

# Spill Response Guidelines

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Safety & Security

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# Overview

## Introduction

A spill is defined as the uncontrolled release of a hazardous material, either as a solid, liquid or a gas. Spills at the University of the Fraser Valley may occur in a variety of worksites, from research and teaching laboratories, to trades workshops, to large scale Utilities operations. The challenges related to dealing with spills will vary with the type and volume of material involved. Spills in laboratories generally involve small volumes of a potentially large number of chemicals, whereas industrial settings generally use fewer, but larger quantities of chemicals.

Regardless of the type or quantity of hazardous materials involved, all worksites must implement measures

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Take all necessary steps to minimize the chance of spills when working with hazardous materials (see 3. Spill Prevention).

Cooperate with their supervisor, the department, and the Spill Designate(s) to implement a spill program in their area.

## Supervisors

Supervisors involved in the supervision of staff members, students, or others are responsible for performing the duties of the employer as designated representatives of the University. Specifically, these include:

Ensuring that an adequate number of persons are trained in spill response for their area.

Provide site-specific training for their area and maintain training records.

Ensuring there is sufficient and appropriate spill response supplies in their area.

Develop and document a spill kit inspection process in accordance with inventoried supplies (see expiration dates where applicable).

Take all necessary steps to minimize the chance of spills when working with hazardous materials (see on page 7).

Cooperate with the department and the Spill Designate(s) to implement a spill program in their area.

Investigate spill incidents to identify cause(s) and implement control measures to prevent or minimize a recurrence.

## Spill Designate

Provide assistance in response to hazardous material spills. The extent to which the Designate and other department personnel respond to spills will vary with department policy. The designate(s) will coordinate response and summoning of additional response personnel and will be available after hours to provide assistance in the event of a spill.

Provide "site-specific" training to department members who work with hazardous materials and will potentially be involved in spill / emergency response situations.

Regularly inspect the workplace to ensure that spill kits are available and that supplies are relevant to the hazardous materials being handled in the area for which the spill kit is designated for use.

Maintain records regarding inspections conducted, tra

# Contract Security



Do not store incompatible chemicals together (e.g. acids with bases). Chemicals must be stored by hazard category and not alphabetically (except within a hazard group).

Purchase solvents in containers with a plastic safety coating.

Ensure that all gas cylinders are securely fastened and upright.

- Do not stage experiments below heavy objects which might fall on them. Ensure the work area is free of unnecessary clutter.
- Select equipment that has a reduced potential for breakage (e.g. Pyrex).
- Mercury spills are one of the most common lab spills. Replace mercury with alcohol thermometers or other alternate type of temperature measuring device.

When planning experiments, anticipate possible accidents and provide controls to deal with problems that may occur.

If you must work alone, ensure the working alone protocol addresses hazardous material spill response as part of the emergency procedures

Check gas cylinder valves and gas tubing for leakage before use.

If possible, keep cylinders of highly toxic or corrosive gases in a fume hood or other ventilated enclosure.

Ensure you have access and know the location of a suitable spill kit before you start working with hazardous materials.

## Disposal

Do not mix incompatible wastes together to avoid uncontrolled chemical reactions.

Properly identify the contents of all waste containers to avoid inappropriate disposal.

Leave at least 20% air space in bottles of liquid waste to allow for vapour expansion and to reduce the potential for spills due to overfilling.

When not in use, keep waste containers securely closed or capped. Do not leave funnels in waste containers.

Biohazardous waste must be labelled and should be in yellow containers.

Dispose of waste on a regular basis; do not allow excess waste to accumulate in the work area.

Contact UFV's Facilities department for 3rd party disposal.

## Preparation

Emergency preparedness is an important element of a spill plan. When worksites are prepared for spills, fewer errors are made and there is a reduced risk to persons, property, and the environment. The essential elements of spill response preparation are train

## Hazard Information

Information on the hazardous material hazards present at the worksite must be kept up-to-date and readily available. Sources of information include the Safety Data Sheets, signs, container labels, posters, and reference books. The worksite supervisor and departmental WHMIS Designate(s) are responsible for ensuring that this information is readily available to worksite personnel.

Risk assessments of the hazardous materials used fall under the department's responsibility. Further information is provided in the Chemical Safety Program. For biosafety risk assessments, a local risk assessment is conducted prior to issuing a Biosafety Permit.

## Equipment

Spill Designate(s) is responsible for ensuring that an adequate supply of spill response equipment is maintained in each department. The equipment required includes personal protective equipment and spill cleanup supplies. Recommended contents for generic spill kits are provided in Appendix B; however, spill kits should be customized to account for specific hazards and conditions in each department or work site.

