



CHEMICAL STANDARDS/GUIDELINES (non-mandatory regulatory compliance)

Academic Affairs Laboratory Safety

Number: AALSSD-2-60-2001		Author: Anne Hawkins
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I. APPLICABILITY

The intent of this document is to provide basic chemical standards/guidelines for educational laboratories and supporting laboratory areas for the, Academic Affairs Laboratories at Ferris State University. The Academic Affairs Laboratory Safety Chemical Standards/Guidelines document is issued by the Academic Affairs Director of Laboratory Safety under the direction of the Provost and Vice President for Academic Affairs as a secured document.

The Chemical Standards/Guidelines document does not address biological materials, radioactive materials, nor does it cover all the chemical hazards that are likely to be encountered in the chemical laboratories and supporting areas. The Standards/Guidelines are only applicable to Academic Affairs Division Faculty, Staff, Student Employees, and Students who may, in the course of performing their jobs or as part of their laboratory requirements, become involved with chemicals in an educational laboratory setting.

The Chemical Standards/Guidelines document is accessible on the Academic Affairs Laboratory Safety website. A printed copy shall be made available upon request to anyone, including the representatives of credentialed local, state, and federal regulators with jurisdiction to inspect.

II. KEY ELEMENTS

- A. The Chemical Standards/Guidelines are presented as minimum standards/guidelines.
- B. The Faculty or Staff members who are responsible for overseeing the procedures carried out associated with the educational chemical laboratories or areas that support the production of teaching materials, shall implement the Chemical Standards/Guidelines and may require additional standards unique to the laboratory procedure involved.
- C. Any Faculty or Staff interested in conducting research shall contact the Academic Affairs Director of Laboratory Safety during the initial planning stage.

III. ROLES IN THE PROCESS

A. Responsibilities and Authority of the Deans

1. Supports Academic Affairs Laboratory Safety compliance in meeting federal, state and local regulatory requirements within any remodeled, renovated, existing or new laboratory facility.
2. Supports the Chemical Standards/Guidelines within the college to serve as minimum chemical safety standards.

3. Notifies the Academic Affairs Director of Laboratory Safety when:

- a. There has been an incident within the laboratory, including an injury, an illness, a chemical release that cannot be addressed by the Faculty/Staff providing oversight in the area.
- b. Prior to assigning new Faculty to new laboratories, relocating the existing Faculty to a different laboratory, or closing a laboratory.

4. Supports and encourages, wherever possible, the substitution of less hazardous chemicals, processes and experiments to reduce potential exposures and the generation of hazardous waste.

B. Responsibilities and Authority of the Department Chair/Director/Head

1. Supports Academic Affairs Laboratory Safety compliance in meeting federal, state, and local regulatory requirements within any remodeled, renovated, existing or new laboratory facility.

2. Supports the Chemical Standards/Guidelines within the college to serve as minimum chemical safety standards.

3. Notifies the Academic Affairs Director of Laboratory Safety when:

- a. There has been an incident within the laboratory, including an injury, an illness, a chemical release that cannot be addressed by the Faculty/Staff providing oversight in the area.
- b. Prior to assigning new Faculty to new laboratories, relocating the existing Faculty to a different laboratory, or closing a laboratory.

4. Supports and encourages, wherever possible, the substitution of less hazardous chemicals, processes and experiments to reduce potential exposures and the generation of hazardous waste.

C. Responsibilities and Authority of Faculty and Staff

1. Supports Academic Affairs Laboratory Safety compliance in meeting federal, state, and local regulatory requirements within any remodeled, renovated, existing or new laboratory facility.

2. Supports the Chemical Standards/Guidelines within the college to serve as minimum chemical safety standards.

3. Notifies the Department Chair or Director if working alone in the laboratory with hazardous materials or if performing other activities will occur before or after normal business hours (Normal business hours 8:00am to 5:00pm).

4. Conducts Hazard Assessments with the assistance of the Academic Affairs Director of Laboratory Safety prior to implementing any changes to equipment, instrumentation, processes, hazardous chemical families or quantities for the purpose of identifying hazardous laboratory conditions or operations.

5. Develops, implements, and documents training for the Faculty, Staff, Student Employees and Students who will be working in laboratories.

6. Notifies the Dean, Department Chair/Director if there is an incident involving a Faculty, Staff, Student Employee or Student that results in an injury, an illness or a chemical release that can not be addressed by the Faculty/Staff providing oversight for the area.

7. Faculty or Staff are responsible for training any Visiting Professors on the Chemical Standards/Guidelines and any specific requirements associated with the processes or tasks they will be performing prior to approving their access to and working in the designated laboratory.

D. Responsibilities and Authority of Individuals Assigned to a Laboratory (Including Visiting Faculty)

1. Performs laboratory exercises/procedures under the direction of the Faculty or Staff providing oversight for the laboratory.
2. Obtains the training necessary to:
 - a. Perform only those processes and procedures within the laboratory which they are assigned.
 - b. Operate only those instrumentation/equipment within the laboratory which they are assigned.
3. Notifies the Faculty, or Staff of any incident that occurs within the laboratory immediately and make themselves available in the event there is a follow-up incident investigation.

E. Responsibilities and Authority of Academic Affairs Director of Laboratory Safety

1. Serves as the Academic Affairs Division's laboratory safety technical resource for implementation of this program. Responsible for:
 - a. Develops the Academic Affairs Laboratory Safety Chemical Standards/Guidelines document.
 - b. Makes the necessary changes to this document to reflect updates to chemical safety standards.

