels should be $< 0.05 \text{ mg/m}^3$)
- 11) Remove All Personal Protective Equipment Before Leaving Room - Decontaminate or Dispose of as "Waste Mercury Materials".
- 12) Place all labelled mercury containers and used spill materials into a solid container and label appropriately - i.e. "Waste Mercury" or "Mercury Clean-up Materials".
- 13) Contact the Health Safety and Environment Office for directions concerning disposal.
- 14) Complete UBC Incident/Accident form and send to Health Safety and Environment and the Department Head.

SPILL KIT CHECKLIST

*The following are suggested items to be included in a spill kit.
This list should be edited to reflect the needs of the lab.*

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| <input type="checkbox"/> 1 Kit or cart (moveable preferably; with rigid liner or shelves with lips) | <input type="checkbox"/> 1 Wringer |
| <input type="checkbox"/> 2 Plastic liners | <input type="checkbox"/> 1 - 24 ounce Mop Head and Handle |
| <input type="checkbox"/> 1 Instruction Booklet/Spill Clean-Up Procedures | <input type="checkbox"/> 1 Spill Squeegee, Floor Size, 18" Head |
| <input type="checkbox"/> 1 Safety Flashlight | <input type="checkbox"/> 1 Spill Squeegee, Bench Size, 8" Head |
| <input type="checkbox"/> 1 Printed Floor Sign (slippery when wet) | <input type="checkbox"/> 1 Polypropylene Broom |
| <input type="checkbox"/> 1 Barricade tape | <input type="checkbox"/> 1 Bench Brush |
| <input type="checkbox"/> 2 Chemical Spill Clothing Kits - MUST BE SEALED
(See Chemical Clothing Checklist) | <input type="checkbox"/> 1 Dust Pan 1 roll Chem/Kleen-Ups Towels, 9 3/4" X 100 ft. roll |
| <input type="checkbox"/> 10 Spill Control Pillows, 1 litre size | <input type="checkbox"/> 1 Glass Disposal Box, 8" X 8" X 10" |
| <input type="checkbox"/> 1-10 litres Damming Material (unreactive, absorbent such as vermiculite) | <input type="checkbox"/> 5 Hazardous Waste Disposal Bags 12" X 18" |
| <input type="checkbox"/> 1 Acid Neutralizer shaker, 2.8 Kg | <input type="checkbox"/> 5 Biohazard Waste Disposal Bags 12" X 24" |
| <input type="checkbox"/> 1 Caustic Neutralizer Shaker, 2.8 Kg | <input type="checkbox"/> 5 Radioactive Waste Disposal Bags 12" X 18" |
| <input type="checkbox"/> 1 Solvent Absorbent Shaker, 2.8 Kg | <input type="checkbox"/> 1 Sponge |
| <input type="checkbox"/> HF Spill Pads 12" X 12" (20 per package) 1 Kg Hg ABSORB Powder | <input type="checkbox"/> 1 Liquid Cleaner, 32 ounce |
| <input type="checkbox"/> 1 Hg/VAP ABSORB | <input type="checkbox"/> 1 Bleach, 1 gallon |
| <input type="checkbox"/> 1 Tongs, 20" long (for picking up broken/contaminated glass) | <input type="checkbox"/> 1 roll pH Paper |
| <input type="checkbox"/> 1 Mop Bucket, 35 quart | <input type="checkbox"/> 1 roll Barricade Tape, 100 feet |
| <input type="checkbox"/> 1 Cover, for CART | |

CHEMICAL CLOTHING CHECKLIST

- 1 Total Body Coverall, Poly laminated TYVEK
- 2 pairs of Foot Covers, Disposable, Polyethylene
- 1 pair Nitrile Gloves
- 1 package Disposable Polyethylene Gloves
- 1 pair Chemical Splash Goggles, Fog Free Lens
- 1 Hydrogen Fluoride Respirator
- 1 Dust and Mist Respirator
- 1 Toxic and Hazardous Chemicals In Industry Chart, Pocket Size

NOTE: Cartridge respirators are not included in the spill kit but must be in the possession of those who have been trained, fit-tested, and authorized to use them.