



### Laboratory Close-Out Procedures and Transportation of Hazardous Materials

#### Introduction

Proper transfer or disposal of hazardous materials is required whenever a responsible individual leaves the University or transfers to a different laboratory. The "Responsible individual" can include, but is not limited to: faculty, staff, post-doctoral, and graduate students. Plan the transfer or disposal of hazardous materials carefully. Hazardous materials such as chemicals, microorganisms, tissues, and radioactive materials can injure faculty, students, staff, contractors and visitors if handled inappropriately.

The primary responsibility for the proper management and disposal of all hazardous materials used in laboratories lies with the principal investigator or researcher. Ultimate responsibility for proper hazardous materials management lies with each department.

- Contact the Office of Environmental, Health, and Safety Management (EH&S) at least two weeks prior to close out to arrange for a preliminary consultation and disposal of chemical wastes.
- Characterize "unknowns" according to applicable procedures prior to lab close-out. EH&S can provide you with these procedures during the consultation. EH&S will only be responsible for disposal costs associated with properly managed chemical wastes. Costs incurred for disposal of improperly managed chemical wastes will be billed to the responsible department.

The presence of numerous unknown substances and unlabeled containers in a laboratory is considered improper management of hazardous materials and is a violation of state and federal regulations. If the improper management of hazardous materials at close-out requires additional services of the EH&S or an outside contractor, the responsible department will be charged back for these services.

If EH&S is not notified in a timely manner to remove the remaining chemicals prior to the occupants departure and is left with improperly managed chemical wastes for disposal, the additional cost of identification and disposal, or any regulatory action and fines, from the improper management of hazardous materials will accrue to the responsible department. It is the responsibility of the department to recover the cost from the principal investigator if it is deemed necessary.

Please consult the IU Bloomington Biosafety Manual, Hazardous Wastes Management Guide, Laboratory Chemical Safety Plan, and Radiation Safety Manual for guidance on procedures regarding the transport and storage of potentially hazardous materials. Please read and adhere to the following procedures when a responsible individual leaves the University or moves to a different laboratory. Use the following checklist to ensure that you have completed all the procedures and have obtained the appropriate close-out signatures.

- Laboratory Close-out Checklist (Appendix A)



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#### Shared Storage Areas

- Shared facilities include storage units such as refrigerators, freezers, cold rooms, stock rooms, flammable liquids cabinets, waste collection areas, etc. They are of special concern, particularly if no one is assigned to manage the area.
- Departing researchers must carefully inspect any shared facility in order to locate and appropriately dispose of their hazardous materials.

#### Chemicals

- Remove all chemicals from refrigerators, freezers, fume hoods and bench tops as well as storage cabinets.
- Label all chemical containers with the proper chemical name. Abbreviations, chemical formulas or structures are not acceptable. Close all containers securely. Seal containers with Parafilm as necessary to minimize odors.
- Determine which chemicals are usable. It is acceptable to transfer responsibility for these chemicals to another research group that can use them. (Do not transfer unusable chemicals to another party). If a new user cannot be found, the chemicals must be managed as chemical waste according to applicable procedures found in the Hazardous Waste Management Guide.
- If useable chemicals are to be transferred to user, obtain the signature on the close-out checklist.
- Empty all beakers, flasks, evaporation dishes, etc. If a vessel cannot be emptied or cleaned enough for disposal in the ordinary trash then it must be managed as chemical waste according to the applicable procedures.
- Prepare chemical wastes in accordance with the Hazardous Waste Management Guide. This process may take some time. All chemical wastes need identification secured to the container with rubber bands, twist ties, string, or wire. Start at least one month before planned departure from the laboratory. Complete chemical waste removal before vacating the laboratory. Allow two weeks for waste collection to occur after notifying EH&S that the waste is properly prepared for pickup.
- Wash off fume hood surfaces and counter tops.
- Notify Facilities Management (Building Administrator) when laboratory clean-up is complete. Facilities Management will contact EH&S to arrange a close-out inspection.



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#### Controlled Substances

- The US Drug Enforcement Agency (DEA) issues controlled substance licenses to individual researchers. There is no central record of permit holders at the University.
- Abandonment of a controlled substance is a violation of the DEA permit under which it was held.
- Permission to dispose or transfer ownership of a controlled substance to another individual must be received from DEA.
- Licensed individuals may dispose of controlled substances through EH&S. Call 812-855-6311 for information.
- If controlled substances are found and the licensee is unknown, contact EH&S.