IV. STANDARDS/GUIDELINES

Chemical Demonstration or Magic Shows

All chemical demonstrations or magic shows that are not included in the syllabus of the Faculty or Staff who have oversight responsibility for the laboratory, shall be considered unplanned;

1. Unplanned chemical demonstrations or magic shows shall be approved by the department chair or director.
2. If the individuals observing the chemical demonstration or magic show are individuals in the K-12 grades, the amount of chemicals located in the laboratory where the demonstration will occur shall be reduced by 50% in accordance with the National Fire Protection Association 45 (NFPA). Consult with the Academic Affairs Director of Laboratory Safety during the early planning stages of the chemical demonstration or magic shows.
3. Shielding shall be placed where applicable between the chemical demonstration or magic show and the audience.
4. At minimum, personal protective equipment shall be worn by the individuals directly involved with the chemical demonstration or magic show, based on the Hazard Assessment determination.

Chemical (Fume) Hood

1. The Faculty or Staff members who are responsible for overseeing the laboratory shall ensure that the Faculty, Staff, Student Employees and Students are trained in the use of the hood.
2. Hoods shall not serve as long term storage location for any chemicals.
3. The hood sash shall be maintained as follows:
 - a. When work is performed within the hood the sash shall be open no more than 18 inches, or to the designated open marking located on the side of the hood, whichever is less space.
 - b. Raise only to add or remove items from the hood.
 - c. Close to one inch from the bottom of the hood when the hood is not in use or an experiment is ongoing within the hood and access is not needed.
4. Any equipment, instrument, or experiment set-up shall be placed in the hood at least six inches from the opening's front edge.
5. Hood certifications are good for one year from the date that hoods were last tested. Hoods shall not be used if the certification has expired. Notify the Academic Affairs Director of Laboratory Safety if hood in use has an expired certification
6. Hoods that have an "Out-of-Service" poster or sign shall not be used for any reason.
7. Academic Affairs Director of Laboratory Safety shall oversee the annual inspection and certification by the approved third party vendor.

Chemical Usage

Assign open and expiration dates to chemicals from the functional groups/chemical properties:

1. Perchlorates
2. Peroxides
3. Peroxidizable materials
4. Monomers capable of polymerizing violently or becoming hazardous after polymerization
5. Material known to become unstable or reactive overtime

Chemical Waste

Chemical waste shall be removed from the teaching laboratory and relocated in an area under the supervision of the Staff providing support to the laboratories;

1. Academic Affairs Director of Laboratory Safety shall make arrangements to have the chemical waste removed prior to the start of the following semester.
2. Chemical waste streams shall not be combined without first contacting the Academic Affairs Director of Laboratory Safety.
3. Prior to incorporating any new chemicals into laboratory processes or experiments contact the Academic Affairs Director of Laboratory Safety

4. Chemical waste shall not be released into a sewer, storm drain or into the atmosphere, unless such release is permitted by federal, state or local governing regulations. The following chemicals shall not be discharged into the sewer:
 - a. Concentrated acids or bases
 - b. Toxic materials
 - c. Explosive materials
 - d. Reactive materials
 - e. Flammable materials
 - f. Mercury or mercury containing materials
 - g. Any material which might interfere with the biological activity of waste water treatment plants, cause structural damage or obstruct flow.
 - h. Contact the Academic Affairs Director of Laboratory Safety with questions concerning the disposal of any new chemical waste.
5. Label the waste container based on the type of classification of the chemical waste, by-product or surplus chemicals that will be placed in the container;
 - a. Hazardous waste labels may be obtained by contacting the Academic Affairs Director of Laboratory Safety.
 - b. Indicate the type of hazard it presents such as Flammable, Corrosive, or Toxic on each container.
 - c. Indicate the date the waste first entered the container.
 - d. Keep all containers' caps tightly closed unless waste is being added to the container.
6. Any paper towels used in clean-up of a chemical spill, or that have become contaminated with a chemical shall be disposed of as chemical waste and not in the ordinary wastepaper basket.

Clothing Requirements for the Laboratory

The minimum clothing requirements should include long pants and closed toe/heel shoes. The Faculty or Staff who has oversight of the laboratory shall:

1. Identify specific and additional requirements (such as safety glasses, gloves, goggles, or laboratory coat).
2. The Faculty and Staff may consult with the Academic Affairs Director of Laboratory Safety for assistance.

Compressed Gases-(Cylinders)

1. Each compressed gas cylinders (empty and full) shall be secured in the upright position with chains, straps or bars at the midpoint of the cylinder **or** with two chains, straps or bars, one at approximately 1/3 and the other at 2/3 height of the cylinder.

2. All cylinders not in use shall be capped.
3. When transporting cylinders use a hand truck and ensure the protective cap is securely in place and the cylinder is strapped to the cart.
4. All compressed gas cylinders shall be stored away from direct or localized heating sources.
5. Empty cylinders shall be separated from full cylinders and labeled "empty" or "MT".
6. Incompatible gas cylinders shall be segregated by distance and flammable gas cylinders shall be stored from other compressed gases.
7. Tap the cylinder only with a pressure regular, which has a CGA fitting designed to be identical to the cylinder in use. Adapters shall not be permitted.
8. Any regulator that is showing any signs of incorrect operations, such as failure to read zero when disconnected from the supply cylinder, shall be removed from service immediately and repaired by authorized repair technicians or replaced.

