

Definition of Terms Found on the Laboratory Compliance Audit Check Sheets

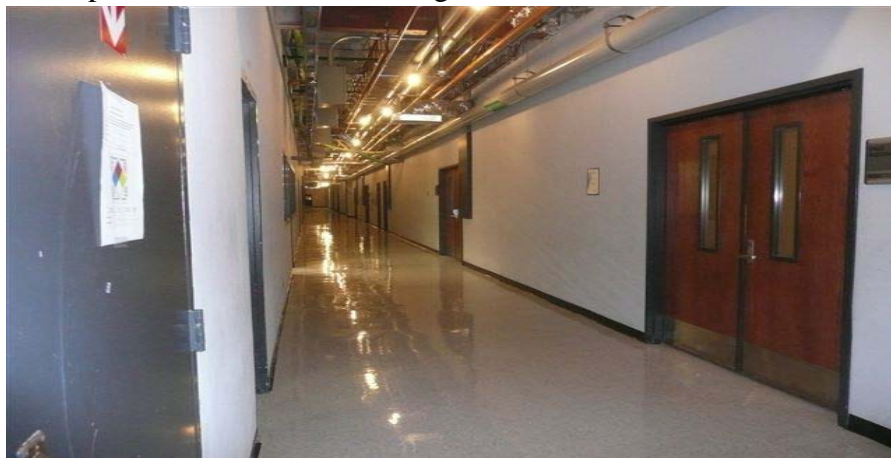
Approved by
Toxic Substances Committee
2011

Laboratory audit items are shown below in the numeric sequence on the audit form used by University Office of Environmental Health & Safety (EHS) safety specialist. Each item below includes the EHS definition of the item, approved by the Toxic Substances Committee, as well as the applicable governmental regulation (Appendix IV). The laboratory audits target compliance with all regulatory agencies not just the issues raised by ADEQ. The Arkansas Department of Labor (DOL) also visits the campus on a regular basis and their focus is “Right to Know” related problems and other problems usually attributed to Occupational Safety and Health Administration (OSHA) compliance. Failure to meet these audit requirements may result in initial and daily monetary fines for the University.

1. Laboratory Access Control Appropriate

Access to laboratories or storage areas that contain hazardous material should be restricted to personnel with hazardous material training. Generally, this means that such spaces should have a locking door that is locked when no one is present. In addition, hazardous material should not be stored in hallways or other areas that are accessible to the general population. Tutoring or holding office hours in a laboratory is also inappropriate. All laboratory doors are required to be in closed position.

In certain areas, such as laboratories with X-ray equipment and laboratories in which controlled substances, select agents, or radioactive materials are used additional restrictions may be placed on access. It may be desirable to fix the door locks such that the doors cannot be left unlocked and a key is required for entry. This approach has proven effective in reducing theft of balances.



2. Arkansas Department of Labor Poster Displayed in Prominent Location

OSHA posters must be displayed in the laboratory in a prominent or conspicuous place. A prominent location is one that is visible and easily accessible by all persons using and visiting the lab. The poster required is titled “Arkansas Department of Labor Notice to Employer and Employee, Act 556 of 1991, Public Employees’ Chemical Right To Know Act.” It is available from either the lab’s DOL (<http://www.arkansas.gov/labor/pdf/poster2.pdf>) or from EHS.

3. Emergency Phone Numbers Posted

A list of important phones numbers should be provided near the phones in the laboratory and immediately outside of the laboratory. An example of an appropriate list of phone numbers is shown in Appendix I.

4. Specific Hazard Warnings Posted

Areas with specific hazards may require signs indicating the specific hazard. Radioactive materials, X-ray equipment, lasers, and high magnetic fields are examples. Be sure that the yellow caution signs provided by the EHS Department are completed accurately. Check the accuracy of the National Fire Protection Association (NFPA) diamond and contact list every semester. If stickers on the yellow caution sign need to be changed or you need new stickers, please contact EHS.



The following caution stickers are available through EHS:



5. Fire Extinguishers Inspected, Charged, Mounted and Appropriately Labeled

Laboratories using hazardous materials must have good serviceable fire extinguishers within maximum travel distance of 75 feet. Fire extinguishers out side the lab are acceptable if the travel distance is less than 75 feet. Inspection tags must be attached and show an inspection within the last 12 months. The extinguisher should bear a tag showing it has been inspected at approximately 30 days intervals and also have a pressure gage indicator within the operable range.

