

III. GENERAL HEALTH AND SAFETY CONCERNS

While safety procedures to protect building occupants from specific hazardous materials are presented elsewhere in this manual, there are a number of general environmental and procedural factors often overlooked in the design and operation of laboratory facilities. These factors can have a considerable effect on the safety of the work area. This section discusses several of these factors which are relevant to the laboratory and recommends certain procedures to follow related to each.

A. Slips, Trips and Falls

The use of preventative, common sense procedures go a long way in reducing the likelihood of slips, trips and falls in the laboratory. The following items shall be observed.

1. Electrical cords or other lines should not be suspended across rooms or passageways. When such items are necessary, the cord or line should be taped to the wall or floor and the hazard clearly marked. Extension cords should not be used as a substitute for permanent wiring.
2. All wet areas due to leaks or spills of any type should be cleaned and dried immediately.
3. Good housekeeping procedures (itemized in Section III.B., "Housekeeping") should be observed at all times.
4. No running, jumping, or horseplay in the laboratory areas should ever be permitted.
5. Ladders should be in good condition and used in the manner for which they were designed. Wooden ladders must not be covered with paint or any other coating since structural defects may be hidden by the coating.
6. Lifting of heavy items must be performed in the proper fashion, using the legs to lift and not the back.

B. Housekeeping

As in many of the other general safety procedures, the following listing of good housekeeping practices indicate common sense activities which should be implemented as a matter of course in the laboratory. These recommendations are necessary to prevent accidents.

1. The area must be kept as clean as the work allows.
2. Reagents, equipment, and samples should be returned to their proper places. Glassware should be placed in specific cleaning areas.

3. Counter tops should be kept neat and clean. Bench tops and fume hoods should not be used for chemical storage.
4. Stored items or equipment must not block access to the fire extinguisher(s), safety equipment, or other emergency items.
5. Each laboratory employee should be responsible for maintaining the cleanliness of his or her area.
6. Chemicals, especially liquids, should never be stored on the floor, except in closed door cabinets.
7. Spills should be cleaned immediately. Water spills can create a hazard because of the potential for slips, trips, and falls. Small spills of liquids and solids on bench tops should be cleaned immediately to prevent contact with skin or clothing. See Section XII., "Spill Control/Emergency Response" for additional information on chemical spills.
8. Reagents, solutions, glassware, or other apparatus should **not** be stored in hoods. Besides reducing the available work space, these items may interfere with the proper air-flow pattern which reduces the effectiveness of the hood as a safety device.
9. Combustible materials such as paper, wooden boxes, pallets, etc., may not be stored under stairwells. Hallways should be kept free of boxes and materials so that exits or normal paths of travel will not be blocked.

C. **Basic Laboratory Safety Rules**

The following protocol must be adhered to when working with biohazardous, hazardous, and radioactive materials.

1. Store and label all biohazardous, hazardous, and radioactive materials properly. Use flammable and acid storage cabinets and explosion-proof refrigerators when required.
2. Spills must be cleaned immediately. Every laboratory is required to have pre-existing plans and materials to clean up all spills that occur in that laboratory.
3. Stairways, halls, and access to egress and emergency equipment such as fire extinguishers, safety showers, and eyewash fountains, shall be kept clear.
4. No eating, drinking, smoking, or applying cosmetics is allowed in areas where hazardous materials are used or stored. Always thoroughly wash your hands before eating or smoking, on completion of work, and after manipulating radioisotopes.

5. Do not store food or drinks in refrigerators, freezers, or containers designated for chemical, biohazardous or radioactive storage.
6. Compressed gas cylinders must be secured at all times, including during transport and when empty. Cylinder caps must be in place when the cylinder is not in use.
7. Do not work alone in a laboratory if the procedures being conducted are deemed hazardous by the laboratory supervisor. Assure that at least 2 people are present at all times if a compound in use is highly toxic or of unknown toxicity.
8. Laboratory coats worn in the laboratory area are **not** to be worn outside the laboratory.
9. No sandals, open-toed, or open-heeled shoes are to be worn by laboratory personnel.
10. Do not pipette by mouth.
11. Work with biohazardous agents must be performed in accordance with the OSHA Bloodborne Pathogen Regulation and/or CDC/NIH Guidelines utilizing proper precautions such as biological safety cabinets, gloves, and procedures which reduce the creation of aerosols.
12. **Never** dispose of a hazardous, biohazardous, or radioactive substance down the drain or in the trash unless specific authorization to do so has been given by the EHSO and/or the Radiation Safety Office.
13. Chemical fume hoods will be tested annually by the EHSO. The radiation hoods must be tested semi-annually by the Radiation Safety Office. It is the responsibility of the researcher to ensure that biological safety cabinets are certified at least annually, after maintenance, or when moved.
14. Eyewashes must be tested and documented annually by the laboratory supervisor or his/her designee to assure proper operation.
15. Eyewashes should be flushed at least weekly to deter amoeba contamination which may damage the eyes.
16. Radioactive material usage areas and animal facilities **must** have controlled access that is strictly enforced. Laboratory areas should not be left unattended unless the area has been secured.
17. Any accidental exposure (inhalation, ingestion, skin contact, or injection), injury, or spills must be reported to the employee's supervisor **immediately**.