Department of Transportation (DOT)

Any Faculty or Staff who identifies a need to ship chemicals by any means, such as but not limited to US Postal Service, UPS and Fed EX, shall contact the Academic Affairs Director of Laboratory Safety during the planning stages. No shipment can be made until it has been determined all individuals involved with the shipping process and the packing materials comply with the appropriate federal regulations.

Door Signage

All door signage for laboratory and support areas shall be obtained from the Academic Affairs Director of Laboratory Safety.

Electrical Practices

1. Inspect all electrical equipment for frayed wires or damaged plugs and sockets before use.
2. Avoid using extension cords or adapters to connect three-prong electrical plugs to two-prong outlets.
3. Do not open any breaker or fuse boxes for any reasons.
4. Report all electrical problems to the Physical Plant.

Eye Protection

The Faculty or Staff with laboratory oversight shall perform an eye protection assessment to determine the type of, if any, eye protection will be required to perform tasks associated with the laboratory activities assigned. Consultation with the Academic Affairs Director of Laboratory Safety is encouraged. If personal protective equipment is required:

1. Eye protection shall be worn by Faculty, Staff, Student Employees and Students who may be exposed to chemical or physical hazards within the laboratory.
2. Eye protection shall not be shared and shall meet the minimum requirements set forth by ANSI Z87.1- Eye and Face Protection.
3. Eye protection shall not be stored or placed on any laboratory working surfaces because of potential contact with chemical materials on the working surfaces.

Eyewash and Emergency Shower

1. All plumbed eyewashes and hand-held drench hoses shall be activated (flushed) weekly and results recorded in the Plumbed Eyewash and Emergency Shower Inspection Book.
2. All emergency showers shall be activated (flushed) monthly and results recorded.
3. All plumbed eyewashes or emergency showers found to be not working shall be reported to the Physical Plant.

Fire Equipment

All laboratories working with combustible or flammable chemicals shall have the appropriate fire extinguishers. Contact the Academic Affairs Director of Laboratory Safety if a fire extinguisher is required.

Flammable Dispensing (Bonding and Grounding Flammable Liquids)

Static electricity is generated during the mixing, pouring, pumping and filtering of flammable liquids. Static electricity shall be minimized during dispensing (pouring) of flammable materials between containers. Contact the Academic Affairs Director of Laboratory Safety prior to establishing a flammable dispensing location.

Bonding - The process of joining two or more containers with electrically conductive wires to neutralize the potential charge between them. The connection shall be created before any transferring between containers occur. The bonding connection shall be made with pressure-type clamps.

Grounding - The process of connecting one or more containers to an earth ground using cold water copper pipes. The connection shall be created before any transferring between containers occur.

Contact the Academic Affairs Director of Laboratory Safety concerning any questions on the use of bonding and grounding.

Flammables Laboratory Supplies With K-12 Students

Prior to permitting any K-12 students within a laboratory, for the purpose of observing or taking part in an experiment or process, the amount of flammables and combustibles liquids shall be reduced by 50% of the normal amount located in the laboratory. Contact the Academic Affairs Director of Laboratory Safety if you have questions or if you're in the planning stage of an event involving K-12 students observing or performing hands-on work with flammables and combustibles.

Flammable Liquids-Safety Cans

Provide a means to control flammable vapors while providing a way to carry and dispense liquids up to 5 gallons. These cans have caps that are spring-loaded and self-closing;

1. Safety cans shall not be filled above their rated capacity, which is up to the seam that joins a metal can top to the body.
2. Prior to purchasing a flammable liquid safety can consult with the Academic Affairs Director of Laboratory Safety.

Flammable Storage Cabinets (Flammable Cabinets)

The need for a flammable cabinets is determined by the class of flammables present in the specific laboratory as well as the total quantity and location of these liquids throughout the building in question. Prior to purchasing a flammable cabinet, contact the Academic Affairs Director of Laboratory Safety. All Flammable Storage Cabinets shall comply with National Fire Protection Association 30, Flammable and Combustible Liquids Code unless indicated otherwise by the Academic Affairs Director of Laboratory Safety;

1. All newly purchased flammable storage cabinets shall have self-closing doors.
2. The flammable storage cabinet shall not be vented. The vent openings shall be sealed with the bungs provided by the manufacture.
3. Grounding of the flammable storage cabinet is not required.
4. Notify the Academic Affairs Director of Laboratory Safety if the flammable storage cabinet may be used for the dispensing or collection processes.
5. With new laboratory construction or remodeling, flammable cabinets will not be permitted to be installed below chemical fume hood.

Food, Drink, and Personal Hygiene

1. Food and drink shall not be present in a designated laboratory. Nor shall food or drink be placed in back packs that are permitted in a designated laboratory.
2. Hands shall be washed before and after removing gloves, and any time hands may have become or are thought to be contaminated.
3. Chemicals or equipment used with chemicals shall not be permitted in areas designated for food consumption.

Gifts

Prior to accepting any potential gift (equipment, instrumentation or chemicals) for a college's laboratory contact the Academic Affairs Director of Laboratory in the early planning stage.

Glassware

1. Damaged items shall be removed from service and disposed of only in the designated broken glass container.
2. Hand protection shall be used when inserting glass tubing into rubber stoppers or corks.
3. All evacuated glass apparatus shall be shielded to contain chemicals and glass fragments should implosion occur.
4. Heating and cooling of glassware shall be in accordance with the glassware manufacturer's information. Any use outside of the glassware manufacturer's ranges may result in damage or breakage of the glassware.
5. When cleaning glassware at the sink use hot water, an environmentally actable cleaning agent and brushes of suitable stiffness;

- a. Wear goggles and gloves while washing.
- b. Use brushes of suitable stiffness. Brushes shall not be forced into any glassware.