## Procedures

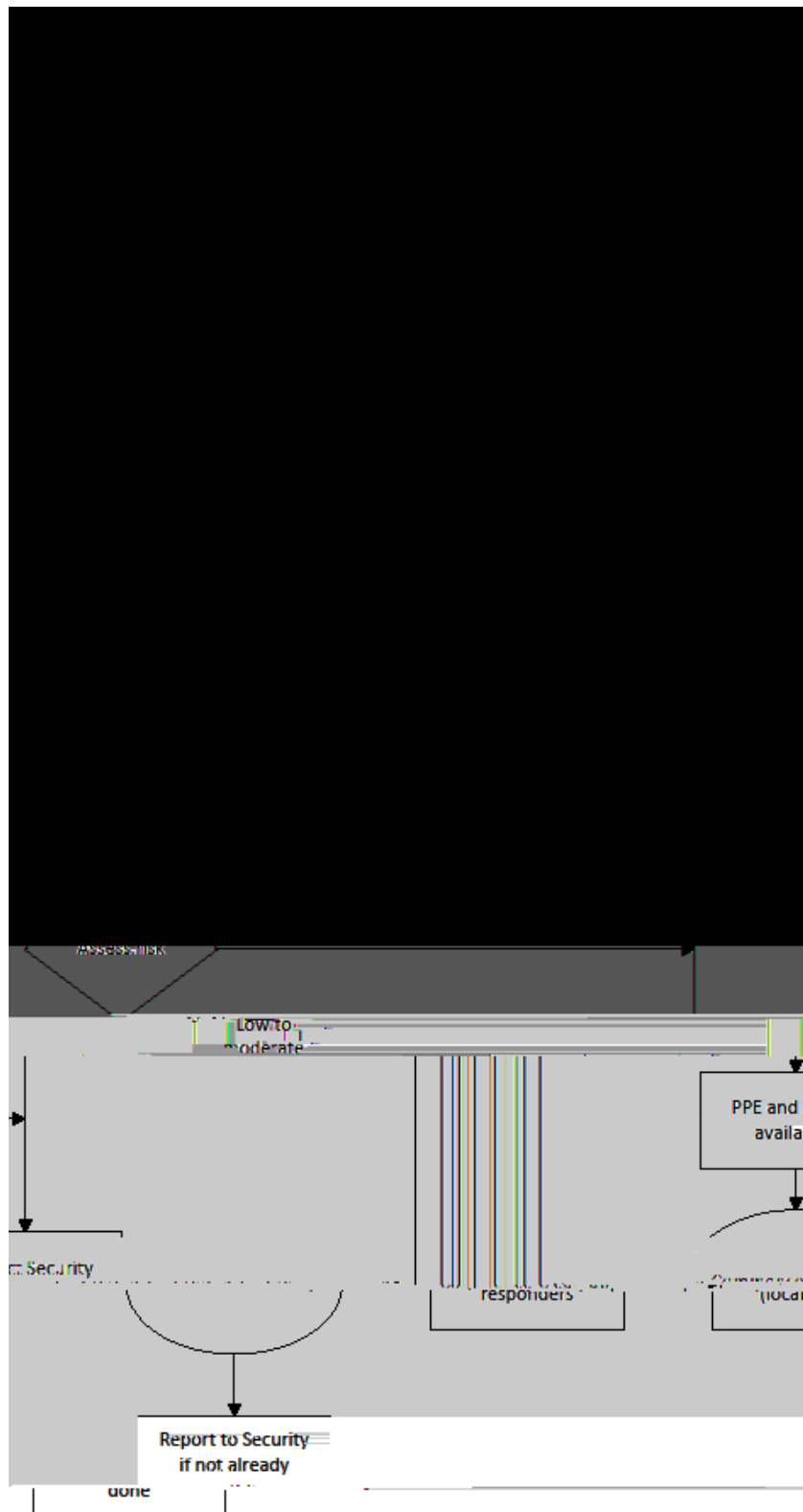
The procedures given in Section 5 provide general guidance for responding to spills and Appendix A includes a flow chart summarizing the actions which should be taken. A copy of this procedure should be made available to personnel at all worksites at the University of the Fraser Valley.