For fire extinguisher service, refilling after use or missed inspections call the help desk at Facilities Management at 575-5050.

6. First-Aid Kit Available and Adequately Stocked

No specific first-aid kits are described in the regulatory literature. Kits that conform to ANSI-Z308.1-1998 and contain the following items are the required minimum.

- (1) 1"x3" Adhesive plastic bandages, 16/bx
- (1) 32 sq. in. Absorbent gauze compress, 1/bx
- (1) Triangular sling/bandage, 1/bx
- (1) 3"x3" Gauze dressing pads, 4/bx
- (1) Antiseptic cleansing wipes (sting free), 10/bx
- (1) 1/2"x2.5 yd. Adhesive tape, 2/bx
- (1) Exam quality gloves, 2pr/bx
- (1) Burn relief packs, 6/bx
- (1) 4"x5" Instant cold compress, 1/bx
- (1) AMA First Aid Guide booklet

Such kits are available from WalMart and other retailers and need not be purchased from a laboratory supplier. All first-aid kits must be placed in a readily accessible location or the location clearly indicated with signs. Each laboratory must contain at least the above minimum first-aid kit. First aid kits may be shared between adjacent laboratories if there are no lockable doors between the laboratories. First-aid kits need not be placed in auxiliary rooms such as instrument rooms, cold rooms and warm rooms but signs giving directions to the nearest available first-aid kit must be present.

7. Safety Shower Accessible, Operational and Tested Monthly

All laboratories or storage areas in which hazardous materials are kept are required to have a safety shower in good working order with easy access. Ideally each laboratory should have a dedicated safety shower. In some cases the shower may be shared by several adjacent laboratories if access to the shower does not involve a lockable door, i.e., the safety shower is located in a hallway to which the laboratories share access. The showers must be accessible within 10 seconds, without assistance by laboratory occupants. Testing of the safety shower is the responsibility of Facilities Management personnel and shall be done once per month. Testing of the showers will be indicated on waterproof tags prominently attached to the showers.

8. Eye-Wash Station Accessible, Operational and Flushed Weekly

All laboratories or storage areas in which hazardous materials are kept are required to have an eye-wash station in good working order with easy access. The eyewash station must be plumbed. Ideally each laboratory should have a dedicated eye-wash station. In some cases the eye-wash station may be shared by several adjacent laboratories if access to the eye-wash station does not involve a lockable door, i.e., the eye-wash station is located in a hallway to which the laboratories share access. The eye-wash station must be accessible within 10 seconds, without assistance by laboratory occupants. Testing of the eye-wash station is the responsibility of Facilities Management personnel and shall be done once per month. The requirement for weekly flushing of the eyewash is the responsibility of the laboratory. For sanitation reasons, the eyewash should be flushed for at least five minutes once a week. This helps minimize bacterial contamination and the potential for infections in already injured eye tissues. Testing and weekly flushing of the eye-wash station must be indicated on a waterproof tag prominently attached to or near the eye-wash.

9. Personal Protective Equipment Available and in Good Working Condition

Appropriate personal protective equipment (PPE) for eyes, face, head, and extremities shall be available in laboratories using hazardous materials. The PPE shall be used and maintained in a sanitary and reliable condition. PPE includes such items as safety glasses, goggles, gloves, respirators, and protective clothing. If special protective equipment such as a respirator is used routinely in a laboratory, instructions and precautions associated with the use, should be described in the laboratory "Chemical Hygiene Manual". Persons required to wear a respirator must be fit tested (EHS provides this service) and must have medical clearance. Specific questions regarding the requirement for or suitability of PPE should be addressed to EHS.

10. Work Area Clean, Orderly, and Properly Illuminated

Obviously, this is a very subjective topic. However, some guidelines are obvious. The doorways and walkways between benches in the laboratory or storage space should be clear from obstacles. Large piles of paper, journals or cardboard boxes are inappropriate. Proper sanitation should be maintained. Sinks full of glassware for extended periods and excessive reagent containers on the benches are inappropriate. Laboratory benches should not be littered with spilled reagents or samples. Electrical cords should be properly routed so as not to be trip hazards. A minimum of 36 inches is required for aisles.

