



SAFETY & ENVIRONMENTAL HEALTH OFFICE

UNIVERSITY CHEMICAL SAFETY COMMITTEE

CHEMICAL EMERGENCY PROCEDURES

REVISION 1.0 03/2005

TABLE OF CONTENTS

PROCEDURE FOR SPILLS OF VOLATILE, TOXIC, CRYOGENIC OR FLAMMABLE MATERIALS:

1. Procedures for Chemical Spill on a Person
2. Procedure for Hydrofluoric Acid Spill on a Person
3. Procedure for Cryogenic Liquid Spill on a Person
4. Incidental Spills - Criteria for Small, Low-Toxicity Chemical Spills
5. Major Spills – Criteria for Response Level
6. Incidental Spills - Steps to be Followed for spill cleanup
7. Mercury Spill Procedure

Appendix A -- Quick Reference for Spill Cleanup Methods

PROCEDURE FOR SPILLS OF VOLATILE, TOXIC OR FLAMMABLE MATERIALS:

1. Warn all nearby persons nearby.
2. Turn off any ignition sources such as burners, motors, and other spark-producing equipment, if possible.
3. Leave the room and close the door if possible.
4. Call 911 to report a life-threatening hazardous material spill (dial 7-2200 or 7-4291 non-emergencies).
5. **Small spills** can be absorbed with paper towels or other absorbents. However, these materials can increase the surface area and evaporation rate, increasing the potential fire hazard if the material is flammable and airborne concentration reaches the flammability level.

PROCEDURE FOR CHEMICAL SPILL ON A PERSON:

1. Know where the nearest eyewash and safety shower are located.
2. For small spills on the skin, flush immediately under running water for at least fifteen minutes, removing any jewelry that might contain residue. If there is no sign of a burn, wash the area with soap under warm running water.
3. If pain returns after the fifteen-minute flooding, resume flooding the area. When providing assistance to a victim of chemical contamination, use appropriate personal protective equipment.
4. For a chemical splash in the eyes, immediately flush the eyes under running potable water for fifteen minutes, holding the eyes open and rotating the eyeballs. This is preferably done at an eyewash fountain with tepid water and properly controlled flow. Hold the eyelids open and move the eye up, down, and sideways to ensure complete coverage. Use an irrigator loop to thoroughly flush the conjunctiva under the upper eyelid, if available in your first aid kit. If no eyewash fountain is available, put the victim on his or her back and gently pour water into the eyes for fifteen minutes or until medical personnel arrive.
5. For spills on clothing, immediately remove contaminated clothing, including shoes and jewelry, while standing under running water or the safety shower. When removing shirts or pullover sweaters, be careful not to contaminate the eyes. Cutting off such clothing will help prevent spreading the contamination. To prepare for emergencies, shears (rounded-tip scissors) should be available in the first aid kit to allow safe cutting of contaminated clothing.
6. Consult the MSDS to see if any delayed effects should be expected, and keep the MSDS with the victim. Call University Police at 7-2200 or 911 to have the victim taken to the emergency room for medical attention. Be sure to inform emergency personnel of the decontamination procedures used prior to their arrival (for example, flushing for fifteen minutes with water). Be certain that emergency room personnel are told exactly what the victim was contaminated with so they can treat the victim accordingly.

PROCEDURE FOR HYDROFLUORIC ACID SPILL ON A PERSON:

Special precautions must be taken when working with hydrofluoric acid. Use the appropriate personal protective equipment as defined by the MSDS. Make sure the integrity of your PPE is in tact as a pinhole in a glove can have disastrous consequences.

Although HF exposures can result in injury, quick response will minimize the damage. All exposures should be treated immediately even though burns may not be felt for hours. Affected personnel must receive immediate medical attention for all eye and inhalation exposures, and all but the most minor skin burns. A summary of first aid procedures is listed below:

Skin Contact – Immediately wash all affected areas with water. Be sure to remove any clothing or jewelry that could trap HF (remove goggles last). Flush skin for fifteen minutes or until medical attention is available. Flushing can be reduced to five minutes if calcium gluconate gel (2.5%) is immediately available. Apply calcium gluconate gel to the affected area (use rubber gloves) every fifteen minutes and massage continuously. Get medical attention. Calcium gluconate gel can be obtained locally from Anachemia Science for approximately \$35 per tube.