In addition to the general procedure outlined in the \_\_\_\_\_ section, hazardous materials specific procedures must also be available at worksites where hazardous materials are present or where large quantities of materials are stored. Site

If the

If an emergency arises, isolate the area, and contact the Security Operations Centre at EXT 7654. When informed of

# Appendix A: Spill Response Flow Chart



# Appendix B: Material Specific Response Guides

## Spill Response Guide No. 1: Flammable Liquids

Flammable liquids have **flash points below 37.8°C**, evaporate quickly, and within a short period of time can reach high vapour concentration. Some common examples of flammable liquids include ethanol, methanol, hexane, diethyl ether, and toluene. Larger spills of flammable liquids may require a response by the fire department if vapour concentration exceeds the lower explosion limit (LEL). **A spill of more than 500 mL is an emergency** that requires area evacuation and notification to the Security Operations Centre (EXT 7654). Spills of less than 500mL can be cleaned-up by local personnel who are adequately trained and have the proper spill response equipment available. If this is the case, proceed as follows:

- 1) If spill absorbent is available in the immediate area, dike around the spill (see **Step 6 below**) if it is safe to do so. This will prevent the spill from spreading further.
- 2) Immediately extinguish any open flames and, and isolate and evacuate the spill area.
- 3) If the area's ventilation system recirculates the air throughout the building, call the Facilities Management (**Mon-Fri, 8am-4:30pm 604854-4542; after hours 1-855-239-7654**) to have the ventilation shut down to prevent the spread of vapour throughout the building. In addition, close any open doors to also help prevent the spread of vapours.
- 4) Assemble spill team members and the spill response kit outside the spill area. **Obtain and read the SDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.
- 5) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a. **Gloves as recommended by SDS or glove manufacturer.**
  - b. Splash goggles or face shield.
  - c. Shoe covers or rubber boots.
  - d. Lab coat or Tyvek™ coveralls.
  - e. Half mask air-purifying respirator with **organic vapour or combination** cartridges, or as **otherwise recommended by the SDS or respirator manufacturer.**
- 6) If not already done, dike around the spill using spill absorbent or spill pillows. Do not use paper towels to absorb the spill since this increases the rate of evaporation and vapour concentration of the liquid.
- 7) Carefully cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.
- 8) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact UFV's Facilities department for disposal of hazardous goods.

- 9) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.
- 10) Remove and bag personal protective equipment for cleaning or disposal.
- 11) If the ventilation system has been shut down, contact Facilities Management to have it restarted.

Once the spill has been cleaned up, the area should not be reentered until it has been purged of all remaining vapour. In the absence of air monitoring equipment, wait at least **1 hour** before reentering the area.



## Spill Response Guide No. 2: Acid Spills

The principal concern is the corrosive effect of these substances. Dilute solutions irritate the skin, while concentrated solutions can result in burns and also react violently with water

Hydrofluoric acid can penetrate deeply and damage underlying tissue. **Note that hydrofluoric acid spills require special response procedures. If you work with hydrofluoric acid, you must have a site-specific safe work procedure, that includes spill and emergency response procedures.**

**A spill of more than 1 litre of liquid or 500g of solid acid is an emergency** that requires area evacuation and notification of the Security Operations Centre (EXT 7654). **All spills of concentrated hydrofluoric acid are emergencies** and require outside assistance. Spills of less than 1 litre / 500g can be cleaned up

- 8) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact UFV's Facilities department for disposal of hazardous goods.
- 9) Check the pH of the spill area. If it is less than pH6, then neutralize with a dilute solution of 5% sodium bicarbonate (baking soda).
- 10) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.
- 11) Remove and bag personal protective equipment for cleaning or disposal.
- 12) If the ventilation system has been shut down, contact Facilities Management to have it restarted.

Once the spill has been cleaned up, the area should be free of any acid fumes or vapours. However, if odors or irritation is still noted, isolate the area, and wait at least **1 hour** before reentering.

For a **solid acid spill**:

- 1) Isolate the spill area and assemble spill team members and the spill response kit outside the spill area. **Obtain and read the SDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.
- 2) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a. **Gloves as recommended by SDS or glove manufacturer.**
  - b. Safety glasses or goggles.
  - c. Lab coat.
  - d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter, or **as otherwise recommended by the SDS or respirator manufacturer.**
- 3) If necessary, slightly moisten the solid, to minimize dust production. Use water, or if the material is water reactive, another inert liquid (e.g., ethylene glycol).
- 4) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact UFV's Facilities department for disposal of hazardous goods.
- 5) Remaining solid acid residue may be neutralized using a dilute solution of sodium bicarbonate (baking soda). Check the pH of the spill area; the final pH should be between pH 6 and pH 10. Use spill absorbent or spill pillows to absorb the neutralized residue.
- 6) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.
- 7) Remove and bag personal protective equipment for cleaning or disposal.