Laboratories using hazardous materials must have lighting that is adequate for the nature of the work. The working place, floors, and passageways must be clearly visible to the extent that hazards can be identified and avoided during routine work. This is normally a product of the proper design of the laboratory or storage space. However, in cases where working under subdued lighting is required as a routine, extra precautions must be taken to guard against trip hazards and access to the light switches should be clear.

11. Refrigerator Properly Labeled (e.g. No Food Storage, No Flammable Storage) and Spark-Proof Where Appropriate.

Label refrigerators used for chemical storage with a "No Food Storage" sticker. Label refrigerators that are not approved flammable storage units with a "No Flammable Storage" sticker.

Flammable materials must never be stored in an unmodified domestic-type refrigerators. Requirements for explosion proof, "laboratory-safe" or a modified domestic refrigerator are explained within NFPA 45.

All containers stored within the refrigerator should be tightly capped to keep vapors from interacting with each other. All containers stored in the refrigerator must be properly labeled. Do not abbreviate or use structures to describe the chemical name.

Inventory the materials in your refrigerator frequently to avoid overcrowding with materials that have long since been forgotten. Also make it a point to defrost your refrigerator occasionally so that chemicals do not become trapped in unique ice formations.

Before flammable materials are stored in a refrigerator, it should be determined if keeping the material chilled will serve any purpose. No benefit is derived from refrigerating a chemical that has a flash point below the temperature of the refrigerator. Never store peroxide formers (i.e., ether) in a refrigerator.

12. Electrical Panels and Switch Covers in Place and Breakers Labeled. No Frayed/Cracked Electrical Cords.

State buildings codes and DOL require that covers on switches, receptacles and electrical panels be in place and that all breakers are labeled. If such deficiencies are noted, they should be reported promptly to Facilities Management. Sinks are common in most laboratories and hard wired GFI receptacles are required for all outlets with 6 ft of a sink.

Cords and cables: Working spaces, walkways, and similar locations shall be kept clear of cords to eliminate hazards to occupants. Extension cords shall not be fastened with staples, hung from nails, or suspended by wire. Extension cords are for temporary use only. Worn or frayed electric cords or cables shall not be used.

13. MSDS Readily Available (electronic forms are permissible)

Laboratories using hazardous materials must have a material safety data sheets for hazardous chemicals and ensure they are readily accessible to laboratory employees/students in their work areas. Electronic forms and accessible websites are permissible, as long as they are kept current and are readily available to all personnel. If a website is used the address shall be prominently displayed in the laboratory. A particularly good web site is Hazard.com. The site contains MSDS's from many of the manufacturers and is readily searchable with multiple entries for the more common chemicals.

14. Hazardous Material Spill Kit Available

Each laboratory must have access to a spill kit containing, at a minimum, absorbents, personal protective equipment, and clean up materials. These kits can be purchased from VWR, Fisher, and other chemical and laboratory suppliers, or can be assembled from available materials. The kits must be strategically placed so that they are readily accessible to all personnel working in the laboratory and all personnel must be advised of their location and trained in their use.

15. Working Reagents Properly Labeled. Peroxides Display Received and Open Date.

All reagents in the laboratory or storage area must be clearly labeled with the contents and some indication of the hazard (toxic, corrosive, flammable, etc). Chemical names or standard abbreviations are required. Formulas or in-house abbreviations or acronyms are not acceptable. Labels must be applied to all temporary containers if the laboratory personnel are not in immediate control of the container. Transferring contents into a beaker for easy pouring does not require a label on the beaker. However, if the contents are transferred to a flask (with a lid) and left unattended overnight, then a label is required.

Hydrogen peroxide is a stable chemical if stored properly. All containers must be properly vented, and stored away from sources of direct heat and combustible materials. Do not store hydrogen peroxide past the expiration date. Solutions containing more than 8% hydrogen peroxide are classified by the U.S. Department of Transportation (DOT) as an oxidizer. Decomposition of hydrogen peroxide liberates oxygen and heat. In dilute solutions the heat evolved is readily absorbed by the water present. In more concentrated solutions, the heat raises the temperature of the solution and accelerates the decomposition rate.

