

Office of Research Safety
Laboratory Safety Manual
215 Chemical Spill Response

1. Purpose

1. To establish basic procedures for responding to chemical spills in areas covered under the OSHA Laboratory Standard.

2. Scope

1. This procedure applies to all faculty and staff using laboratories in Biology, Chemistry, Liquid Crystal Institute, Physics, Psychology, Anthropology, Exercise, Leisure and Sport, Technology, and Geology Departments.

3. References

1. Occupational Safety and Health Administration. (1990). Hazardous Waste and Emergency Response (OSHA 3114). U.S. Department of Labor, Washington, DC.
2. CRC Handbook of Laboratory Safety 4th edition. A.K. Furr, ed. Boca Raton, Fl: CRC Press, 1995.
3. Laboratory Health and Safety Handbook. R.S. Stricoff. New York: Wiley: 1990.

4. Responsibilities

1. Each Department will name a Department Emergency Coordinator and a back-up emergency coordinator.
2. It is the responsibility of each individual using hazardous materials to become familiar with the emergency response procedures, if any, that govern his or her facility.
3. Post the KSU [Emergency Response Guide](#) prominently in each laboratory.

5. GENERAL RULE The following general rules should be followed in the event of a major (i.e. greater than 5 gallons of a typical solvent; much less for highly toxic materials) hazardous materials spill or other emergency.

1. **ACTIVATE EVACUATION (FIRE) ALARM, IF NECESSARY, FOR THE BUILDING**
 1. Be familiar with the sound of the alarm system in your facility. If the incident could threaten the health of individuals in the building, activate the alarm.
2. **CALL FOR HELP DIAL 911**
 1. Get as much information as you can about the chemical. If possible, locate a Material Safety Data Sheet (MSDS). Be sure 911 has been accurately informed as to the nature and location of the spill, and whether there are injuries requiring the assistance of an ambulance.
3. **ATTEND TO LIFE-THREATENING INJURIES**
 1. The primary concern in the event of an emergency is to protect life and health of others.
4. **PREVENT ACCESS TO THE AREA**
 1. Barricades of some sort should be set up to prevent inadvertent access to the area of the spill. This action may be necessary to prevent injury and to control the spread of

contamination.

5. NOTIFY DEPARTMENT CHEMICAL HYGIENE OFFICER
 1. Call DCHO for assistance and guidance.
 6. CONTAIN THE SPILL TO PREVENT RELEASE TO THE ENVIRONMENT.
 1. If the spill can be safely contained, prevent release to the sanitary sewer system, the storm sewer, and/or the ground. Do not jeopardize your own safety.
 7. INITIATE MATERIAL SPECIFIC CLEAN-UP PROCEDURES.
 1. The DCHO will assist in spill clean-up. However, accountability for the spill and disposal of spill residue belongs to the individual or department.
6. WHO SHOULD CLEAN UP A SPILL? The following guidelines are offered to help decide who should clean up a chemical spill. These guidelines constitute a portion of a document that the Environmental Protection Agency (EPA) calls a Contingency Plan for Hazardous Waste Generators, and these guidelines must be followed in the event of a chemical spill.
1. Laboratory Personnel Clean up the Spill
 1. For chemical spills that do not involve injury, do not represent a fire or life hazard, are less than one gallon, have the proper protective equipment to do the cleanup, laboratory personnel will clean up the spill.
 2. Department Emergency Coordinators/Manager Laboratory Safety Clean up the Spill
 1. For all other chemical spill situations, including those for which there are questions or doubts about who should clean up the spill, notify Department Chemical Hygiene Officer, call Manager, Laboratory Safety at 4996 and Director Occupational Health and Safety at 2298. After hours, call 911. Report all injuries, fires, explosions and potentially life threatening situations first to 911, then to DCHO. If the chemical spill is too large, Fire Department Haz Mat Teams and private contractors will be called in to handle the cleanup procedures.
7. PLANNING FOR CHEMICAL SPILL EMERGENCIES
1. Two people in each Department or service area to be designated as the on-site emergency coordinator and back-up emergency coordinator. This may be the Department Chemical Hygiene Officer and any other person. These people should know what hazards exist in the lab or area and how to implement this spill response plan (contingency plan) for the area. They will act as advisors to Police, Fire Department and Environmental Health and Safety personnel.
 2. Prepare a Telephone Emergency Sheet.
 3. The following should be posted by all telephones
 1. Emergency telephone number: 911
 2. Name and phone number of the Department Chemical Hygiene Officer
 3. Manager, Laboratory Safety telephone number: 4996
 4. Director Environment and Safety number: 2298
 5. Location of fire extinguishers
 6. Location of spill control equipment
 7. Location of fire alarm, if present
 4. All employees involved with handling chemicals should be trained in chemical spill procedures

when they are first hired and periodically thereafter. Document the training and have employee and supervisor sign the documentation form to certify that the training was given. Keep these certification forms with the departmental training records.

