

Spill Response Guidelines

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Safety & Security

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Record of Amendments

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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 to reduce the potential for spills and have a plan for responding to spills. This document describes generic methods for preventing spills, responding to spills of low or moderate hazard and information on reporting and addressing larger spills at the University of the Fraser Valley.

Purpose

The purpose of the Spill Response Guidelines is to provide guidelines, including roles and responsibilities, for preventing, mitigating, and responding to hazardous materials spills.

Scope

The Spill Response Guidelines apply only to UFV properties located in Canada.

Roles and Responsibilities

Departments

- Implement measures to prevent potential spills of hazardous materials.
- Develop “site specific” or department specific spill response procedures where hazardous products are used or stored that present a risk upon exposure.
- Appoint Spill Designate(s) / Alternate Spill Designate(s); Provide support to the Spill Designate(s).
- Maintain an inventory of hazardous materials used and stored in the department.

Workers

Legislation dictates that the worker has an obligation to protect their own health and safety and that of other workers present while they are working. The worker is also expected to cooperate with their employer for the purpose of protecting their health and safety and that of other workers. Specifically, these responsibilities include:

- 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 *Prevention* 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, training conducted and spill kit maintenance.

Manager, Environmental Health & Safety

- Provide assistance to departments and designates in developing site specific spill response procedures and spill kits.
- Assist in the response to hazardous material spills that are beyond the ability of the departmental personnel.
- Assist in the investigation of hazardous material spill incidents to determine direct, indirect, and root causes, and to provide preventative recommendations.
- Implement and annually review the Spill Response Guidelines, or as necessary.

Contract Security

- Receive spill reports/calls for assistance at the Security Operations Centre.
- Initiate appropriate UFV call out procedures.
- Initiate and control evacuations of the building(s).
- Control access to the incident area.
- Provide access for external responders.

Prevention

The first step in spill response is to prevent the spill from happening in the first place. The worksite should be examined to identify measures that can be taken to minimize the risk of a spill occurring. These measures can be identified during regular worksite safety inspections.

Spills occur during five types of activities: storage, transport, transfers, usage, and disposal.

Storage

- Ensure shelving units are sturdy, and not overcrowded with containers. Shelves used for hazardous materials storage should be securely fastened to the wall or floor to provide added stability.
- Ensure the hazardous materials are stored within easy reach of everyone in the lab, and no higher than eye level. Large bottles and containers should be stored as close to floor level as possible.
- Do not store hazardous materials containers directly on the floor where they might be knocked over and broken unless they are in Underwriters Laboratories of Canada (ULC) approved safety cans or still in their original shipping carton and packing.
- Do not store chemical containers on top of flammable storage or acid storage cabinets.
- Minimize the number of hazardous materials and size of containers stored in the room. For commonly used chemicals (i.e. acids, solvents), a good rule of thumb is to keep quantities in the room to either a single bottle or a one-week supply, whichever is less.
- Ensure that lighting and ventilation is adequate in the storage area.
- Regularly inspect the hazardous materials in storage to ensure there are no leaking or deteriorating containers. Some items to note:
 - Keep the outside of containers clean and free of spills and stains.
 - Check that caps and closures are secure and free of deformation. Use only screw caps on chemical containers in storage; foil, Parafilm™, corks or other plugs are not acceptable.
 - Ensure that metal containers are free of rust, bulges, or signs of pressure buildup.
- Do not store hazardous materials in unsuitable containers or containers made of incompatible material (i.e.: no HF in glass containers).

- 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.

Hazardous Material Inventories

- Each department or work area is required to maintain a current inventory of hazardous materials used and stored in the workplace.
- Provide a copy of the hazardous material inventory to Safety & Security for emergency response purposes.

Transport

- When transporting large, heavy or a multitude of containers use a cart suitable for the load with high edges or spill trays that will contain any spills or leaks. Two people should be involved when transporting large amounts of chemicals.
- Carry glass containers in bottle carriers or another leak resistant, unbreakable secondary container.
- Use a gas cylinder handcart when transporting large gas cylinders. Ensure cylinder is securely strapped to the cart.
- When possible, transport chemicals in freight elevators to avoid the possibility of exposing people on passenger elevators in the event of a spill. Do not take the stairs.
- Comply with the Transportation of Dangerous Goods Act and Regulations when transporting hazardous material on public roads.