Each container of peroxide chemical shall be labeled with the date received by the user and the date opened. For organic peroxides requiring temperature control, it is recommended that the storage temperature range be marked on the container. The end user is responsible for labeling the containers. Store organic peroxides in areas which are:

- Well ventilated.
- Out of direct sunlight and away from steam pipes, boilers or other heat sources.
- At temperature as recommended by manufacturer/supplier. Always keep the storage area within the recommended temperature range.
- Supplied with suitable spill clean-up equipment and materials.
- Free of ignition sources such as open flames, hot surfaces, and spark-producing tools and devices.
- Accessible at all times.
- Labeled with suitable warning signs.
- Used peroxide should be disposed of promptly.

Allow only trained, authorized people into storage areas. To limit exposure, keep the amount of organic peroxides in storage as small as possible. Inspect storage areas regularly for any deficiencies including damaged or leaking containers and poor housekeeping. Correct all deficiencies as soon as possible.

16. Hazardous Waste Properly Labeled

All hazardous waste in the laboratory or storage area must be clearly labeled with the contents, the date the contents were placed in the container, the date the container was filled and closed, some indication of the hazard (toxic, corrosive, flammable, stench) and a generator's name, phone number, dept, building and room number. The container must also be labeled with the words "**Hazardous Waste**". Chemical names are required. Formulas or in-house abbreviations or acronyms are not acceptable. Use only the labels provided by EHS. Substitute labels may not be used unless approved by EHS. If the contents are a mixture then reasonable estimates of the percentages of each component must be included. The material should be disposed within three days of the end fill date. To dispose, FAX EHS appropriate form as described on EHS web site <http://ehs.uark.edu/>.

17. Hazardous Material Containers Closed and in Good Condition

Laboratories using hazardous materials must keep containers closed during storage. A container holding hazardous material shall be open only when it is necessary to add or remove waste. This is a commonly cited violation and one that is difficult to remember during everyday operations in the laboratory. **Do not leave a hazardous waste container with a funnel in it.** Funnels with lids are available (VWR, Fisher, etc.) for four liter containers that are designed specifically for holding discarded reagents as well as HPLC effluents. These are highly recommended for high usage laboratories.

Containers must be free from leaks. Combining aqueous solutions with organic solvents often generate conditions which lead to corrosion of metal containers, i.e., Five gallon drums. These containers should be inspected frequently and not used repeatedly to store hazardous waste. Head space is required for every container. Approximately 20% of the container should be empty. Over filled containers will not be picked up. The container should not react with the waste being stored (e.g. no hydrofluoric acid in glass). Similar wastes may be mixed if they are compatible (e.g. flammable liquids). **Wastes from incompatible hazard classes shall not be mixed** (e.g., flammables with oxidizers). Certain metals also cause disposal problems when mixed with flammable liquids or other organic liquids.

Hazardous waste containers must also be placed in secondary containment containers, such as plastic tubs or equivalent. In the event of a broken container, the tubs will prevent the contents from dispersing or going down a drain. **Important Note:** Hazardous waste must be stored in the room in which it is generated. Hazardous waste cannot be moved to another room for storage unless the room and procedures meet the requirements for 90 day storage.

18. Online Chemical Inventory Available and Up to Date

Laboratories using hazardous chemicals must maintain a current and accurate inventory. The inventory shall list the name and the approximate amount on hand. The inventory shall be treated as a living document and updated as frequently as needed. Electronic inventories are adequate. Note: The University has acquired a university-wide inventory system, and all laboratories are required to maintain their inventory on the online system. Contact the EHS office (575-5448) to receive more information.

19. Hazardous Chemical List Posted

A list of materials contained in the laboratory that are particularly hazardous must also be provided outside the door to each laboratory. This list should be written to aid fire department personnel. This list should not contain an exhaustive inventory. It should contain all hazardous chemicals in the room in quantities totaling 1 liter or 1 kg or greater and any quantity of explosives, highly reactive or highly toxic substances and all other extremely hazardous materials. For example a 5 lb bottle of sodium chloride is not of interest to the fire department personnel but a 1 lb container of sodium metal is of very significant interest. Gas cylinders in general should be listed. Approved forms may be requested through EHS office or found on EHS website.