18. Accurate records of receipt, use, transfer, and disposal of highly toxic, carcinogenic, suspect carcinogenic and radioactive materials must occur.
19. Protective gloves are required in all areas where there is potential for skin exposure or splashes of biohazardous, hazardous, or radioactive materials. Employees must remove gloves when they become contaminated and before leaving the work site to prevent contamination of door knobs, light switches, telephones, etc. Employees must wash their hands immediately after removal of gloves. Goggles, face shields, or safety glasses are required when a potential for splash of hazardous or infectious materials is present and may be required for work with radioactive material.
20. Disposal of any materials containing cytotoxins or antineoplastic agents **must** be arranged through the EHSO.

D. **Safety Practices for Disposal of Broken Glassware**

1. All broken glass requires special handling and disposal procedures to prevent injury to personnel. Inspect all glassware before use. Do not use broken, chipped, starred or badly scratched glassware. If it cannot be repaired, broken glass should be discarded.
2. There are potentially five types of broken glass that may be disposed in the OU waste stream. All broken glass should be disposed of in a manner that will significantly reduce the potential for employee injury.

a. Food and Beverage Glassware

Recycle or dispose of food and beverage glassware in a rigid, puncture-resistant container as described in Section III.D.3., "Acceptable Containers."

b. Radioactive Glassware

Contact the Radiation Safety Office for appropriate procedures.

c. Glassware with Biological Contamination

Biologically contaminated needles and other contaminated sharps such as broken glass, glass with sharp corners, and glass that has the potential to break such as microscope slides, pipettes, test tubes or thin-walled vials must be placed in a closeable, puncture resistant, leak-proof container that is red or labeled with a biohazard symbol prior to disposal, reprocessing, or reuse. Contaminated needles and other contaminated sharps must not be recapped, removed, sheared, or broken prior to placement in this container. This sharps container must be sterilized and placed in an opaque trash bag prior to disposal.

Broken glassware that may be contaminated with human blood, human blood components, products made from human blood or other potentially infectious materials should not be picked up directly with the hands, but should be cleaned up using mechanical means, such as a brush and a dust pan, tongs, or forceps.

d. Glassware with Chemical Contamination

Contact the EHSO for assistance with the disposal of the residue and debris from the cleanup of a spill of a chemical substance. If chipped or broken edges pose a significant hazard to the employee, then the glassware and chemical will have to be disposed as a special hazardous waste. Also, containers that have held cytotoxic/antineoplastic agents or an EPA "P" listed waste require special disposal procedures. Please see Appendix D for cytotoxic/antineoplastic agents and Appendix E for the EPA "P" list.

e. Uncontaminated or Disinfected Glassware

Dispose of uncontaminated or disinfected glassware in rigid, puncture-proof containers as described below.

3. Acceptable Containers

All containers used for broken glass disposal should be puncture-resistant containers.

- a. A metal or thick plastic can or bucket with a sealing lid is ideal.
- b. If glassware is dry, a cardboard box may be used if all seams and edges are sealed or taped.
- c. Wet broken glassware should be dried, if possible, before disposal. If broken glass is wet, the cardboard boxes must be lined with one or more puncture-resistant plastic bags and the edges should be taped.
- d. Clearly mark the container in large letters with the words "CLEAN BROKEN GLASS" before discarding in the solid waste stream.
- e. Limit quantities to approximately no more than 15 pounds so that lifting of the box will not create a situation that could cause back injury. Wherever possible, move the box with a dolly instead of by hand.

E. Emergency Telephone Notification

An emergency call system should be established by laboratory personnel in the event of

equipment malfunction or spill after hours.

1. During regular working hours, each minilicense holder, investigator, or laboratory supervisor should make the necessary arrangements to remove and relocate any hazardous, biohazardous, or radioactive materials housed in temperature-controlled units (freezers, refrigerators, environmental chambers, etc.) or fume hoods that malfunction or stop due to equipment or power failure.
2. For after-hour emergencies, the names and off-duty telephone numbers/pager numbers of the individuals who will be responsible for management of such materials or a spill should be posted on or near each piece of equipment in hallways and on the doors to each laboratory unit or storage room.
3. If a malfunctioning unit or spill is discovered by the OUPD, they will follow the call system to contact an individual, but they will **not** move or clean scientific materials, chemicals or specimens. Such actions will be the responsibility of the person contacted.
4. When a person on the list is contacted, he/she will be responsible for managing the incident. The management may include contacting other persons on the call list or coming on-site and handling the materials.
5. The lists must be kept up-to-date.

