

Laboratory Closeout Procedures

Environmental Health & Safety
Wichita State University

Contents

These guidelines have been developed for research groups involved in physically relocating laboratories from one facility to another. The intent is to help you plan and execute movement of your precision instruments, equipment, and hazardous materials without incident. This is also an opportunity to evaluate, plan, and organize your equipment and chemical needs. Planning and preparing for your move is the perfect time to update your chemical and equipment inventories, clean out unusable and outdated materials, repair or discard broken equipment...a chance to start your new laboratory off the way you have always wanted it to be.

If you have questions before, during, or after your move, please contact Environmental Health & Safety at 978-3347 or via e-mail to: michael.strickland@wichita.edu.

Before You Start

- ✓ One Month Before You Move
- ✓ Three Weeks Before You Move
- ✓ As You Pack and Begin Moving
- ✓ Questions? Call EH&S...
- ✓ Within the First Week of Moving

One Month Before You Move

- Begin planning your move and review what you have on hand.
 - Review these *Laboratory Closeout Procedures*.
 - Look in all your cabinets and on all your shelves.
 - Look in your storage areas.

Are there chemicals that are outdated or that are no longer needed?

Are there unknowns or unlabeled chemicals?

Are chemical containers intact and caps in good condition?

Are any “surprises” under the fume hood or tucked behind equipment?

Are there old lecture bottles or other gas cylinders?

Does your equipment require special handling?

Do you have damaged or old equipment?

Examine the area you are moving into.

Three Weeks Before You Move

- ✓ Notify EH&S, 3347 or e-mail: michael.strickland@wichita.edu, to start the laboratory

clearance process.

- ✓ Begin packing. Refer to “As You Pack and Begin Moving.”
- ✓ Contact EH&S for instructions to pack and move radioactive materials.

As You Pack and Begin Moving

- ✓ Pack and move items during normal business hours so staff will be available in the event of a spill or accident.
- ✓ Do not transport hazardous materials alone ... use the “buddy system.”
- ✓ Use appropriate Personal Protective Equipment (goggles, lab coat, gloves, closed-toe shoes).
- ✓ Have boxes, plastic bags, and containers checked for broken glass available *before* you begin.
- ✓ Read the New Area Checklist and Safe Storage sections before moving items.

Within the First Week of Moving

- ✓ Post required warning signs (radiation, biohazard, etc).
- ✓ Review the location of safety showers, eye washes, fire extinguishers, and exits.
- ✓ Document your review and include it in your Injury & Illness Prevention Program training records.
- ✓ Revisit your old lab space. Has anything been left behind? EH&S will survey the space to determine if it is free of hazards.

Packing Chemicals to Be Moved

- ✓ Wear personal protection appropriate for the materials being handled (safety glasses, goggles, lab coat, gloves, closed toe shoes, etc.).
- ✓ Be certain containers are properly labeled and not likely to leak during transport. ***Do not move unknowns or containers that are not in good condition.***
- ✓ Separate chemicals into compatible and related groups and provide separate boxes for each group. This is a good time to lay the groundwork for segregated storage in your new lab.
- ✓ Refer to the Chemical Storage Guidelines for more details about inventory and segregation.
- ✓ **Separate chemicals into these categories:**
 - **Caustics (Bases)**
 - **Acids (mineral)**
 - **Flammables (including organic acids)**
 - **Poisons (Toxics)**
 - **Oxidizers**
 - **Water Reactives**
- ✓ Use sturdy partitioned boxes or chemical containers
- ✓ Do not allow bottle necks or stems to protrude from boxes. Leave room to completely close a box. Boxes that cannot be stacked are not acceptable for transport.
- ✓ Limit the size of boxes to 18" per side; take care not to make a box too heavy.
- ✓ Separate refrigerated materials into hazard classes and handle them according to their special

requirements; do not box them together.

Packing and Moving Biological Materials

Biological materials include all etiologic agents, human and other animal tissues, blood, blood products, and other body fluids. Achieve maximum protection from accidental exposures when transporting these materials by packing in primary and secondary containers.

Primary containers. Seal primary containers to prevent leakage. Avoid contamination of the exterior of primary containers. Examples of primary containers include test tubes, vacutainers, IV bags, culture flasks, vials, Petri dishes, etc. A primary container must be surrounded by absorbent packing material when placed inside a secondary container.