Decanting

- When transferring chemicals between containers, pay careful attention to the size of the receiving container to prevent overfilling it.
- When transferring liquids from large containers, use pumps, siphoning (not initiated by mouth) or other mechanical means instead of pouring.
- Use spill containment trays to catch leaks and spills when transferring liquids.
- When transferring flammable liquid from drums, ensure that both the drum and receptacle are grounded and bonded together to avoid an explosion initiated by a static electric spark.

Handling & Use

- In laboratories, work in a fume hood whenever possible.
- When setting up and working with laboratory apparatus:
 - Inspect laboratory glassware for cracks or defects before using it.
 - Secure flasks and beakers to prevent them from tipping over.

- 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 training, hazard information, proper equipment, and written procedures as described below.

Training

Spill response training is coordinated and arranged by each department.

The training should include, but is not limited to, the review of the applicable Safety & Security, Spill Response Guidelines for emergency response, review of department specific spill response plan, instruction in spill cleanup techniques, and review of hazards found in the work area (chemical, physical, biological) which may be of concern during a spill response.

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 *Response* 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-specific procedures should include information on the hazards of the material; the quantity and storage location of the hazardous material; the personal protective equipment and spill abatement equipment required and their location; the instructions for containing and cleaning up the spill; the first-aid measures and materials required to treat exposed individuals; and the method of waste disposal.

Response

When a spill occurs, personnel at the spill scene must act quickly to reduce the consequences of the spill. The actions taken depend on the magnitude, complexity, and degree of risk associated with the spill. The following steps outline the actions which should be taken in response to a hazardous materials spill. See also Appendix A: Spill Response Flow Chart.

If the material is...	And the volume is...	And beyond the department or area's capability to safely contain and/or clean up the spill then...
Flammable liquids	> 500 mL	Call the Security Operations Centre at 1-855-239-7654 or Local 7654
Combustible & other Non- Flammable Organic liquids	> 1 L	
Acid Spills	> 1 L or 500 g	
Alkali & Base Spills	> 1 L or 500 g	
Mercury	> 30 mL	
Oxidizers	> 1 L or 500 g	
Highly Toxic Materials (i.e., Cyanide)	> 100 mL or 50 g	
Low Hazard Materials (i.e., Sodium chloride)	Any volume	
Water reactive materials	Any volume	
Compressed gas leaks	Any volume	
Biological/Biohazard	> 10 L	

Stay clear and warn others.

Proceed with caution and advise others that are in the immediate area of the spill of the potential danger.

Assist injured or contaminated persons.

If persons are injured, provide first-aid if you or another available individual is trained to do so. If persons have been contaminated by the spilled material, lead them to the nearest eyewash or emergency shower (depending on the extent / location of the contamination) and assist in washing off the material. However, do not put yourself at risk and become a casualty. Injuries resulting from chemical spills are often medical emergencies, call for first aid at EXT 7770.

Assess the situation. Is this an emergency?

An emergency situation exists when there is a high risk to:

- Persons
- Property
- Environment

The material specific Spill Response Guides included in Appendix B provide information on the quantity of spilled material that is considered an emergency for different classes of hazardous materials. These amounts are for guidance only. Spills of amounts less than that listed may also constitute an emergency depending on the circumstances. Always consider the whole situation when determining if an emergency exists or not. All spills in areas accessible to the general University community (e.g.: corridors, lobbies) are considered emergencies. Whenever a spill occurs in a public area, contact Security Operations Centre (SOC) (EXT 7654).

If an emergency arises, isolate the area, and contact the Security Operations Centre at EXT 7654. When informed of an emergency, SOC will contact the appropriate emergency response persons or team. For this purpose, specific information is needed from the person reporting the incident. This information must include:

- Identity of the person making the report.
- Nature of the incident (fire, explosion, chemical spill, gas leak).
- Location of the incident (building and room number).
- Presence of any injuries.
- When and how the incident occurred.

Get help for all but minor spills.

If an emergency does not exist, assistance from outside the immediate work area may still be required. Consider the following:

- Number and training of persons required.
- Personal protective equipment required.
- Spill abatement material required.
- Nature of the spill (e.g. amount spilled, hazards of the spilled chemical).