Eye Contact – Immediately flush eyes for at least fifteen minutes with water while holding eyelids open. Get medical attention. Flushing can be limited to five minutes if medical personnel are immediately available to administer sterile calcium gluconate (1%) solution (via continuous drip).

Inhalation – Move to fresh air as soon as possible. Get medical attention. Medical personnel can administer pure oxygen and calcium gluconate (via nebulizer) to patient.

Laboratory personnel should only attempt to clean up small HF spills that do not involve personnel contamination and that are contained and under control. Be sure that good ventilation is available and that personal protective equipment is worn before attempting to clean up a HF spill.

Although accidents involving HF may not be totally eliminated, pre-planning will minimize the effects of such incidents. All laboratories that store or use HF should develop standard operating procedures that outline how to safely use HF, as well as how to respond to personnel contamination and HF spills. Please contact the S & EH Office for more information on HF, or for assistance in developing safe handling procedures.

PROCEDURE FOR CRYOGENIC LIQUID SPILL ON A PERSON:

Contact with cryogenic liquids may cause crystals to form in tissues under the spill area, either superficially or more deeply in the fluids and underlying soft tissues. The first aid procedure for contact with cryogenic liquids is identical to that for frostbite. Rewarm the affected area as quickly as possible by immersing it in warm, but not hot, water (between 102° and 105° F). Do not rub the affected tissues. Do not apply heat lamps or hot water and do not break blisters. Cover the affected area with a sterile covering and seek assistance as you would for burns.

INCIDENTAL SPILLS – CRITERIA FOR SMALL, LOW-TOXICITY CHEMICAL SPILLS:

Be prepared. Keep appropriate spill-containment material on hand for emergencies. Consult with S & EH to determine which materials are suitable in a particular lab.

Laboratory workers must receive training to distinguish between the types of spills they can handle on their own and those spills that are classified as "MAJOR." Major spills dictate the need for outside help.

Laboratory workers are qualified to clean-up spills that are "incidental." OSHA, under the HAZWOPER standard, defines an incidental spill as a spill that does not pose a significant safety or health hazard to employees in the immediate vicinity nor does it have the potential to become an emergency within a short time frame. The period that constitutes a short time is not defined. Laboratory workers can handle incidental spills because they are expected to be familiar with the hazards of the chemicals they routinely handle during an "average" workday. If the spill exceeds the scope of the laboratory workers' experience, training or willingness to respond, the workers must be able to determine that the spill cannot be dealt with internally.

MAJOR SPILLS – CRITERIA FOR RESPONSE LEVEL:

Emergency assistance is provided by Charlotte – Mecklenburg Fire Department/Hazardous Materials Team, S & EH and outside contractors, if deemed necessary. Spills requiring the involvement of individuals outside the lab are those exceeding the exposure one would expect during the normal course of work. Spills in this category are those which have truly become emergency situations in that laboratory workers are overwhelmed beyond their level of training. Their response capability is compromised by the magnitude of the incident.

Factors that clearly indicate a *major spill* are:

- the need to evacuate employees in the area
- the need for response from outside the immediate release area
- the release poses, or has potential for conditions that are immediately dangerous to life and health
- the release poses a serious threat of fire and explosion
- the release requires immediate attention due to imminent danger
- the release may cause high levels of exposure to toxic substances
- there is uncertainty that the worker can handle the severity of the hazard with the PPE and equipment that has been provided and the exposure limit could be easily exceeded
- the situation is unclear or data is lacking regarding important factors.