Hazard Communication

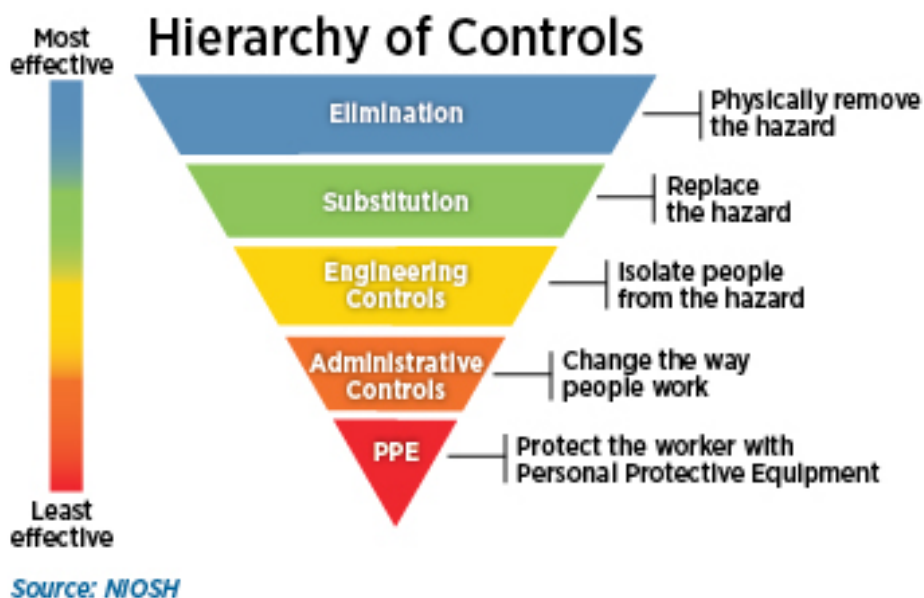
1. Refer to Academic Affairs Laboratory Safety Hazard Communication Program (AALSSD-2-50-1000)

Hazardous Waste (See Chemical Waste)

Hierarchy of Controls

Implement the hierarchy of controls based on the results of the hazard assessment. The following controls are ranked from the most effective to the least effective controls:

1. Eliminate the hazards by substituting the use of a less hazardous material or process.
2. Use engineering controls such as chemical hoods to perform the experiment.
3. Use administrative controls such as notes, syllabus, and experiment instructions.
4. Use of personal protective equipment such as gloves, safety glasses, laboratory coats and respirators.



Housekeeping

1. Access to walkways, exits, eyewash stations, emergency showers, fire extinguishers and other emergency equipment shall remain unobstructed at all times.
2. Coats, book bags, and all other personal items shall not be stored on any laboratory bench top or in the aisles as directed by the Faculty or Staff having oversight.

3. When drawers and cabinets are not in use keep all drawers and cupboard doors closed.
4. Only work with chemicals or materials that are labeled in accordance to the Academic Affairs Laboratory Safety Hazardous Communication written program.
5. All compressed gas cylinders shall be secured to walls or benches (refer to the Compressed Gases-Cylinders section in this standard/guideline).
6. Clean up all spills on bench tops and floors. Use the spill kit and fill out the necessary spill report. Notify the Academic Affairs Director of Laboratory Safety at extension 2154 when a spill kit is used or required.
7. Clean laboratory tops prior to leaving.

Injuries

For major injuries Call 911 and request immediate medical assistance;

1. After the injured or ill individuals have been stabilized report the incident to the Faculty, Laboratory Supervisor or supervisor.
2. Fill out the Incident Investigation Report Form located on the Academic Affairs Laboratory Safety website under Emergency Information, follow directions for reporting and send a copy of the report form to the Academic Affairs Director of Laboratory Safety.

Labeling

All chemicals shall:

1. Retain their original manufacturer's label.
2. If the manufacturer's label becomes unreadable or there is a need to pour some of the chemical into another container, secondary labels shall be used. The information placed on the label shall comply with the Academic Affairs Laboratory Safety Hazard Communication Written Program:
 - a. Identify the chemical
 - b. Identify physical hazard, health hazard or environmental hazard
 - c. Signal word (Danger or Caution) to indicate the hazard level

Laboratory Coats

The Faculty or Staff having oversight shall perform a personal protection assessment to determine if laboratory coat protection will be required to perform experiment or process associated with the laboratory activities assigned. Consultation with the Academic Affairs Director of Laboratory Safety is encouraged. If laboratory coats are required:

1. The laboratory coats shall be made of 100% cotton unless specified by the Faculty or Staff.
2. Laboratory coats shall fit the wearer and be capable of being fully snapped to protect street clothing and the wearer's body. Sleeves shall extend beyond the wrist to protect the arm.
3. Laboratory coats shall not be worn outside the laboratory unless the wearer is transporting chemicals, samples, or compressed gas cylinders. Laboratory coats shall not be worn in any meeting room, break area, dining area or to local eating establishments.

4. Remove laboratory coats prior to leaving the laboratory. Hang the laboratory coat up on a hanger in such a manner not to contaminate the inside of the laboratory coat that comes into contact with street clothing or as specified by the Faculty or Staff with oversight.
5. Report all incidents involving a spill that has contaminated the laboratory coat. Fill out a spill and an incident form. Significantly contaminated coats will be considered hazardous waste and shall be managed based on the type of contamination.
6. Laboratory coats shall not be taken home or to the public laundries to be cleaned. Contact the Academic Affairs Director of Laboratory Safety to identify a suitable laundry service that specializes in laboratory coats and can provide routine laundering or reusable laboratory coats.