F. Laboratory Close-Out Procedures

The research faculty assigned to a particular laboratory (hereinafter referred to as researcher) is responsible for proper disposition of all items in the laboratory, including furniture, equipment, chemicals, biological materials, radioactive materials, glassware, sharps and waste materials. The Department Chair is responsible for ensuring that all researchers understand these responsibilities and that the following procedures are followed when a researcher leaves the University or transfers to a different department or laboratory.

If improper management of hazardous materials at close-out requires removal services from the Environmental Health and Safety Office (EHSO) or Radiation Safety Office (RSO), the responsible department may be charged for this service. Details on proper procedures for chemical hazards are found in Chapter V., "Hazardous Waste" of this manual, biological materials are found in Chapter VIII., "Biomedical Waste" of this manual, and radiologic materials are found in the *OU Radiation Safety Manual*.

Any regulatory action, fines or costs resulting from improper management, identification, or disposal of hazardous materials will accrue to the responsible department. Procedures are as follows.

1. The researcher should notify the Department Chair of any furniture,

- equipment, or supplies that are to be transferred with the researcher, and those that will remain.
2. The researcher should dispose of all biological materials, including microorganisms, cultures, tissue, and wastes in accordance with the procedures outlined in Section VIII., "Biomedical Waste". If tissue is held in a liquid preservative, in most cases, the liquid should be separated and disposed as a hazardous chemical (see number 3. below on hazardous chemical disposal). If any biological materials are to remain, an appropriate person should be identified to take responsibility for these materials, and the appropriate department heads should be notified.
 3. Hazardous chemicals and compressed gas cylinders that will not be transferred with the researcher must be properly labeled in accordance with the OU *Hazard Communication Policy and Program*. The researcher should attempt to locate other faculty or staff who may be able to utilize some or all of the chemicals. Gas cylinders should have the connections removed, the cylinder caps replaced, and be returned to the supplier. Those chemicals that remain and cylinders that are non-returnable must be segregated and inventoried on a *Hazardous Materials Pick-up Request Form* as described in Section V., "Hazardous Waste". The researcher should then contact the EHSO to arrange for pick-up of the materials.
 4. Chemical/gas cylinder pick-up must be completed before the laboratory is vacated. Chemical and waste collection may take up to a week after receipt of the *Pickup Request Form*, however, every effort will be made to achieve timely removal.
 5. Any collection of unlabeled or improperly marked containers or chemical products take longer and may result in a cost to the department. The cost of analysis of unknowns will be borne by the department.
 6. Once the hazardous chemicals have been segregated into one identifiable area, the researcher shall ensure that all remaining refrigerators, freezers, cold/warm rooms, fume hoods, biological safety cabinets, incubators, drying ovens, storage cabinets, sinks and bench tops are clear of glassware, chemicals, sharps and other items, and that surfaces of these items are cleaned and appropriately disinfected. Refrigerators and freezers should be defrosted and cleaned. Equipment which has been in contact with microorganisms or human blood or tissue should be decontaminated. If laboratory equipment is to be discarded, be aware that capacitors, circuit boards, transformers, mercury switches, mercury thermometers, radioactive sources, and chemicals must be removed prior to disposal. Contact the EHSO for assistance with these issues.
 7. The researcher should empty all drawers and look behind/under lower

drawers for items that may have fallen out.

8. One of the most problematic situations is the sharing of storage areas such as refrigerators, freezers, cold room, stock rooms, equipment rooms, and waste collection areas. Departing personnel must carefully inventory any shared facility and manage hazardous materials from these areas in the same manner as above.
9. The researcher may use the *Hazardous Materials Closeout Checklist* in this section to assist in the process. Upon completion of all steps on the checklist, the researcher should sign a *Check Sheet for Vacating Room*, and post the form on the door to the laboratory or cold/warm room and contact the EHSO.
10. The EHSO will perform an exit inspection at the time of chemical pick-up and will sign the *Check Sheet for Vacating Room* form. Once this is completed, the EHSO will contact the Radiation Safety Office.
11. Prior to closeout of a radioactive use area and/or a radioactive materials use permit, it is the responsibility of the authorized user and the department to complete the following steps. If the authorized user fails to satisfactorily complete these steps, the department is responsible for completion of these steps.
 - a. Package all radioactive materials (stock vials, sealed sources, lead containers/shields, and solid and liquid wastes) and label them in accordance with RSO procedures as radioactive materials or waste.
 - b. Arrange for pick-up of all radioactive wastes and materials through the RSO.
 - c. Following removal of all radioactive wastes and materials, perform a contamination survey (and if appropriate, a GM survey) of all former storage and use areas within the laboratory. Areas of potential residual contamination include refrigerators and freezers, centrifuges, water baths, hoods, sinks, floor areas under waste containers, etc.) If there are contaminated areas or equipment in the laboratory, these must be decontaminated. A follow-up survey must be made of the decontaminated areas and the results indicated in the survey.
 - d. Radioactive materials signs, labels, and warning tape must be removed from all surfaces and equipment that are free from radiation contamination. However, do not remove the "Caution-Radioactive Materials" sign at the entrance to the lab.
 - e. Provide the Department Head and the RSO with a copy of the final

decontamination survey.