#### Gas Cylinders

- Remove gas connections, replace cylinder caps, and return cylinders to suppliers.
- All cylinders must have the manufacturer's original label or a legible hand written identification securely fastened to the cylinder.
- If a cylinder is empty or non-functional this must be marked or indicated on the cylinder.
- If cylinders are non-returnable, please contact EH&S.

#### Animal and Human Tissues

- Animal specimens, organs, and tissues in preservative are disposed by EH&S. Contact EH&S for information.
- Frozen specimens should remain frozen and be picked up by Laboratory Animal Resources for disposal. Contact LAR at 812-855-2356.
- Human tissue should be placed in a biohazard waste bag and disposed of as potentially infectious waste. Contact the IU Bloomington Biosafety Officer for more information at 812-856-3638.
- If tissue was stored in a refrigerator or freezer - defrost, clean and disinfect the refrigerator and freezer when emptied.
- Locate an appropriate person to take responsibility for retained samples.
- If appropriate tissue disposal is uncertain, contact the IU Bloomington Biosafety Officer at 812-856-3638.

#### Microorganisms and Cultures

- If the material cannot be decontaminated, contact the IU Bloomington Biosafety Officer at 812-856-3638.
- Locate an appropriate person to take responsibility for retained samples.



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#### Mixed Hazards

- Occasionally it is necessary to dispose of materials that may contain more than one hazard. Contact EH&S at 812-855-6311 for information on the disposal of any combination of biohazardous materials, and chemicals and/or radioactive materials.

#### Sharps

- Dispose of infectious waste sharps: Autoclave sharps container and discard in 55 gallon infectious waste drums that are picked up for disposal by EH&S. Infectious waste sharps include: all needles and syringes; broken or unbroken glass and plastic ware that has contacted infectious agents or was used in animal or human patient care or treatment, including plastic pipettes and other used plasticware that is recognizable after autoclaving or made of plastic that shatters on breakage or is considered breakable by the investigator.
- Chemically contaminated sharps: Segregate from other sharps into a puncture resistant container and label "Chemically Contaminated Sharps". Call EH&S for a waste pick-up.
- If uncertain, contact EH&S at 812-855-6311.

#### Radioactive Materials

- Contact the Radiation Safety Office (812-855-3230) to relocate any radioactive materials to another laboratory, to remove these materials from the University or the radioactive material inventory, for decontamination of the work area, and to conduct a final survey of the vacated area.

#### Equipment

- Clean and disinfect equipment (including refrigerators) before departing. Especially equipment in which biohazardous materials were used or stored. Alert EH&S and Facilities Management of exhaust or filtration equipment used with extremely hazardous substances or organisms.
- If moving biological safety cabinets, decontaminate before moving and recertify before use in the new location.
- Deface or cover hazard labels on equipment to be moved or discarded.
- When discarding laboratory equipment: remove capacitors, transformers, mercury switches, mercury thermometers, radioactive sources, chemicals and biohazards before disposal.



### Laboratory Close-Out Procedures and Transportation of Hazardous Materials

#### Movement and Transportation of Hazardous Materials

Laboratory close-out and the subsequent movement of hazardous materials may require movement of materials within the University or to another university. Accidents during movement or transportation of any of these materials can result in serious harm to persons and property. For this reason, federal law and University policies require that persons who move or transport hazardous materials in the course of their employment or on behalf of the University are:

1. Trained and authorized to handle and transport hazardous chemicals within University property; and
2. Licensed and/or certified to package and transport hazardous materials off University property.

The movement of hazardous chemicals can occur in three ways; 1) within the University buildings between rooms or laboratories; 2) within the University between buildings, departments, branch campuses, or into the field for research and 3) to other institutions or entities such as another university, a waste disposal facility, or a return to the manufacturer. Certain federal laws and public safety concerns require that there be some control over movement of these materials. It is important to the safety of all members of the University community on each campus that movement of hazardous materials be restricted to persons who have received training, can carry out the task safely, and adequately handle an emergency should an accident or chemical spill occur.

Ownership and liability for chemicals used in University research belongs to the University not the Principal Investigator. When Principal Investigators leave an institution, the research gets transferred to the new institution, which then becomes the owner. The original institution is legally responsible for the shipment to the new institution. The transfer of ownership of the chemicals needs to be documented in the transfer of ownership of the research and equipment.