Laboratory Design

When there is a potential for a laboratory design change, remodel, upgrade or closeout contact the Academic Affairs Director of Laboratory Safety during the planning stages.

Laboratory Entry Requirements

The Faculty or Staff who have the responsibility for overseeing the processes and experiments that are performed within the laboratory shall establish the entry requirements for all who enter the space during the time of the Faculty or Staff have oversight for the laboratory. These requirements shall address:

1. Who may enter the laboratory
2. The clothing that shall be worn within the laboratory
3. When long hair shall be restrained
4. The personal protective equipment that shall be used and when
5. If book bags and coats may be brought into the laboratory, where they shall be placed to ensure they are not in the way of the laboratory processes or tasks

Laboratory Entry Requirements involving persons who are **Non-FSU Individuals** shall follow the Access to Laboratories by Non-FSU Individual program (AALSSD-2-70-2003);

1. No minors under the age of five will be permitted to enter any laboratory or laboratory support area.
2. Laboratory access shall be granted by the College Dean or designee appointed by the College Dean.
3. Access to laboratories by Non-FSU Individuals shall not apply to vendors and contractors providing service to the laboratory or supporting laboratory areas.

Laboratory Planning

The Faculty or Staff responsible for overseeing the teaching of laboratory experiments or exercises are responsible for identifying the potential hazards. If the Faculty or Staff determines that the laboratory experiments or exercises are those of research nature, they shall contact the College/Department Chemical Hygiene Officer to discuss a Chemical Hygiene assessment.

Mercury

No mercury containing device or chemicals shall be permitted. Contact the Academic Affairs Director of Laboratory Safety for assistance.

Oxidizers

1. Shall be stored away from incompatible materials such as flammable/combustible materials, greases, paper trash containers, finely divided metals, organic liquids and other oxidizers.
2. Strong oxidizing agents shall be stored and used in glass or other inert containers. Cork and rubber shall not be used.

Procurement

1. Prior to buying any chemical listed on the EPA List of Lists, or the Chemical Facility Anti-Terrorism Standard (CFATS) Appendix A Chemical of Interest list, consult with the Academic Affairs Director of Laboratory Safety prior to any purchase.
2. No Perchloric acid shall be purchased for any laboratory within the Academic Affairs Division.
3. No Hydrofluoric acid shall be purchased for any laboratory within the Academic Affairs Division.
4. The following chemicals shall not be purchased for the first time without approval from the College Dean and the Academic Affairs Director of Laboratory Safety:
 - a. Vinyl Chloride
 - b. Methylenedianiline (MDA)
 - c. Ethylene Oxide
 - d. Formaldehyde or formalin
 - e. Acrylonitrile
 - f. Inorganic Arsenic
 - g. Cadmium
 - h. Benzene
 - i. 1,3, Butadiene
 - j. Methylene Chloride
 - k. Chromium (VI)
 - l. Beryllium
 - m. Silica (respirable crystalline silica)

5. Prior to purchasing a chemical for the first time:
 - a. Review the Safety Data Sheet to become knowledgeable with the chemical hazards, storage, and waste stream.
 - b. Individual purchasing of the new chemical will ensure the information associated with the handling, storage and disposal is made known to all the individuals who may become involved with the chemical including the Academic Affairs Director of Laboratory Safety.
 - c. Determine the maximum size container that is permitted per the fire codes in the area where the chemical will be used and stores. Contact the Academic Affairs Director of Laboratory Safety for assistance.
 - d. Consult with the Academic Affairs Director of Laboratory Safety to determine if the new chemical presents any unique security risk and how it shall be managed with the material arrives.
 - e. Consult with the Academic Affairs Director of Laboratory Safety concerning the new waste stream that will be generated by the new chemical to ensure the waste may be managed acceptably internally by the Staff and by the waste hauler vendor.
6. All purchases shall not be based on “the cheaper unit price basis of large quantities”. All purchases shall be based on the minimum quantity that will address the identified need.
7. Ensure the Safety Date Sheet associated with the chemical purchased is placed in the SDS New Note book and the name of the chemical is added to the list at the front of the SDS Notebook.

Peroxidizable Material (Aldehydes, Ethers, Compounds Containing Benzylic Hydrogen Atoms)

1. Shall be purchased in amounts that are expected to be used within a six month to one year time frame.
2. Upon receipt the container shall be dated with the date received and the date opened, date expired (based on the manufacturer’s expiration date or one year from purchase date whichever is shortest) and the date last tested.
3. Store away from ignition sources. Store in airtight containers in dark, cool and dry places. Do not store under sink cabinets.
4. If solids or crystals observed in the liquid or around the cap of a peroxide forming chemical, do not move the chemical contact Academic Affairs Director of Laboratory Safety immediately.
5. Perform routine testing for peroxides.

Personal Protective Equipment (PPE)

The Faculty or Staff providing oversight of the laboratory shall perform a personal protective equipment assessment to determine the type of personal protective equipment that will be required in order to perform tasks associated with the laboratory activities assigned. Consultation with the Academic Affairs Director of Laboratory Safety is encouraged. If personal protective equipment is required:

1. The PPE shall be kept clean and stored in a designated area where it will not become contaminated by the daily activities of the laboratory.