INCIDENTAL SPILLS – STEPS TO BE FOLLOWED FOR SPILL CLEANUP:

The following steps shall be followed for **incidental spills**:

1. Alert persons in the area that a spill has occurred.
2. Evaluate the toxicity, flammability, and other hazardous properties of the chemical as well as the size and location of the spill (for example, chemical fume hood or elevator) to determine whether evacuation or additional assistance is necessary. Large or toxic spills are beyond the scope of this procedure.
3. Contain any volatile material within a room by keeping door/s closed. Increase vapor capture efficiency by minimizing sash height of the chemical fume hood or activating the emergency purge, if available.
4. Consult your MSDS, the laboratory emergency plan, or procedures in this document, or call S & EH for correct cleaning procedures.
5. Obtain cleaning equipment and protective gear from S & EH or chemistry stockroom, if needed.
6. Wear protective equipment such as goggles, apron, laboratory coat, gloves, shoe covers, or respirator. Base the selection of the equipment on the hazard.
7. First, cordon off the spill area to prevent inadvertently spreading the contamination over a much larger area.
8. Absorb liquid spills using paper towels, spill pillows, vermiculite, or sand. Place the spill pillow over the spill and draw the free liquid into the pillow. Sprinkle vermiculite or sand over the surface of the free liquid.
9. Place the used pillows or absorbent materials in plastic bags/buckets for disposal along with contaminated disposable gear, such as gloves. Mark all bags/buckets with label detailing waste contents and hazards.
10. Neutralize spills of corrosives and absorb, if appropriate. Sweep up waste and place in plastic bags/buckets for disposal. Mark all bags/buckets with label detailing waste contents and hazards.
11. Complete a S & EH hazardous waste collection form. S & EH will pick up the waste materials.
12. Laboratory Manager or PI will complete an Incident Report describing the spill and response actions and send a copy to S & EH. A copy may be kept by the department head, if required.

Information for specific chemicals may be found in **Appendix A - Quick Reference for Spill Cleanups, Hydrofluoric Acid Spill on a Person** and in the **Mercury Spill Procedure**. Consult the MSDS and your laboratory's Safety Plan, which has specific information on spill procedures for your workplace.

MERCURY SPILL PROCEDURE:

Mercury is a high-density, low-viscosity liquid at room temperature. During a spill, it can form tiny droplets that adhere to surfaces and enter cracks and crevices. In the case of small mercury spills (e.g., mercury-containing thermometers), laboratory personnel should be able to handle the cleanup. .

To minimize the spill hazard, place a splash plate beneath all mercury-containing equipment.

Procedures for small mercury spills:

Equipment needed – Mercury Spill Kit from S & EH or Chemistry Stockroom (Room 225 – Burson).

Mercury vacuum pump, eyedropper, water or vacuum drive aspirator (optional)
Chemical amalgam
Laboratory coat
Gloves
Shoe protectors
Glass or plastic collection container
Plastic bags
Wipes or paper towels
Barricade tape

1. Before entering the contaminated area, put on protective clothing.
2. Establish a cleanup area and section it off to avoid spreading mercury.
3. Draw all visible mercury into a glass or plastic collection container.
4. Sprinkle the contaminated area with chemical amalgam. Wet with a little water.
5. Wipe up the powder from the contaminated area with a wet towel or a damp sponge impregnated with chemical amalgam. Repeat steps 4 and 5.
6. Sprinkle a very light coating of chemical amalgam into the cracks and crevices.
7. Dispose of the contaminated solid waste material (such as boots, gloves, wipes, or thermometer glass) in a plastic bag and seal tightly.
8. Dispose of the collected mercury and the bags of waste through S & EH. Do not bring the waste bag to the Safety Office; it will be picked up from your laboratory. Store the bag in a chemical fume hood until it is collected by S & EH.
9. The principal investigator shall ensure that an incident report is completed and sent to S & EH.

MEDICAL SURVEILLANCE FOR CHEMICAL EXPOSURE:

When is Medical Surveillance Required?

Signs and Symptoms. Whenever an employee or student develops signs or symptoms associated with a hazardous chemical exposure, that person shall be provided an opportunity to receive an appropriate medical examination.

Exposure Monitoring. If exposure monitoring reveals that the airborne concentration of a chemical is above the action level or the permissible exposure limit (if no action level is set) for a chemical regulated by OSHA, medical surveillance shall be implemented for affected persons as prescribed in the OSHA standard for the material, if applicable.

Spills, Leaks, and Other Releases. If a spill, leak, explosion, or other occurrence results in the likelihood of a hazardous chemical exposure, affected employees shall be provided an opportunity for a medical consultation. The consultation will determine whether there is a need for a medical examination.