Minor spills or spills of chemicals of low toxicity and/or volatility can be handled by personnel at the worksite. More serious spills up to the amounts listed in the Spill Response Guides may be handled by local personnel with assistance from the Spill Designate and other members of the departmental spill team. If the nature, quantity, or location of the spill exceeds the capacity of departmental personnel to deal with it safely and effectively, then outside help must be requested by contacting the Security Operations Centre (EXT 7654). If there is any doubt regarding the ability of local or departmental personnel to handle a hazardous material spill, always contact the Security Operations Centre (EXT 7654) and request assistance.

Control and clean-up the spill.

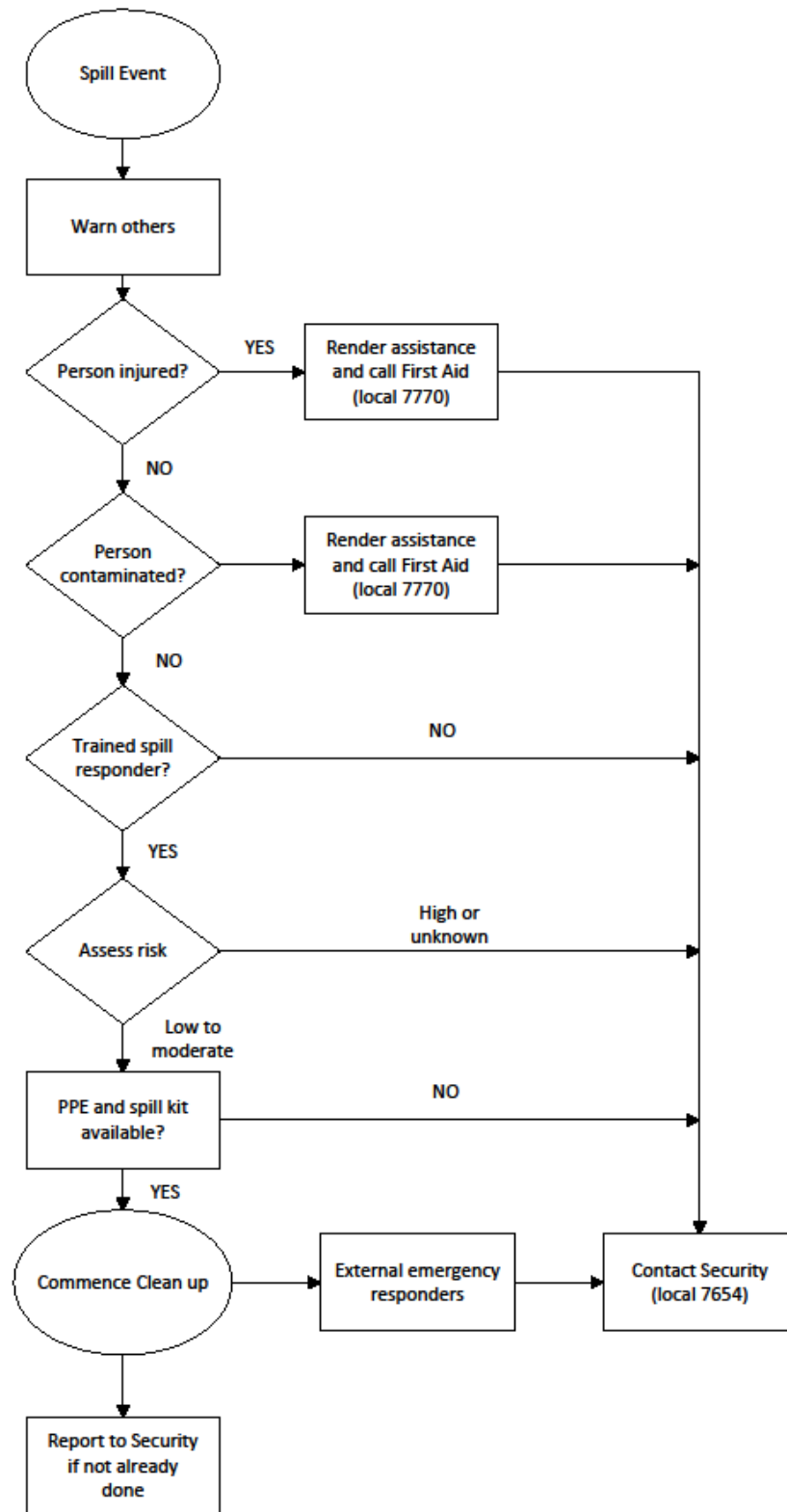
The material specific Spill Response Guides included in Appendix B provide information on the hazards of spills and how they should be handled in terms of containment and clean-up. In all cases, consult the Safety Data Sheet for chemicals, Pathogen Safety Data Sheets for biosafety hazards to obtain more specific information on the material spilled to ensure it is cleaned up safely and effectively.