2. Safety glasses or goggles shall not be stored in the pocket of a laboratory coat or on any laboratory bench top.
3. Prior to each use, the PPE shall be inspected to ensure it is in good condition. Any personal protective equipment showing signs of wear such as but not limited to discoloration shall be disposed.
4. After the use of any PPE except for one time usage equipment and laboratory coats that have not been exposed to a chemical spill/splash, the wearer will clean the equipment.
5. PPE contaminated by chemicals because spills, splashes, or rubbing up against a chemical contaminated work surface shall be removed and cleaned;
 - a. As the result of an accident involving hazardous chemicals, any PPE that is heavily contaminated shall be disposed of as hazardous waste.
 - b. Non-heavily contaminated laboratory coats shall be cleaned and laundered (refer to Laboratory Coat section within this document).

Power Failure

In the event of a power failure:

1. Turn off all equipment to prevent damage should the power cycle on and off or if the power returns slowly.
2. Close all sashes on chemical hoods.
3. Bring all experimentation to a controlled end. Leave cooling water circulating in condensers if in use. Cap all chemicals.

Refrigerator/Freezer Storage

Prior to purchasing a refrigerator or freezer for the laboratory consult with the Academic Affairs Director of Laboratory Safety. There are three types of refrigerators:

1. Domestic, used for storage of non-flammable chemicals only.
2. Flammable refrigerator/freezers, used for the storage of flammable chemicals.
3. Explosion resistant refrigerator/freezers, used for the storage of flammable chemicals in hazardous locations.
4. Refrigerated Storage of Chemicals:
 - a. Label with labels that attach to the storage container with an adhesive that is suitable for the temperatures and conditions within the refrigerator or freezer.
 - b. Label shall contain the name of the chemical/material, the date it was placed in the refrigerator or freezer, the name of the owner (no initials).
 - c. All storage containers shall be tightly closed; no open beakers, test tubes, flasks, bottles or other containers shall be permitted.

- d. The owner of the storage container is responsible for inspecting the integrity of the containers and lids stored in the refrigerator or freezer at least once a semester.
- e. Ultra-low freezers (less than -40 F) generally cannot be approved for storage of flammable materials. Consult with the Academic Affairs Director of Laboratory Safety.

Regulatory Agency Inspection

In the event a compliance officer from any regulatory agency presents credentials and requests to conduct an inspection, immediately contact the Academic Affairs Provost Office. Do not permit an inspection to take place without either the Academic Affairs Director of Laboratory Safety present or a representative from the Provost's Office.

Respiratory

Respiratory protection is generally not necessary in the laboratory setting and shall not be used as a long term substitute for adequate engineering controls.

Consult with the Academic Affairs Director of Laboratory Safety concerning the possible use of respiratory protection. Do not begin using any type of respiratory without the approval of Academic Affairs Director of Laboratory Safety.

Receiving, Internal Transporting and Storing (Chemicals)

Access to the stockroom/storeroom/laboratory support areas shall be limited to identified Faculty, Staff, and Student Employees and shall remain secured when designated personnel are not present. Chemical Storages shall be designed to meet the needs and usage of the identified area that supports the laboratories and the laboratories themselves.

The following receiving of chemical standards/guidelines shall be implemented:

1. Chemical deliveries shall not be made to departmental offices, unless this is the only option. If chemicals are delivered to a departmental office the following shall occur:
 - a. No package shall be accepted from the U.S. Postal Service or any commercial package delivery company such as Fed Ex or UPS if the package:
 1. Has the incorrect address
 2. Appears to be damaged
 3. Appears to be leaking
 - b. A separate area or location shall be established where it is out of the way of normal office traffic and may be secured if necessary.
 - c. The individual who is the "owner" or his/her designee, who has been trained in the handling and transportation of chemicals shall be required to pick the chemical up on the day of delivery. The owner or his/her designee is responsible for ensuring the chemical is taken to the laboratory or laboratory support area and stored.
2. All individuals who are involved with receiving chemicals shall be training on the process specifically used by the department to receive and notify the designated "owners".
3. Only Academic Affairs Division Faculty or Staff owner or his/her designee who have been trained, shall be responsible for transporting, unpacking, inspecting, and storing chemicals.

Within the building, the following transportation of received chemicals standards/guidelines shall be implemented:

1. Faculty, Staff or outside delivery personnel shall transport chemicals to the appropriate designated location.
2. Only if the chemical received is in its original packaging, the weight of the package can be easily handled, and the hallways are not crowded with students waiting to enter the classrooms or classes are changing, then the owner or his/her designee may carry the single package to its destination, otherwise the chemical shall be transported by a cart.
3. The transport cart shall:
 - a. Be stable and have sides to contain the package.
 - b. Have wheels large enough to handle uneven floor surfaces.
 - c. Have a secondary containment that shall be used in addition to the cart when transporting individual containers of liquids.