5. Emergency personnel can be aided by drawing a map of each lab or service area and clearly labeling where chemicals and waste chemicals are stored and the total quantity of chemical types in a room (e.g. 5 gallons flammables, 2 pounds oxidizers, 5 cylinders of compressed non-flammable gas, etc.). Fire extinguishers, eyewashes, spill kits and exit routes and other safety equipment or hazards should also be clearly marked. Keep a copy of the map in the main office of the department and send a copy to Manager, Laboratory Safety. If an emergency then does occur, the main office or the Laboratory Safety Manager could provide advance warning to emergency response personnel of hazards in a room. Update these maps whenever chemical management practices change in the room.
6. If your area holds a significant amount of chemicals, the outside door to the room should be labeled with a National Fire Protection Association (NFPA) "704" sign to alert fire fighters to the dangers within.
7. Purchase spill kits for chemicals or spill cleanup material and personal protective equipment (chemical resistant gloves, safety goggles, etc.) for each laboratory or department. Know the limitations of the personal protective equipment. Any questions about the personal protective equipment, call Manager, Laboratory Safety at 4996.
8. **LARGE CHEMICAL SPILL.** Chemical spills or hazardous materials emergency situations should be handled as a fire emergency. Initial response in a fire situation can be summarized as RESCUE, CONFINE, REPORT, SECURE AND CLEANUP (FIGHT FIRE). These principles can also be applied to a hazardous materials spill situation.

1. RESCUE

1. Just as you are not to re-enter a burning building, do NOT go back in to an area where a chemical spill has occurred. In many documented cases, rescuers not wearing proper protective equipment have been overcome by toxic or asphyxiating fumes trying to rescue other victims and died as a result. Do not make this mistake.
2. As you leave an area involved in a chemical spill, assist people exiting the area.
3. Evacuate personnel from the spill area.
4. Direct personnel to nearest fire exit. Do not use elevators.
5. Alert neighbors
6. Attend to victims
 1. First Aid
 2. General Response
 3. Remove victim from spill area to fresh air (but do not endanger your own life by entering areas with toxic gases).
 4. Immediately remove contaminated clothing.
 5. Wash skin with soap and water.
 6. Flush skin and/or eyes with water for at least 15 minutes. (You may not feel any immediate effect from chemical spills, but it is very important to wash quickly and thoroughly as many chemicals can cause severe tissue damage that is not apparent till hours later.)
 7. Get medical attention for victims.

7. Chemical Spills over Large Body Areas

1. Remove contaminated clothing while under shower.
 2. Flood affected body area in cool water for at least fifteen minutes.
 3. Resume water wash if pain returns.
 4. Wash off chemicals with mild detergent and water; do not use neutralizing chemicals, unguents, creams, lotions or salves.
 8. Make sure medical personnel understand exactly what chemicals are involved.
2. Victims of Bromine Spills
 1. Flush with cold water; apply compress saturated with dilute thiosulfate.
 2. Get immediate medical help.
 3. Victims of Hydrogen Fluoride (HF) Spills
 1. Flush with cool water until any whitening of tissue disappears.
 2. Swath injured area with soaking wet, iced cloths or with HF treatment.
 3. Get immediate medical help.
 4. CONFINE
 1. Close fire doors.
 2. Isolate area.
 3. Establish exhaust ventilation if possible.
 4. Vent fumes only to outside of building.
 5. Open windows, if possible without exposing yourself to fumes.
 6. If fumes are in room that is not vented to outside of building, close off room.
 5. REPORT
 1. Call 911:
 1. for spills that involve injury requiring medical treatment,
 2. for spills that involve fire or explosion hazards,
 3. for spills that are potentially life threatening, and
 4. for all chemical spills after work hours
 2. Call Department Chemical Hygiene Officer:
 1. for chemical spill situations that do not require 911 assistance.
 2. for spills of <5 gallons of a chemical, or any quantity of a highly reactive or toxic material,
 3. for spills of an unknown chemical,
 4. for spills you do not have proper training or proper protective equipment to do the cleanup, and
 5. for spills for which you have any questions or doubts about your ability to clean up the spill.
 3. The type of information you will be requested to provide when you call 911 and Department Chemical Hygiene Officer consists of the following:
 1. First, state that it is an emergency.
 2. The name, telephone number and location of the reporter.
 3. Location of the incident.
 4. Time and type of incident.
 5. Name and quantity of material involved, to the extent known.
 6. The extent of injuries, if any.
 7. The possible hazards to human health or the environment outside the facility,
 8. Warn emergency responders of any other hazards they may encounter, such as large quantities of stored chemicals (particularly flammables, oxidizers and air-

born toxic or irritant materials), radioactive materials or biohazards, etc., on site.