- **Hazardous Chemicals:** Off site transportation of hazardous chemicals should only be done by DOT licensed hazardous material carriers to another location via a public thoroughfare. Toxic materials, carcinogens, highly reactive chemicals controlled substances, and other restricted chemicals should be moved by trained laboratory staff only. All chemicals should be properly labeled and packaged. Incompatible chemicals should not be placed together during storage or transport. Secondary containment should be utilized to control spilled material.
- **Radioactive materials:** Removal of radioactive materials from the University is prohibited without prior approval of the Radiation Safety Office. Contact the Radiation Safety Office (812-855-3230) to remove any of these materials from the University and make arrangements for shipment.
- **Biological Materials:** Off site transportation of biohazardous materials should only be done by DOT licensed hazardous materials carriers to another location via a public thoroughfare. Contact the IU Bloomington Biosafety Officer (812-856-3638) to make arrangement for shipment of biological materials.



### Laboratory Close-Out Procedures and Transportation of Hazardous Materials

#### Transportation of Hazardous Materials for Non-Commercial Purposes

A University employee handling and transporting hazardous materials in a private vehicle, rented vehicle, or University vehicle during the course of their work is performing non-commercial business. Transportation of hazardous materials for non-commercial business is not subject to Department of Transportation (DOT) Hazardous Material Regulations found in 49 CFR Parts 171-180.

The handling and movement of hazardous materials and waste within a building between rooms is governed by 29 CFR Part 1910.1200, Hazard Communication, 29 CFR Part 1910.1450, Occupational Exposure to Hazardous Materials in Laboratories, and 40 CFR Part 262, Standard Applicable to Generators of Hazardous Waste. These standards have specific training requirements that must be met to ensure that employees are thoroughly familiar with proper handling and emergency procedures. This training is provided by EH&S.

Similarly, the handling and movement of hazardous materials between buildings, between campuses, or into the field for research, in University vehicles by University personnel for non-commercial purposes are not subject to the DOT Hazardous Material Regulations. However, these personnel must:

1. Have a valid driver's license,
2. Be authorized to use a University vehicle,
3. Use a University vehicle (private or rented) or an authorized service vehicle (DO NOT use personal vehicles),
4. Use the proper containment and packaging materials en-route.
  - a) Make sure containers are tightly closed and sealed with Parafilm if necessary
  - b) Bottles must be labeled with the full chemical name and hazard (i.e. flammable, etc.)
  - c) Use a secondary container such as a 5-gallon bucket or ice chest.
  - d) Pack spill absorbent materials between bottles.
  - e) Secure the secondary container in the vehicle so that it does not tip over.
5. Have completed one or more of the following training programs provided by EH&S:
  - a) Hazard Communication, 29 CFR Part 1910.1200
  - b) Occupational Exposure to Hazardous Materials in Laboratories, 29 CFR Part 1910.1450
  - c) Standard Applicable to Generators of Hazardous Waste, 40 CFR Part 262 including emergency procedures to be used in the event of an accident.



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#### **Transportation of Hazardous Materials for Commercial Purposes**

University stockroom employees that receive hazardous chemicals shipped by commercial carriers are subject to the training requirements found in the DOT Hazardous Material Regulations found in 49 CFR Parts 171-180. This training is provided by EH&S.

Chemicals being shipped to another institution or business that are offered to commercial carriers are subject to the DOT Hazardous Material Regulations found in 49 CFR Parts 171-180. Because the ownership of chemicals being moved to another institution changes the transportation becomes a commercial enterprise and these transportation requirements are also subject to the DOT Hazardous Material Regulations found in 49 CFR Parts 171-180. Therefore the commercial carrier must be licensed to transport hazardous materials in accordance with federal law.

In the case of transportation of complete chemical collections to another university, the commercial carrier must package their own containers using properly trained, licensed and/or certified individuals to ensure that the materials are properly segregated for shipping, packaged in DOT approved containers, labeled, and shipped with the proper manifest or shipping documents in accordance with the DOT regulations.



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Appendix A

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Office of Environmental, Health, and Safety Management 1514 E. Third Street Bloomington, IN 47405 (812) 855-6311 [www.ehs.indiana.edu](http://www.ehs.indiana.edu)



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#### Closeout Checklist for Laboratories

Please check refrigerators, freezers, fume hoods, bench tops, storage cabinets, closet spaces, and shared storage areas for hazardous materials.