The following storage of chemical standards/guidelines shall be implemented for received chemicals:

1. Packages shall be opened in the laboratory or the appropriate laboratory support area by the owner or his/her designee;
 - a. The owner or his/her designee shall verify that the containers are not damaged, the manufacturer's label is intact and the item order is what was received.
 - b. The owner or his/her designee shall apply a date received to the label for all chemicals, especially any potentially unstable chemical.
 - c. Confirm that an SDS was received with the chemical. If the SDS is missing contact the supplier and request a copy immediately.
 - d. The SDS shall be placed in the Academic Affairs Laboratory Safety, new or reused Safety Data Sheet Notebook and enter the chemical name to on the list of chemicals found at the front of the SDS Notebook if the chemicals in not already listed.
2. Storage process shall be developed for each storage area that addresses the segregation of incompatibles and isolates particularly flammable, reactive and toxic materials.
3. A storage process that is exclusively alphabetical is prohibited.
4. Chemicals shall not be stored:
 - a. On the floor or above eye level. Large containers shall be stored on the lower shelves.
 - b. Only chemicals necessary for no more than one week of experiments, shall be housed in the teaching laboratory in the hoods.
 - c. Chemicals shall not be left uncapped in the hoods and storage in hoods shall be minimal.

5. If metal shelving assemblies are used they should be of heavy gauge construction with a chemically resistant finish.
6. Wood shelves shall have chemically resistant coverings. Wood shelves shall not be used with nitric acid or any acid that reacts vigorously with organic materials.
7. Storage trays or secondary containers lined with spill absorbent pads shall be used to minimize the spread of a spill.
8. Laboratory refrigerators and freezers shall be marked "No Food Storage".
9. Acids (Inorganic and some organic acids) shall be stored in a dedicated acid cabinet.
10. Oxidizing acids shall be isolated, such as in its own separate secondary container.
11. Flammables shall be stored in a non-vented flammable cabinet. Acetic acid and acetic anhydride shall be stored in a flammable cabinet.
12. Highly toxic chemicals shall be stored in a dedicated cabinet.

Service Animals

Any Faculty, Staff, Dean, Department Chair or Director who is approached with a request to provide reasonable accommodation to persons with disabilities for their working service animal to enter any laboratory where chemicals are used or stored shall not approve the entry of the animal until the request has been reviewed by the Office of Educational Counseling and Disabilities Services, and Academic Affairs Director of Laboratory Safety has been contacted.

Spills/Release

1. Ferris State University employees are ***not authorized to respond to any emergency spills/releases*** and must rely on an approved external Emergency Response Team.
 - a. Evacuate from the immediate area of the spill/release
 - b. Identify the spilled/released substance
 - c. Call 911
2. In the event of an incidental spill/release, Faculty or Staff who are responsible for oversight of the laboratory, area supporting the laboratory or laboratory processes shall institute all actions necessary to remedy the effects of the unauthorized release. These actions include:
 - a. Cleaning up the spill if they have the knowledge and skills.
 - b. If the Faculty or Staff is unable to perform the tasks associated with the unauthorized release clean-up, contact the Chair or Director and advise them of the incident.
 - c. Remove all individuals in the laboratory and prevent re-entry until a clean-up process has been identified.
 - d. The Chair or Director will advise the Academic Affairs Office at (231)591-2154 that assistance is needed with spill mediation.

- e. The Academic Affairs Director of Laboratory Safety will contact outside vendors responsible for the clean-up.
3. In the event the incidental Spill/Release occurs after normal business hours (after 8am-5pm):
 - a. If the Faculty or Staff is unable to perform the tasks associated with the unauthorized release clean-up, contact Public Safety, Chair or Director and advise them of the incident.
 - b. Remove all individuals in the laboratory and prevent re-entry until a clean-up process has been identified.
 - c. The Faculty or Staff will contact the Dean, Chair or Director and advise them of the incident.

Theft, Unauthorized Usage or Sabotage

Report any theft or diversion of chemicals, equipment or instruments to:

1. The Department Chair/Director or Dean immediately after the loss has been discovered;
 - a. Any sabotage or vandalism of chemicals is suspected.
 - b. Any unauthorized (not Faculty or Laboratory Supervisor approved) laboratory experimentation.
2. The Faculty or Staff who have oversight of:
 - a. Chemicals that have been sabotaged or vandalized.
 - b. Any unauthorized (not Faculty or Laboratory Supervisor approved) laboratory experimentation.
3. If the theft observed is in progress do not attempt to stop it;
 - a. Call 911 and report immediately.
 - b. Do not disturb the area of the theft until Public Safety and other authorities are finished with their investigation.

Transportation of Chemicals within Ferris State University, Buildings and Campus

Anyone involved with transporting chemicals, samples, or other materials between adjacent or neighboring buildings on the campus shall walk.

1. Wear appropriate personal protective equipment (PPE) when transporting chemicals. At minimum PPE shall include safety glasses, laboratory entrance attire and closed toe/heel shoes. Laboratory coats shall only be worn outside of the laboratory when transporting chemicals, cylinders, experimental material or laboratory equipment/instrumentation.
2. Never open any door with gloved hands or take a drink from the water fountain.
3. The chemicals, samples, or other research materials being transported shall be secondarily contained such as with the use of a rubber bucket or plastic pail large enough to hold the contents of the chemical container in the event breakage occurs.

4. Use sturdy carts with secondary containment.
5. For transporting of compressed gas cylinders, refer to the compressed gas cylinder section in this document.
6. When transporting compressed gas cylinders, chemicals, samples or other materials through public hall ways the materials shall be attended at all times while under transport.
7. When transporting large Dewars of cryogenic liquids in elevators no individual shall ride the elevator with the Dewar;
 - a. Place a clearly visible sign to warn Faculty, staff and students not to enter the elevator while the Dewar is in transport.
 - b. After the Dewar reaches its destination, the elevator shall be returned to normal operation.
8. When transporting chemicals between floors, use unoccupied passenger elevators. Stairs shall only be used if the elevator is out of service and only for small containers that can be easily carried by hand.
9. Chemicals shall never be routed through office spaces as the transportation pathway.
10. Chemicals shall never be routed through carpeted areas as the transportation pathway.
11. Incompatible chemicals shall not be transported together. Consult the chemical's SDS sheet for compatibility information.