Medical Consultation and Evaluation. Medical consultation and evaluation shall be performed under the direct supervision of a licensed physician without cost to the employee or student, without loss of pay, and at a reasonable time and place. For employees, medical examinations or surveillance shall be provided through the Workers Compensation Program administered by the claims manager in the Safety and Environmental Health Office. For students, the medical program shall be administered through the Student Health Service facilities.

The principal investigator or laboratory supervisor shall ensure that the following information is provided to the physician: the identity of the chemical involved in the exposure, a description of conditions relating to the exposure, any quantitative data available regarding the exposure, and a description of signs and symptoms experienced by the affected person.

The principal investigator or laboratory supervisor shall ensure that the following information is obtained from the physician in writing:

- Recommendation for medical follow-up.
- Results of the medical examination and associated tests.
- Any medical condition revealed in the course of the examination that may place the affected person at increased risk as a result of the exposure.
- A statement that the physician has informed the affected person of the results of the consultation or examination and any medical condition that may require further treatment.
- The physician shall not reveal specific findings or diagnoses unrelated to the chemical exposure. All medical records shall be kept as part of an employee's or students' permanent file.

Appendix A -- Quick Reference for Spill Cleanups

Chemical Spilled	Cleanup Procedure
Acids, organic	Apply sodium bicarbonate. Absorb with spill pillow or vermiculite.
Acids, inorganic	Apply sodium bicarbonate/calcium oxide or sodium carbonate/calcium oxide. Absorb with spill pillow or vermiculite. Note: Hydrofluoric acid is an exception to this general practice; see below.
Acid chlorides	Do not use water. Absorb with sand or sodium bicarbonate.
Aldehydes	Absorb with spill pillow or vermiculite.
Aliphatic amines	Apply sodium bisulfite. Absorb with spill pillow or vermiculite.
Aromatic amines	Absorb with spill pillow or vermiculite. Avoid skin contact or inhalation.
Aromatic halogenated amines	Absorb with spill pillow or vermiculite. Avoid skin contact or inhalation.
Azides (potential explosives)	Absorb with spill pillow or vermiculite. Decontaminate with 10% ceric ammonium nitrate solution.
Bases (caustic alkalis)	Neutralize with acid or commercial chemical neutralizers and absorb with spill pillow or vermiculite.
Carbon disulfide (flammable and toxic)	Absorb with spill pillow or vermiculite.
Chlorohydrins	Absorb with spill pillow or vermiculite. Avoid skin contact or inhalation.
Cyanides	Wet or mist solids before sweeping, or use a HEPA filter vacuum to collect the solids. Absorb liquids with spill pillow or vermiculite.
Halides, organic or inorganic	Apply sodium bicarbonate.
Halogenated hydrocarbons	Absorb with spill pillow or vermiculite.
Hydrazine	Absorb with spill pillow or vermiculite. Avoid organic matter.
Hydrofluoric acid	Absorb with calcium carbonate (limestone) or lime (calcium oxide) rather than sodium bicarbonate. The use of sodium bicarbonate will lead to the formation of sodium fluoride, which is considerably more toxic than calcium fluoride. Be careful in the choice of spill pillows used to absorb the acid. Certain pillows contain silicates that are incompatible with hydrofluoric acid.
Inorganic salt solutions	Apply soda ash.
Mercaptans/organic sulfides	Neutralize with calcium hypochlorite solution. Absorb with spill pillow or vermiculite.
Nitriles	Sweep up solids. Absorb liquids with spill pillow or vermiculite.
Nitro compounds, organic nitros	Absorb with spill pillow or vermiculite. Avoid skin contact or inhalation.
Oxidizing agents	Apply sodium bisulfite.
Peroxides	Absorb with spill pillow or vermiculite.
Phosphates, organic and related	Absorb with spill pillow or vermiculite.
Reducing substance	Apply soda ash or sodium bicarbonate.
Reference: <i>Reagent Chemicals</i> , MCB Manufacturing Chemists, Inc., 1981, pp. 359-402.	

The University of North Carolina at Charlotte would like to acknowledge Northwestern University for the basic content and design of this document.