- f. Contact the RSO to schedule a radiation safety closeout survey. Do not allow further use of radioactive materials in the room until the closeout survey is complete.
12. The Radiation Safety Office will perform a radiological survey in laboratories where radioactive materials have been utilized or where any radioactive materials signage exists. Upon completion of this clearance, the Radiation Safety Office will sign the "Check Sheet for Vacating Room" form. If there has been no use of radioactive materials in the lab, no survey for radiation contamination is necessary, and the Radiation Safety Office will indicate so on the "Check Sheet for Vacating Room" form.
13. Upon completion of these steps, the "Check Sheet for Vacating Room" form should remain posted on the door to the laboratory, thus identifying the laboratory as cleared for cleaning, construction, renovation, or use. Retention of this form, once cleaning, construction, renovation, or use occurs, is not necessary.

HAZARDOUS MATERIALS CLOSEOUT PROCEDURES CHECKLIST

| Hazardous Material/Procedure | Date Completed or N/A |
|------------------------------|-----------------------|
|------------------------------|-----------------------|

Chemicals

| | |
|---|-------|
| Inventory all chemicals and label all containers | _____ |
| Transfer responsibility of chemicals to: _____ | _____ |
| Prepare chemical waste for shipment and submit pick-up request form to EHSO for proper disposal | _____ |
| Clean laboratory surfaces | _____ |
| Verify that hazardous wastes have been removed | _____ |

Gas Cylinders

| | |
|--|-------|
| Return to supplier. For non-returnable cylinders, fill out Pick-up request form and submit to EHSO | _____ |
|--|-------|

Microorganisms and Cultures

| | |
|--|-------|
| Autoclave and dispose of waste | _____ |
| Dispose of any preservatives | _____ |
| Clean incubators, ovens, refrigerators, and freezers | _____ |
| Transfer responsibility for samples to: _____ | _____ |

Animal Tissue

| | |
|---|-------|
| Dispose of tissue. Method: _____ | _____ |
| Dispose of preservative. Method: _____ | _____ |
| Clean refrigerators and freezers. | _____ |
| Transfer responsibility for samples to: _____ | _____ |

Controlled Substances

| | |
|---|-------|
| Contact EHSO or RSO for disposal assistance | _____ |
|---|-------|

Radioactive Materials

| | |
|---|-------|
| Package all materials and waste for disposal and pickup | _____ |
| Perform contamination survey (decontaminate and resurvey if needed) | _____ |
| Schedule close-out survey with RSO | _____ |
| Review results of radiation safety survey | _____ |

Mixed Hazards/Waste

| | |
|---|-------|
| Identify mixed hazards | _____ |
| Submit pick-up request form to EHSO for proper disposal | _____ |

HAZARDOUS MATERIALS CLOSEOUT PROCEDURES CHECKLIST (Cont.)

Equipment

- Clean or decontaminate equipment to be left in place _____
- Remove hazardous materials stickers or labels from
equipment _____
- If laboratory equipment is to be discarded, any equipment
presenting unusual hazards (e.g., mercury switches, radio
active sources, PCB-contaminated oils, freon, etc.) must
have these removed prior to disposal _____
- Check equipment outside of laboratory (e.g., freezers in the
hallway) _____
- Empty all drawers _____

Shared Storage Areas

- Check all shared storage areas for hazardous materials _____

Completion

- Contact EHSO and/or RSO _____

DO NOT REMOVE CHECK SHEET FOR VACATING ROOM ROOM NUMBER _____

Post This Notice on the Door of the
Laboratory/Cold Room/Warm Room

This room has been cleaned of all hazardous materials (including broken glass and sharps) under my responsibility and no hazardous materials, spills or residues are present in this room. Refrigerators, freezers, fume hoods, biological safety cabinets, storage cabinets, incubators, drying ovens, and sinks have been cleaned and appropriately disinfected.

Researcher

Date

All hazardous materials and biomedical wastes have been removed from this room.

Environmental Health and Safety Office

Date

This room has been surveyed and has no radiation contamination.

No radiological survey of this room is necessary.

Radiation Safety Office

Date

DO NOT REMOVE