Report the spill.

All spills and gas releases must be reported to Safety & Security by completing the Incident Report. The report should include the date, time, location, description of the spill (e.g. type and quantity), personnel injuries or exposures, equipment damage, escape of material (e.g. into sewers or bodies of water), witnesses, and persons involved in supervision and clean-up of the spill. The report should be submitted to Safety & Security as soon as possible (within 24 hours of the spill occurring) regardless of whether or not the Security Operations Centre was notified.

The purpose of this reporting procedure is not to place blame, but to identify measures that may prevent similar incidents in the future.

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 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 acid spill**:

- 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) Isolate & evacuate the spill area.
- 3) If the spilled chemical is volatile, and the area's ventilation system recirculates the air throughout the building, call Facilities Management (Mon-Fri 8am-4:30pm 604-854-4542; 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 **acid gas 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. Ideally, use spill absorbent that contains a mild neutralizing agent such as sodium carbonate (soda ash)
- 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) 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 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 alkali or base spill**:

- 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) Isolate and evacuate the spill area.
- 3) If the spilled chemical is volatile, and the area's ventilation system recirculates the air throughout the building, call Facilities Management (Mon-Fri 8am-4:30pm 604-854-4542; 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 cartridges/filters **as recommended by the SDS or respirator manufacturer.**
- 6) If not already done, dike around the spill using spill absorbent or spill pillows. Ideally, use spill absorbent that contains a mild neutralizing agent such as sodium carbonate (soda ash)
- 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) Check the pH of the spill area. If it is greater than pH10, then neutralize with a dilute solution of 5% citric acid.

- 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 alkali 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 alkali or base 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 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 alkali or base residue may be neutralized using a dilute solution of 5% citric acid. 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. 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**:
 - 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 recommended by the SDS or respirator manufacturer.**
- 3) 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). Send them for disposal as hazardous waste. Contact UFV's Facilities department for disposal of hazardous goods.
- 4) If there is still oxidizer residue left in the spill area, neutralize with dilute 5% sodium thiosulfate solution. Use spill absorbent or spill pillows to absorb the neutralized residue.
- 5) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.
- 6) Remove and bag personal protective equipment for cleaning or disposal.

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 of these substances are emergencies** and require area evacuation and notification of the Security Operations Centre (**EXT 7654**). Spills of less than 100mL / 50g can be cleaned up by local personnel who are adequately trained and have the proper spill response equipment available. **These chemicals, however, should always be evaluated on an individual basis.** Proceed as follows for a **liquid spill**:

- 1) If spill absorbent 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) If the spilled chemical is volatile, and the area's ventilation system recirculates the air throughout the building, call the Facilities Management (Mon-Fri 8am-4:30pm 604-854-4542; 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.
- 3) 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.
- 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 TyvekTM 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
- 6) 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) 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 8 above**.
- 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.

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. Safety Glasses or Splash goggles.
 - c. Shoe covers or rubber boots.
 - d. Lab coat or Tyvek™ coveralls.
- 4) If not already done, dike around the spill using spill absorbent or spill pillows
- 5) Cover the spill area with spill absorbent or spill pillows, starting at the outside and working inward.
- 6) 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.
- 7) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.
- 8) Remove and bag personal protective equipment for cleaning or disposal. For a **solid spill**:
 - 1) 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.
 - 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.
 - 3) If necessary, use water to lightly moisten the solid, to minimize the spread of dust.

- 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) Mop the affected area using detergent and water. Dispose of this water to the sanitary sewer.
- 6) Remove and bag personal protective equipment for cleaning or disposal.

Spill Response Guide No. 7: Air & Water Reactive Material Spills

These materials are particularly hazardous since they will rapidly react with water and/or air to produce toxic products, and in many cases are also pyrophoric and may spontaneously ignite in the presence of water and/or air. Typical examples of water and air reactive materials include the alkali metals, metal hydrides and strong reducing agents such as sodium borohydride. **All spills of air & water reactive materials are emergencies** and require area evacuation and notification of the Security Operations Centre (**EXT 7654**). If a spill of a **liquid reactive material** occurs;

- 1) Isolate the spill area.
- 2) If an inert spill absorbent such as dry sand or kitty litter is available in the immediate area, dike around the spill if it is safe to do so. This will prevent the spill from spreading further.
- 3) Evacuate the area and, if not already done so, contact the Security Operations Centre (**EXT 7654**). Meet emergency responders and provide information on the nature, extent, and exact location of the spill.