## Spill Response Guide No. 3: Alkali & Base Spills

Like acids, the principal concern is the corrosive effect of these substances. Dilute solutions irritate the skin, while concentrated solutions can result in burns. Concentrated alkali compounds can penetrate deeply and damage underlying tissue.

A spill of more than 1 litre of liquid or 500g of solid alkali or base is an emergency that requires area



## Spill Response Guide No. 4: Oxidizer Spills

Oxidizing agents can ignite organic solvents and combustible materials. They are also skin and respiratory irritants. Examples include concentrated hydrogen peroxide, and permanganate, chlorate, nitrate, and dichromate compounds. **Spills in excess of 1 litre of liquid or 500 grams of solid oxidizer are emergencies** and require area evacuation and notification of the Security Operations Centre (**EXT 7654**). Spills of less than 1 litre / 500g can be cleaned up by local personnel who are adequately trained and have the proper spill response equipment available. If this is the case, proceed as follows for a **liquid oxidizer spill**:

- 1) If spill is available in the immediate area, dike around the spill (**see Step 5 below**) if it is safe to do so. This will prevent the spill from spreading further.
- 2) Isolate and evacuate the spill area.
- 3) Assemble spill team members and the spill response kit outside the spill area. **Obtain and read the SDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.
- 4) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a. **Gloves as recommended by SDS or glove manufacturer.**
  - b. Splash goggles or face shield.
  - c. Shoe covers or rubber boots.
  - d. Lab coat or Tyvek™ coveralls.
  - e. Half mask air-purifying respirator with cartridges and/or filters **as recommended by the SDS or respirator manufacturer.**
- 5) If not already done, dike around the spill using spill absorbent or spill pillows. Remove or moisten with water any combustible affected by the spill.
- 6) Carefully cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.
- 7) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact UFV's Facilities department for disposal of hazardous goods.
- 8) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.
- 9) Remove and bag personal protective equipment for cleaning or disposal. For a **solid oxidizer spill**: dnr.3 (a) s(s)-4(t)-3 s3.3 ( ) 1z0.004 Tc 0.006 T2.8 (d)-0.8 (o)- 0.004 Tcs0.002 0.8 (o)-.8 9en0.004 Tcw 4tdt4t

- 2) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a. **Gloves as recommended by SDS or glove manufacturer.**
  - b. Safety glasses or goggles.
  - c. Lab coat.
  - d. **Half mask air-purifying respirator with N95 or greater protection particulate filter or as recommended by the SDS**

## Spill Response Guide No. 5: Highly Toxic Materials Spills

Highly toxic chemicals include those with high acute systemic toxicity, and substances with chronic toxic effects such as carcinogens, reproductive or developmental (embryo toxins, teratogens) toxins, and mutagens. Also included in this category are compounds that can easily produce toxic products. For example, cyanide and sulfide salts produce toxic hydrogen cyanide and hydrogen sulfide, respectively, in the presence of acids. **In general, spills of more than 100mL of liquid or 50g of solid**

- 10) Remove and bag personal protective equipment for cleaning or disposal.
- 11) If the ventilation system has been shut down, contact Facilities Management to have it restarted.

For a **solid spill**:

- 1) Isolate the spill area and assemble spill team members and the spill response kit outside the spill area. **Obtain and read the SDS** for the substance to determine the hazards associated with it and any special precautions that will need to be taken.
- 2) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a. Gloves **as recommended by SDS or glove manufacturer.**
  - b. Safety glasses or goggles.
  - c. Lab coat.
  - d. Half mask air-purifying respirator with **N95 or greater protection** particulate filters, or cartridges and/or filters **as recommended by the SDS or respirator manufacturer.**
- 3) Slightly moisten the solid, to prevent the spread of dust. Use water, or if the material is water reactive, another inert liquid (e.g., ethylene glycol).
- 4) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact UFV's Facilities department for disposal of hazardous goods.
- 5) Remove any remaining residue using minimal detergent and water. Absorb this wash water using spill absorbent or spill pillows and dispose of as hazardous waste as in **Step 4 above**.
- 6) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.
- 7) Remove and bag personal protective equipment for cleaning or disposal.