Secondary containers. Rigid, break resistant containers that can be sealed such as cardboard, metal, or plastic mailing tubes, closed metal ice chests, and sealable pans are suitable secondary containers.

Labeling. Identify the containers with an international Biohazard symbol. Label both the primary and secondary containers. Include the type of biological material and the name and phone number of the Principal Investigator. These labels must be legible and indelible.

Chemical Storage Guidelines

- ✓ Inventory - As You Pack
- ✓ Labeling
- ✓ Segregate Incompatibles and Store by Hazard Class
- ✓ General Guidelines
- ✓ Storage Areas
- ✓ Storage Guidelines by Hazard Class

Inventory - As You Pack

- ✓ Minimum inventory information: chemical name, date received, date opened, quantity.
- ✓ Check each container for condition, corrosion, expiration date, etc.

Peroxide forming materials that are more than one year old or have been opened for more than six months should not be moved to the new laboratory. Such items should be disposed of by the expiration date listed by the manufacturer.

Organic peroxides have unusual stability characteristics that make them the most hazardous substances in the laboratory. As a class, organic peroxides are considered to be powerful explosives and are sensitive to heat, friction, impact, and light. They are also reactive with

strong oxidizing and reducing agents. Compounds that form peroxides during storage include:

Ethyl ether	Dioxane	Tetrahydrofuran
Isopropyl ether	Acetal	Divinyl acetylene
Potassium metal	Butadiene	Vinylidene chloride
Vinyl chloride	Vinyl ethers	Cumene
Cyclohexene	Styrene	Sodium amide
Dicyclopentadiene	Diacetylene	Methyl acetylene
Vinyl acetylene	Vinyl acetate	Methylcyclopentane

Source: H.L. Jackson, W.B. McCormack, C.S. Rondesvedt, K.C. Smeltz. I.E. Viele, Organic Chemical Department, E.I. duPont de Nemours and Company, Wilmington, DE. 1989

- ✓ Retain an extra copy of the inventory outside the laboratory (for example, in the departmental office) for reference in an emergency.
- ✓ The location of all Material Safety Data Sheets (MSDS) should be noted on the inventory.

Labeling

Chemical containers must be labeled as follows:

Primary containers - Chemical name, major hazard(s), precautions, date opened.

Secondary containers - Label chemicals transferred from their original containers into secondary containers with the chemical name, hazard(s), precautions, and date.

Segregate Incompatible Chemicals and Store by Hazard Class

Recommended general hazard classes for storage are:

Caustics (bases)	Poisons (Toxics)
Acids (mineral)	Oxidizers
Flammables - (including organic acids)	Water Reactives

Do not store chemicals alphabetically, except within a hazard classification.

General Guidelines

Keep flammable chemicals by themselves in approved storage cans or cabinets

Keep acids away from bases.

Separate organic chemicals from inorganic chemicals.

Store oxidizers away from flammable chemicals.

Biohazards may be labeled and stored as one hazard class (group).

Class A and B carcinogens (cytotoxics) should be labeled and stored with their chemical family.

Store Class C carcinogens (cytotoxic) in a glove box or other similar regulated area.

Storage Areas

- Store large bottles and containers close to the floor.
- Shelves should be bolted to the wall.
- Shelves should have lips or retaining cords to prevent containers from falling.
- Storage areas should be well lighted, ventilated and maintain uniform temperature.
- Secondary containment is recommended by using polyethylene trays/tubs.

Storage Guidelines by Hazard Class

Oxidizers. These materials yield oxygen and react with water, fire, flammables and combustibles. Examples include inorganic nitrates, permanganates, inorganic peroxides, persulfates, and perchlorates.

- Keep separate from flammables and organic materials.
- Keep separate from reducing agents (i.e., zinc, alkaline metals, formic acid, etc)
- Label with the ***Date Received, Date Opened***, and discard within three to six months of opening. Unopened peroxide forming chemicals should be discarded within 12 months of receipt depending on the specific chemical.

Acids. Materials with a pH of 5 or less. Examples include acetic, chromic, nitric and hydrofluoric acids.