For a **solid spill**:

- 1) Isolate the spill area.
- 2) If an inert spill absorbent such as dry sand or kitty litter is immediately available in the area, immediately smother the spilled material if it is safe to do so. For reactive metals (e.g., sodium, potassium), a Class D fire extinguisher may be used.
- 3) Evacuate the area and, if not already done so, contact the Security Operations Centre (**EXT 7654**). Meet emergency responders and provide information on the nature, extent, and exact location of the spill.

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., Lab coats, gloves, goggles, respirator) should be worn when cleaning up RG2 spills.
- 5) Find the Lab spill kit and bring to the spill location.
- 6) Use only disinfectants that have been verified to be effective against the RG2 agent (e.g., 0.8% solution of Clinicide, 10% solution of Bleach). Slowly and carefully pour disinfectant around the outer perimeter of the spill and allow it to flow into the spill. Allow the disinfectant to be in contact with the spill for up to 30 minutes
- 7) If any broken glass is present, use forceps from the spill kit to pick up the glass and transfer to a solid container lined with a biohazard bag. DO NOT use your hands. Autoclave as per ref. 3.4 in the UFV Biosafety Standard Operating Procedures.
- 8) Absorbent materials (e.g., paper towels) soaked with disinfectant should be placed over the spill. After the appropriate time, discard these materials into a biohazardous waste container and autoclave.
- 9) Using absorbent material (e.g., paper towels) wipe up the spill and discard the paper towels in a biohazard autoclave bag. Discard any other contaminated materials (e.g., gloves and other wastes from clean-up) into an autoclave bag.
- 10) Remove any contaminated garments (lab coats, shoe covers) or other safety equipment (e.g., goggles, face shield) and place into a biohazardous bag or container for autoclaving. Thoroughly wash your hands and face with antibacterial soap and water.
- 11) Report the spill to Safety & Security by completing an Incident Report.

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. 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 isolate and evacuate the spill area.
- 3) If the area's ventilation system recirculates the air throughout the building, call Facilities Management (Mon-Fri 8am-4:30pm 604-854-4542; 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. 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 disposable pipette. Do not use a household vacuum cleaner since this will disperse mercury vapour throughout the room.
- 5) Pipette the aspirated mercury into a labeled glass waste container. Shine a flashlight on the surface to identify small mercury droplets that escape into cracks and crevices.
- 6) Spread a commercial mercury amalgam mix over the contaminated surface after all visible mercury droplets have been removed. Sweep up mercury amalgam using a small brush and dispose of it into a labeled glass waste container. Take care not to break up any mercury droplets. Alternately, wipe the surface using a mercury absorbent cloth (e.g., Mercon wipes) or suppressant and dispose of it into a labeled clear, plastic bag.
- 7) Send all mercury and contaminated material for disposal. Contact UFV's Facilities department for disposal of hazardous goods.
- 8) Remove and bag personal protective equipment for cleaning or disposal.

Spill Response Guide No. 11: Compressed Gas Leaks

Compressed gas leaks can be roughly divided into two categories. The first are those leaks which occur away from the cylinder in gas lines, tubing, or apparatus. These, once detected, can generally be stopped by closing the main cylinder valve. The second are those leaks that occur at the cylinder itself, and that cannot be stopped by closing the cylinder valve. Similarly, in some cases, it may not be possible to close a cylinder valve due to age or poor condition of the valve. **All leaking gas cylinders are an emergency if the leak cannot be stopped by closing the cylinder valve.** Leaks of oxygen, flammable gas, or toxic gas are especially dangerous. The following procedure should be followed:

- 1) If a leak is suspected, perform a leak test with a commercial leak detection solution or a non-reactive, detergent solution. If the leak is detected or is obvious, proceed to **Step 2**.
- 2) If the leak cannot be stopped by closing the cylinder valve, and it is **an inert atmospheric gas** (e.g., nitrogen, carbon dioxide, etc.) clear the affected area and/or floor. If the leak is of a **flammable, toxic, or corrosive gas** and is outside of a ventilated enclosure that will contain the gas, immediately activate the building fire alarm system, and evacuate the building.
- 3) If not already done so, contact the Security Operations Centre (**EXT 7654**). Meet emergency responders and provide information on the nature, extent, and exact location of the leak.