## Spill Response Guide No. 6: Low Hazard Material Spills

Low hazard materials are those with no appreciable health hazard when encountered in quantities typical for University work sites. These include such solid materials as sodium chloride, calcium chloride, and liquids such as ethylene glycol, oils, and most paints. **In general, all spills of these materials may be cleaned up by local personnel unless there are other mitigating circumstances** that require outside assistance, area evacuation and notification of the **Emergency Management (EXT 7770)**. If this is not the case, proceed as follows for a **liquid spill**:

- 1) If spill absorbent is available in the immediate area, dike around the spill (see **Step 4 below**) if it is safe to do so. This will prevent the spill from spreading further.
- 2) Move outside the spill area. **Obtain and read the SDS** to confirm that the material is of low hazard and can be cleaned up safely following this procedure.
- 3) Don the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a. **Gloves as recommended by SDS or glove manufacturer.**
  - b.

4) Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Contact UFV's Facilities department for disposal of hazardous goods.

5)



## Spill Response Guide No. 8: Risk Group 2 Biohazardous Spill

For small spills of Risk Group 2 biohazardous materials: a liquid culture of 10 litres or less.

- 1) The following general practices are required for all laboratories or any personnel working with infectious material in which a small biohazard spill has occurred.
- 2) Immediately notify any nearby persons and have them leave the area.
- 3) Any authorized personnel should be immediately notified. If no authorized personnel are present, leave the room and close the door. Post a temporary warning sign indicating the nature of the spill then contact the Biosafety Officer or UFV Security.
- 4) Spills should only be cleaned up by authorized and trained personnel. Appropriate personal protective equipment (e.g. gloves, lab coat, eye protection, etc.) should be worn during cleanup. Spills should be cleaned up immediately after the spill has occurred. Do not clean up spills until you have been trained and authorized to do so. Spills should be cleaned up by authorized and trained personnel. Appropriate personal protective equipment (e.g. gloves, lab coat, eye protection, etc.) should be worn during cleanup. Spills should be cleaned up immediately after the spill has occurred. Do not clean up spills until you have been trained and authorized to do so.

## Spill Response Guide No. 9: Combustible & Other Non-flammable Organic Liquids

Combustible liquids (e.g., mineral spirits) have **flash points above 37.8°C but below 93.3 °C** and are not fire hazards at room temperature. The principal hazard from non-flammable, volatile liquid spills is exposure to the vapour by inhalation or skin absorption. **A spill of more than 1 litre is an emergency** that requires area evacuation and notification of the Security Operations Centre (**EXT 7654**). Spills of less than 1 litre can be cleaned up by local personnel who are adequately trained and have the proper spill response equipment available.

11) If the ventilation system has been shut down, contact Facilities Management to have it restarted.

Once the spill has been cle

## Spill Response Guide No. 10: Mercury Spills

Elemental mercury and mercury compounds are toxic by inhalation and in some cases, absorption through the skin. Although mercury evaporates slowly, in areas of poor ventilation the vapour concentration will increase over time and become a chronic or acute health hazard.

**REPORT ANY SPILL OF MERCURY TO THE SECURITY OPERATIONS CENTRE (EXT 7654)**

Spills in excess of 30mL are emergencies that require area evacuation and notification of the Security Operations Centre (**EXT 7654**). Spills of less than 30mL can be cleaned up by local personnel who are adequately trained and have the proper spill response equipment available. If this is the case, proceed as follows for a mercury spill;

- 1) Isolate and evacuate the spill area.
- 2) Assemble spill team members and the spill response kit outside the spill area.
- 3) Don the appropriate personal protective equipment. Depending on the scale of the spill, this can include:
  - a. Nitrile gloves.
  - b. Safety glasses or splash goggles.
  - c. Shoe covers or rubber boots.
  - d. Lab coat or Tyvek™ coveralls.
  - e. Half mask air-purifying respirator with **mercury vapour** cartridges.
- 4) Using a razor blade, scrapper, or similar tool, gently push small droplets of mercury together and remove them using a hand-held mercury aspirator or da 9.8254 /TT1 1 Taspcolo(o)-6.6 p2.2 (m)er(e)-6 (p)-0 u-





## Appendix C: Spill Kits

Spills kits can be assembled from individual parts or suitable spill kits may be purchased from most chemical or safety supply companies. If you do choose to purchase a commercial kit, however, ensure that it contains all the necessary items as listed below. In addition, note that most commercial spill kits and the lists below are generic; it is important that spill kits be tailored to meet the specific spill control needs of each lab, work area, or department.

### **1) Small Chemical Spill Kit**

A small chemical spill kit should be available in each lab or work area that uses chemicals. It can be used for immediate response to most spills, and to clean up small, low hazard spills that may occur and do not require specialized personnel protective equipment or spill control supplies. Although most small

- PVC (4)
- PVA (4)
- Nitrile (4)
- Plastic shoDC /TT2 1 Tf9.7608 0 0 9.96 6B6D)