- Keep separate from bases and chemicals which could evolve poison vapors if in contact with acids such as sodium cyanide.
- Store large containers at floor level or at least below eye level.
- Separate inorganic from organic acids.
- Separate acids from active metals such as sodium and potassium.
- Store perchloric acid and nitric acid as oxidizers.
- Hydrofluoric acid spills can be neutralized with calcium hydroxide only.

Poisons (Toxics). These materials are dangerous if inhaled, swallowed or absorbed through the skin. Examples include phenol and hydrazine.

- Store according to label directions
- Keep separate from other hazard classes.
- Keep tightly sealed in containers in good condition.

Caustics (bases). This includes all materials that are pH 9 or greater; examples are ammonium hydroxide, calcium hydroxide, and sodium hydroxide.

- Keep separate from acids.
- Store solutions of inorganic hydroxides in polyethylene containers.
- Store large containers below eye level, near or on the floor.

Flammable/Combustible. Vapors of these materials ignite easily at room temperature. Examples include alcohols, esters, ketones, ethers, and pyrophoric chemicals.

- Store flammable liquids in approved safety cans or cabinets.

Keep these materials away from open flame, heat, sun, and spark sources.
 Use only UL or Factory Mutual approved explosion safequot, quot, or spark proofquot refrigerators for cold storage of flammable materials.

Water Reactive. These materials react with water to yield flammable or toxic gases or other hazardous conditions. Examples include hypochlorite compounds and metal hydrides.

Keep away from water and water sources.
 Do not store above or below sinks.
 Use a dry chemical extinguisher to suppress fire.

New Area Checklist

- ✓ Emergency Equipment
- ✓ Chemical and Waste Storage
- ✓ Flammable Liquids
 - Maximum Container Size
 - Maximum Quantities
- ✓ General Conditions
- ✓ Radiation Safety

Emergency Equipment.

Emergency eye wash station and shower accessible within 100 feet of your laboratory?
 Fire extinguishers accessible within 50 feet?

Chemical and Waste Storage.

Acid - Caustic - Flammable - Water Reactive - Oxidizer - Poison - segregated?
 Are chemicals segregated into related and compatible groups by hazard class?
 Corrosive materials stored low on shelves below waist height?
 Are flammable materials stored correctly?
 No more than 10 gallons of flammable liquids stored in an open laboratory.
 Quantities greater than 10 gallons must be inside flammable storage cabinets.
 Correct flammable storage containers are in use.
 Storage of flammable materials in the laboratory should be minimal.

Flammable Liquids - Maximum Container Size.

<u>Container Type</u>	<u>Class 1A</u>	<u>Class 1B</u>	<u>Class 1C</u>
Glass*	1 pint	1 quart	1 gallon
Metal or approved			
Plastic	1 gallon	5 gallons	5 gallons
Safety Cans	2 gallons	2 gallons	2 gallons
Metal Drums	Contact EH&S at ext. 3347 for storage requirements.		

* Class Key

Class 1A - flash point $\geq 73^{\circ}\text{F}$ (22.8°C); boiling point $\geq 100^{\circ}\text{F}$ (37.8°C).

Class 1B - flash point $\geq 73^{\circ}\text{F}$ (22.8°C); boiling point $\geq 100^{\circ}\text{F}$ (37.8°C).

Class 1C - flash point $\geq 73^{\circ}\text{F}$ (22.8°C); boiling point $\geq 100^{\circ}\text{F}$ (37.8°C).

*Exception for storage of quantities in excess of 1 gallon may be requested from EH&S, ext. 3347.

Flammable Liquids - Maximum Quantities.

<u>Location</u>	<u>Maximum Quantity</u>	<u>Conditions</u>
In open lab in safety cans	10 gallons	Must comply with container size requirements above
In fire rated storage cabinet	60 gallons	

General Conditions.

Waste containers in good condition, closed, and labeled with the words ***Hazardous Waste?***

Chemical storage shelves have lips or guards on outer edges?

Fume hoods are functioning properly?

Fume hoods certified by EH&S?

Hazardous work areas posted - biohazard, cytotoxic, radiation, laser, sonicator, UV?

Compressed gas cylinders secured?

Sharps container for broken glass, needles and other sharp objects available and labeled?

Is there a minimum of 28" in the aisles?

Radiation Safety.

Are radiation signs posted properly?

Are waste storage areas shielded?

Are waste and sewer disposal guidelines and logs posted?

Are use logs posted?