Date  
Completed  
or N/A

#### **Chemicals (Solids, Liquids, Gases)**

- Labeled chemical containers with contents (full chemical name(s)). \_\_\_\_\_
- Closed all containers securely to prevent leaks or spills. \_\_\_\_\_
- Segregated incompatible materials. \_\_\_\_\_
- Store flammable liquid containers greater than 10 gallons in designated storage cabinets. \_\_\_\_\_
- If transferring chemicals to another lab, identified useable chemicals and moved them to (name and room no.): \_\_\_\_\_
- Agreed with department chair/dean what chemicals will remain with me. They will be transported to a facility outside IU. (Packaging of the containers and shipment documentation must be done in accordance with Department of Transportation regulations. See Laboratory Close-out and Chemical Transportation Guidelines.) \_\_\_\_\_
- Identified, labeled, and properly stored hazardous waste. \_\_\_\_\_
- Contacted EH&S to make arrangements for proper disposal (855-6311). \_\_\_\_\_
- Identified contents and labeled compressed gas cylinder(s). \_\_\_\_\_
- Removed pressure regulators on cylinders and screwed the cylinder caps into place. \_\_\_\_\_
- Return cylinders to the gas supplier or Chemistry Stores. (Do not leave in lab.) \_\_\_\_\_
- Contacted EH&S (855-6311) to collect unwanted, non-returnable cylinders. \_\_\_\_\_

#### **Biological Materials**

##### *Animal and Human Tissue:*

- All animal and human tissues have been placed in a biohazard bag or box for incineration. \_\_\_\_\_
- Refrigerators and freezers have been emptied and cleaned. \_\_\_\_\_
- Transferred responsibility to: (name) \_\_\_\_\_  
(location) \_\_\_\_\_

##### *Microorganisms, Cultures, and Recombinant DNA:*

- All infectious and/or recombinant material placed in biohazard bag and steam sterilized. \_\_\_\_\_
- Incubators, ovens, refrigerators, and freezers have been emptied and cleaned. \_\_\_\_\_
- Disinfected all workbenches, instrumentation, and other lab material that may have been contaminated during research. \_\_\_\_\_
- Transferred responsibility to: (name) \_\_\_\_\_  
(location) \_\_\_\_\_
- Removed all Biohazard signs from cleaned equipment and laboratory door (after confirming with Biosafety Officer (856-3638, JH A015)). \_\_\_\_\_
- Submitted a biological material inventory to Biosafety Officer (Jordan Hall A015) identifying organisms that have been destroyed or transferred \_\_\_\_\_

##### *Transporting Biological Materials:*

- Consulted Biosafety Officer (856-3638) regarding Department of Transportation regulations and proper shipping containers. \_\_\_\_\_



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#### Controlled Substances

*Principal Investigators who possess a DEA Registration must have:*

- Contacted the Chemical Hygiene Officer (855-5454) to ensure proper disposal of schedule drugs. \_\_\_\_\_
- Notified the DEA of destruction, termination, or transfer of the registration as appropriate. \_\_\_\_\_  
Call the Chemical Hygiene Officer (855-5454) for instructions. \_\_\_\_\_

#### Radioactive Materials

- Packaged all materials in approved and labeled waste containers. \_\_\_\_\_
- Completed radioactive waste cards and attached to containers. \_\_\_\_\_
- Contacted the Radiation Safety Officer (RSO) at 855-3230 to request removal of radioactive waste. \_\_\_\_\_  
Scheduled closeout survey with the RSO; arranged for a responsible person to be present during survey. \_\_\_\_\_
- Performed contamination survey, decontaminated and re-surveyed if necessary. \_\_\_\_\_
- Removed all radiation labels and stickers from benches, sinks, hoods, etc. (do not remove Caution - Radioactive Material sign from entry door). \_\_\_\_\_
- Returned all inventory sheets to the RSO. \_\_\_\_\_
- Transferred inventory to: \_\_\_\_\_
- Checked all shared areas for radioactive materials/waste. \_\_\_\_\_

#### Equipment, Lab Furniture, General Safety/Security

- Contacted EH&S for information regarding contaminated equipment. \_\_\_\_\_
- Decontaminated equipment or furniture to be left in lab, including fume hoods, bench tops, and shelves. \_\_\_\_\_
- Arranged for transfer of ownership of equipment to leave with the Principal Investigator. \_\_\_\_\_
- Arranged for removal of equipment to stay with the department. \_\_\_\_\_
- Arranged for removal of unwanted, broken, or obsolete equipment. \_\_\_\_\_
- Identified useable non-working equipment with operational deficiency. \_\_\_\_\_
- Checked all shared areas, freezers, incubators, and cold rooms for hazardous materials/waste. \_\_\_\_\_
- Collected and containerized all sharps, needles, razor blades, surgical blades, and glass for disposal. \_\_\_\_\_
- Returned keys to departmental business office or facility manager. \_\_\_\_\_
- Returned computers, peripherals, software, data disks to department chair/dean or facility manager. \_\_\_\_\_