Transportation of Chemical or Shipment off Campus

The movement of chemicals, samples, and materials on public roads, by US Postal services or other commercial carries, or by airplane are controlled by the Department of Transportation (DOT) and international regulations. Contact the Academic Affairs Director of Laboratory Safety in the initial transportation planning stages of any item that requires transportation or shipment off campus;

1. Do not prepare any package for shipment until the Academic Affairs Director of Laboratory Safety has addressed the DOT and International Air Transport Association (IATA) regulations.
2. Personal vehicles or those owned by Ferris State University shall not be used to transport any experimental materials, or chemicals.

Unattended Experiments

Unattended experiments shall be avoided. Contact the Academic Affairs Director of Laboratory Safety if an unattended experiment is being considered.

Vacuum and Pressure Operations with Glassware

Prior to the use of any glassware with a vacuum or pressure, the Faculty or Staff overseeing the operations shall confirm the glassware is designed and rated for vacuum and pressure operations;

1. No glassware with any signs of damage or repair shall be used for vacuum or pressure operations.
2. Place all vacuum apparatus behind a blast shield or inside a chemical hood. When using the chemical hood the sash shall be lowered to approximately 3 inches from complete closure.

3. All glass containers used in vacuum work or are under pressure shall be securely and adequately taped or shielded to restrain flying glass in the event of an implosion or other incident.

V. DEFINITIONS

The following is a list of common terms and their definitions as they are used in the Academic Affairs Laboratory Safety Chemical Safety Standards/Guidelines written program.

Chemical Storage

Any area in the Academic Affairs Division including laboratory settings, departmental stockrooms, storerooms, laboratory work areas, specific storage cabinets (flammable, acid, base or compressed gas), refrigerators and freezers designated to contain chemicals.

Employee

A person (Faculty, Staff or Student Employee) who is assigned to work in a laboratory workplace and who may be exposed to hazardous chemicals in the course of his or her assignments.

Faculty

The term is most commonly used in this context in the United States; includes professors of various rank: assistant professors, associate professors, and (full) professors, usually tenured (or tenure-track) in terms of their contract of employment, as well as adjunct. Department chairs, deans, vice presidents, presidents and librarians for this document will be considered faculty members.

Laboratory-Type Hood

A work chamber which is used in a laboratory, which is enclosed on 5 sides and has a moveable sash or fixed partial closure on the remaining side, which is constructed and maintained to draw air from the laboratory and prevent or minimize the escape of air contaminants into the laboratory, and which allows chemical manipulations to be conducted in the enclosure without inserting any portion of the employee's body other than hands and arms. The term includes walk-in hoods with adjustable sashes if the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised, and so that employees do not work inside the enclosure during the release of airborne hazardous chemicals.

Laboratory Support Area

A location that is designated and constructed to applicable fire codes and standards such as a chemical store room or stock room. The intent of this area is to store chemicals and laboratory supplies such as glassware and equipment/instrumentation (if the location will not cause harm to the equipment/instrument).

Minor

Any individual under the age of 18 years, is considered to be a Non-FSU individual. Minors who are enrolled in a Ferris State University laboratory course for credit shall not be considered a minor for the Chemical Standards/Guidelines.

Non-FSU Individual

Any individual who has no direct association with the University. These individuals are not employed by the University in any manner, or attend any courses offered by the University for college credit or non-credit. Any individual who is attending or involved with summer internships, summer camps or volunteering with laboratory projects (not currently enrolled at the University) are considered Non-FSU individuals. Minors are considered Non-FSU Individuals.

Protective Laboratory Practices and Equipment

Those laboratory procedures, practices, and equipment that are accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Staff

Any Academic Affairs Division employee who has responsibilities for a laboratory or providing support to a laboratory who is not Faculty or a Department Chair/Director or Dean.

Secured Document

Any written document developed and maintained by the Academic Affairs Director of Laboratory Safety as a secured document for the Academic Affairs Division. Secured documents shall be denoted with AALSSD and includes the Academic Affairs Laboratory Safety Management system and all forms of written or graphic representation, including forms, graphs, charts, and posters. Only the Academic Affairs Director of Laboratory Safety is authorized to initiate, oversee review, amend and release approved secured documents.

Service Animal

Any dog that is individually trained to do work or perform tasks for the benefit of an individual with a disability, including a physical, sensory, psychiatric, intellectual, or other mental disability. The work or tasks performed by a service animal must be directly related to the handler's disability. Examples of work or tasks include but are not limited to, assisting individuals who are blind or have low vision with navigation and other tasks, alerting individuals who are deaf or hard of hearing to the presence of people or sounds, pulling a wheelchair, retrieving items, etc.

Visiting Faculty

A professor, instructor, or post-doctoral from another institution invited to teach or use Ferris State University facilities for a limited period, usually for a semester or one academic year.

VI. RELATED OR REFERRED TO DOCUMENTS**Academic Affairs Documents**

- Academic Affairs Laboratory Safety Hazard Communication Program - AALSSD 2-50-1000
- Academic Affairs Laboratory Safety Eyewash and Emergency Shower Equipment (Plumbed) - AALSSD 2-50-1001
- Academic Affairs Laboratory Safety Access to Laboratories by Non-FSU Individuals Program - AALSSD 2-70-2003