9. The safest route to approach the spill.
10. Stay on the phone until the 911 operator says it is ok to hang up.

6. SECURE

1. Until Emergency Responders arrive on the scene, laboratory personnel will have to block off entrances to the spill site and prevent people from entering the contaminated area.
2. Lock or block doors leading to the chemical spill and post signs on doors warning of the spill.
3. Tape or rope off stairwells and elevators leading to the spill and hang signs on the tape.
4. When chemical fumes are being spread through a building's air handling system, call Physical Plant Services to have the ventilation system shut off.
5. Post staff by commonly used entrances to the spill site so they can warn people to use other routes.
6. For large outdoor chemical spills, keep people upwind and uphill from the site.

7. CLEANUP. Based on the chemical spill situations described in the "Who Cleans Up the Spill" section, decide who will do the cleanup.

1. Small Chemical Spill Clean up. Perform all the procedures in the RESCUE, CONFINE, REPORT, and SECURE sections above, with the exception that you do not need to report the incident to 911.
 1. When cleaning spill yourself, locate the spill kit.
 2. Choose appropriate personal protection.
 3. Always wear protective gloves and goggles or face shield.
 4. If there is a chance of body contact, wear apron and coveralls.
 5. If the spill is on the floor, wear rubber or plastic boots (NOT leather).
 6. If there are inhalation hazards, wear respirator.
 7. Remove ignition sources.
 8. Turn off hot plates, stirring motors, flame sources.
 9. Shut down all equipment.
 10. If unable to shut off sources of ignition, notify emergency responders.
 11. Confine or contain the spill.
 12. Cover with an absorbent mixture.
 13. Clean up minor spills with paper towels or sponge if they won't react.
 14. Sweep solid materials into a dust pan, place in sealed container.
 15. For small amounts of inorganic acids/bases use neutralizing agent and absorbent material.
 16. For small amounts of other materials absorb with non-reactive materials (e.g., vermiculite, sand, towels, Floor-Dri).
2. Large amounts of inorganic acids/bases:
 1. Neutralize and call for help.
3. Large amounts of other materials.
 1. Make a judgment call: depending on the amount, toxicity or what the substance can run into or react with, you may handle it yourself or call for help.
4. Spills that require special handling.
 1. Acid Chlorides.
 1. Use Oil-Dri, Zorb-all or dry sand.
 2. Avoid water, avoid sodium bicarbonate.

2. Mercury:
 1. Small spills (broken laboratory thermometer and smaller quantities of mercury), open windows and ventilate area while cleaning.
 2. Use aspirator bulb or suction device (available from Edmund Scientific).
 3. Mop with mercury decontaminating powder solution (saturated solution of HgX in water)
 4. Do not use vacuum cleaners.
 5. For (1) spills larger than a broken laboratory thermometer, (2) any spill in an oven or heated area, and (3) spills in small unventilated rooms, call your Department Chemical Hygiene Officer.
3. Alkali Metal (e.g., Sodium or Potassium Metals),
 1. Smother with dry sand.
 2. Put in hood.
 3. If possible, dispose of by reacting with isopropyl alcohol.
4. White (Yellow) Phosphorus:
 1. Blanket with wet sand or wet absorbent.
 2. Remove absorbent material with a broom and dust pan.
5. Disposal
 1. Contact Manager, Laboratory Safety to determine the appropriate route of disposal. 2-4996

8. Comments

1. Questions arise as to what constitutes a large spill requiring a chemical cleanup team and what are the limitations of the spill kits commonly purchased for laboratories.
2. A "large" spill can be as small as a few milliliters if the material is a highly volatile, toxic compound spilled in a confined space. Many times you will have to make a professional judgment as to the severity of the spill. When in doubt you can always call Manager, Laboratory Safety at 4996
3. Chemical spill cleanup kits are very handy to have in the lab and other service areas that use chemicals. The kits are useful if you and your fellow workers know how to use them properly. Chemical absorbent or neutralizing powder and pads can be used to quickly contain a spill. Use these items if your personal safety is not jeopardized. Often the best use of such a kit is to put on the respirator in the event of a spill, put the absorbent on the spill to contain the material, then leave the room and secure the area.
4. Be aware of the fact that while you may be in a well ventilated room, the Lower Explosive Limit (LEL) of a chemical may be reached at the surface of the spill and you want to avoid any sparks or sources of ignition when doing the cleanup. The protective equipment in the spill kit will not protect you from a flash fire. Many times, the best way to handle the spill of a highly volatile compound such as diethyl ether or chloroform, is to open windows and fume hoods, leave the room, close and lock the door and let the room air out. If in your professional judgment there is a strong risk of a flash fire or explosion call 911 for fire department backup protection and evacuate the area - pull the nearest fire alarm. In most cases of a chemical bottle breaking in a laboratory, however, you will not need to call the fire department as the lab ventilation system is usually designed to handle such situations.