#### Lab Inspection

- Requested a clearance/exit inspection by the Chemical Hygiene Officer (855-5454). \_\_\_\_\_



### Laboratory Close-Out Procedures and Transportation of Hazardous Materials

#### Guidance for Transporting Chemicals between Laboratories

The following guidance is provided to ensure the safe removal, transportation, and storage of chemicals during movement between laboratories. EH&S personnel will be available to assist with chemical segregation and removal of old chemicals for disposal as necessary. Contact EH&S (855-6311, [www.ehs.indiana.edu](http://www.ehs.indiana.edu)) for an appointment.

After vacating a laboratory, clearance inspections are performed to ensure that the custodians are not exposed to any laboratory hazards or chemical spills. Please be sure that there are no sharps or razor blades remaining and that all chemical spills are cleaned up such as areas where ethidium bromide may have been used including the bench top, fume hood deck, and the fronts of drawers and counters where spillage may have occurred.

Attached is a chemical segregation chart to be used for transportation purposes and future chemical storage.

1. Be sure to wear the proper personal protective equipment (PPE) when handling chemicals. The minimum PPE is lab coat, gloves, and safety glasses.
2. Have a properly equipped spill kit available at the point of origin and at the new lab. EH&S will provide spill kits for all the labs.
3. Separate chemicals into the following hazard classes for transportation. These are the general hazard classes that should be used to store the chemicals in the new lab.
  - Non-Hazardous
  - Flammables
  - Corrosives (separate acids and bases)
  - Oxidizers  
Note: Be sure to separate oxidizers from organics. This includes separation of oxidizing acids (nitric, sulfuric, perchloric) from organic acids (acetic, citric, etc.)
  - Explosives
  - Water reactives
  - Air reactives or pyrophorics
  - Carcinogens & Mutagens
  - Poisons & Toxins
  - Compressed Gases It is convenient to separate the chemicals by placing them in plastic tubs or nalgene trays available at the chemistry and biology stockrooms.
5. Label any unlabeled containers. Identify and separate any old chemicals for disposal. If you need assistance please call EH&S to arrange for an appointment (855-6311, [www.ehs.indiana.edu](http://www.ehs.indiana.edu)).
6. Fragile glass containers such as flasks should be carefully placed in a plastic tub on a bed of vermiculite not touching neighboring bottles.
7. Use a lab cart with a sufficiently deep tray (2-3 inch sides) to prevent bottles from falling off or tipping over the side.



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8. Don't overload the lab carts or stack containers and trays.
9. Move the lab cart slowly and carefully over door thresholds and bumps.
10. Use freight elevators whenever possible.
11. When unloading (or loading) chemical containers do not rush, handle containers deliberately, one at a time. Grasp bottles firmly, use two hands if necessary. Don't pick them up by the lids, use finger holes or bottle handles if present.
12. Use plastic tubs for hazard class segregation in the new cabinets. Label tubs according to hazard class for storage.
13. Gas cylinders should be moved using a cylinder truck or dolly only. The cylinder should be secured to the dolly with the regulator removed and the cap in place. The cylinders should be secured to the wall bracket or rack upon arrival in the new lab.

### Suggestions for Moving Refrigerated, Frozen, or Incubated Materials

Some chemicals may be sensitive to prolonged storage at ambient temperature and should be moved from a refrigerator to a refrigerator. The following procedure is suggested for moving refrigerated, frozen, or incubated materials to maintain the integrity of the materials. You must have access to a second refrigerator, freezer, or incubator.

1. Move all the refrigerated, frozen, or incubator materials into one refrigerator, freezer, or incubator.
2. Move and setup the emptied appliance in the new lab.
3. Move the materials from the old lab to the new lab and place in the new refrigerator, freezer, or incubator.
4. Move the second refrigerator, freezer, or incubator to the new lab and redistribute the materials into both appliances.

If your materials are sensitive to short term exposure to ambient temperature you may want to use a cooler to move the materials in from lab to lab.

### Movement of Radioactive Materials

1. Radioactive substances cannot be moved until the authorization is approved for the new location.
2. To obtain a new authorization the Radiation Safety Office (JH 075, 855-3230) will need a scaled drawing or diagram of where the radioactive storage and work areas will be and will need to inspect the new area.
3. The vacated lab areas will need to be surveyed before any occupation or remodeling of those areas will be allowed.