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 spill kit components are common items found throughout the lab, there must be a consolidated spill kit for emergency use.

a) Personal Protective Equipment

- Chemical Splash Goggles.
- Lab Coat.
- Heavy Nitrile or Neoprene Gloves.
- Respirator Protection if required – Please note annual fit testing and maintenance of the respirator is required.

b) Spill Clean Up Equipment

- Plastic Dustpan & Brush.
- Heavy Plastic Bags (at least 3 mil thickness).
- Universal Spill Absorbent (1:1:1 mix of sodium carbonate: kitty litter: sand), Spill Pillows, or other suitable spill absorbent (enough to absorb a spill of the largest container in the work area).
- Other absorbents / neutralizers as required for the chemicals in the lab.

2) Large / Departmental Chemical Spill Kit

Every department that have significant quantities of chemicals should have one or more large chemical spill kits containing PPE and spill cleanup supplies to compliment the smaller worksite kits, and as backup supplies for outside responders (i.e., EHS). The number and location of these kits will depend on the size of the department, whether the department is located on several floors or in several buildings, the number of chemicals in use, etc. In general, it is recommended that there be a large spill kit for each floor or building.

a) Personal Protective Equipment

- Half-mask air purifying respirator (2) Please note annual fit testing and maintenance of the respirator is required.
- Multigas Type Respirator Cartridges (6)
- Safety goggles (2)
- Face-shield (1)
- Disposable coveralls (Tyvek™) (6)
- Gloves
 - Neoprene (4)

- PVC (4)
- PVA (4)
- Nitrile (4)
- Plastic shoe covers (box)
- Duct tape (roll)
- Alcohol swabs (box) or respirator disinfectant

b) Spill Clean Up Equipment

- Chemical absorbent (20 litres)
- Plastic pail (20 litre) with lid (2)
- Felt marking pen (2)
- Heavy Plastic Bags; at least 3 mil thickness (12)
- Plastic bucket with handle (1)
- Long handle sponge mop (1)
- Extra sponges (4)
- Plastic dustpan (1)
- Broom (1)
- Duct tape (roll)
- Detergent (box)
- Citric Acid (500g)
- Sodium Bicarbonate (500g)
- Sodium Thiosulfate (500g)
- Spill Response Guideline

3) Mercury Spill Kit

All areas that work with elemental mercury or mercury containing equipment (e.g., thermometers) should have a mercury spill kit available. The following list includes only those items specific to cleaning up a mercury spill and must be used in conjunction with other items from a large / departmental spill kit.

- Mercury clean-up supplies (ex: Merconwipes™, Merconvap™, amalgamating powder, etc.)
- Mercury aspirator, disposable pipettes & bulbs, or similar equipment.
- Razor blades or scrapers.
- Plastic, zip-lock bags
- Flashlight
- Mercury Vapour Respirator Cartridges. Please note annual fit testing and maintenance of the respirator is required.

4) Biosafety Spill Kit

- Personal protective equipment: Nitrile gloves, safety glasses
- Absorbent materials such as paper towels, cotton balls, swabs, cloth rags
- Forceps for picking up broken glass and sharps
- Autoclave plastic bags for disposing of contaminated items
- Appropriate disinfectant, such as 0.8% solution of Clinicide; 10% solution of Bleach

Appendix D: Emergency Contacts

Emergency and First Aid information

Fire
Police
Ambulance
Hazardous Material Response



911

(9-911 from a UFV landline phone)

First Aid 1-855-282-7770
 (Local 7770)

Security 1-855-239-7654
 (Local 7654)

**Hazardous Materials Spill –
 Quantum Murray** 1-877-378-7745

Non-Emergency Contacts

	Fire	Police	Ambulance
Abbotsford	604-853-3566	604-859-5225	604-872-5151
Chilliwack	604-792-8713	604-792-4611	604-872-5151
Mission	604-826-2313	604-826-7161	604-872-5151
Hope	604-869-5671	604-869-7750	604-872-5151
UFV			

Emergency Management 604-557-4005
 (Local 4005)

Environmental Health & Safety 604-557-5272
 (Local 5272)

Facilities 604-852-4542
 (Local 4542)