20. Laboratory Reagents Properly Stored, Chemical Storage Cabinets Labeled Properly.

Laboratories using hazardous materials must keep incompatible materials from being placed in the same container or any unwashed container having residue from another incompatible chemical. Storage containers with incompatible materials shall also be separated in case leakage or breakage would result in mixing.

As a minimum, acids, bases and organic solvents should be stored separately. Each cabinet should be labeled with the corresponding chemical stored. For example if the storage cabinet stores peroxides, a label on the outside of the cabinet should state "Peroxides."

Before storing, inspect all incoming containers to ensure that they are undamaged and properly labeled. Do not accept delivery of defective containers. Store all chemicals according to the recommendation of supplier. Hydrogen peroxide is generally sold in plastic vented containers and stored in a refrigerator. It should never be stored in sealed glass bottles as these will ultimately explode due to the internal pressure produced by the decomposition.

While it is desirable to store solid oxidizers in separate areas this is not always convenient. Storage on shelves with other dry reagents is acceptable if care is taken to assure that the neighboring reagents are not incompatible. For example, potassium permanganate is often stored with other solid potassium salts such as potassium carbonate, potassium sulfate and potassium hydroxide. The important consideration is compatibility.

Other procedures for general storage to be aware of include:

- Containers on shelves should not extend over the edge of the shelf.
- Large bottles and bottles containing toxic, flammable, or corrosive liquids should be stored on shelves below eye level (approximately 5 feet).
- Use a tray or basin under concentrated acids and bases or chemicals of different hazard classes.
- Vented cabinet or a vented area under a hood is a good place to store volatile chemicals.
- Be careful with older bottles of materials that may form peroxides (diethyl ether, tetrahydrofuran, dioxane). Opened containers of these materials should not be stored more than one year past open date. All peroxide forming compounds shall be dated upon receiving and upon opening.

21. Flammable Chemicals Stored in Flammable Liquids Cabinet. Total Solvents Outside < 10 Gallons.

Flammable liquids must be stored in appropriately designed flammable liquid cabinets (see Appendix II for details). Reagent bottles should be returned to the cabinets in a timely manner and should not accumulate on the bench top. Cabinet doors shall be kept in the closed position. Bulk storage of solvents should be done in areas specifically designed for this function. EHS personnel should be consulted if large quantities of flammable liquids are to be stored. Note that gravity flow shall not be used to transfer flammable liquids.

A maximum of 180 gallons of flammable and combustible liquids with a flash point of < 140 °F can be stored in a fire area (room with one-hour fire rated walls and self closing 20-minute fire rated door). This amount must be stored in the following manner:

- Not more than 10 gallons in containers or 25 gallons in safety cans shall be located outside a flammable storage cabinet.
- Not more than 60 gallons in a flammable storage cabinet.
- Not more than 3 flammable storage cabinets per laboratory.

In addition to the 180 gallons as stated above, a maximum of 60 gallons of combustible liquids with a flash point 140 °F and < 200 °F can be stored outside of a flammable liquids cabinet.

There is no gallon limit to combustible liquids with a flash point of 200 °F in a fire area.

Classes IA-II are characterized as flammable; Class III as combustible.

Class	Flashpoints	Boiling Point	Examples
IA	below 73°F (23°C)	below 100°F (38°C)	ether, petroleum ether, pentane
IB	below 73°F (23°C)	100°F (38°C) or above	acetone, acetonitrile, methanol, propanol, ethanol, benzene, carbon disulfide, cyclohexane, dioxane, ethyl acetate, heptane, hexane, pyridine, toluene
IC	73°-99°F (23°-37°C)	100°F (38°C) or above	xylene, butyl alcohol, amyl acetate
II	100°-139°F (38°-59°C)	100°F (38°C) or above	acetic acid, amyl acetate, formaldehyde, dimethylformamide
IIIA	140°-199°F (60°-93°C)	100°F (38°C) or above	aniline, benzaldehyde, bromobenzene, cyclohexanol, formic acid, nitrobenzene, octanol
IIIB	above 200°F (93°C)	100°F (38°C) or above	acetophenone, castor oil, dibutyl phthalate, ethylene glycol, glycerine, dimethyl sulfoxide

22. Hazardous Waste Stored No Longer than 3 Working Days

Hazardous waste must be disposed within 3 working days of when the container is declared full and dated as full. Containers must be free from leaks pending weather conditions.

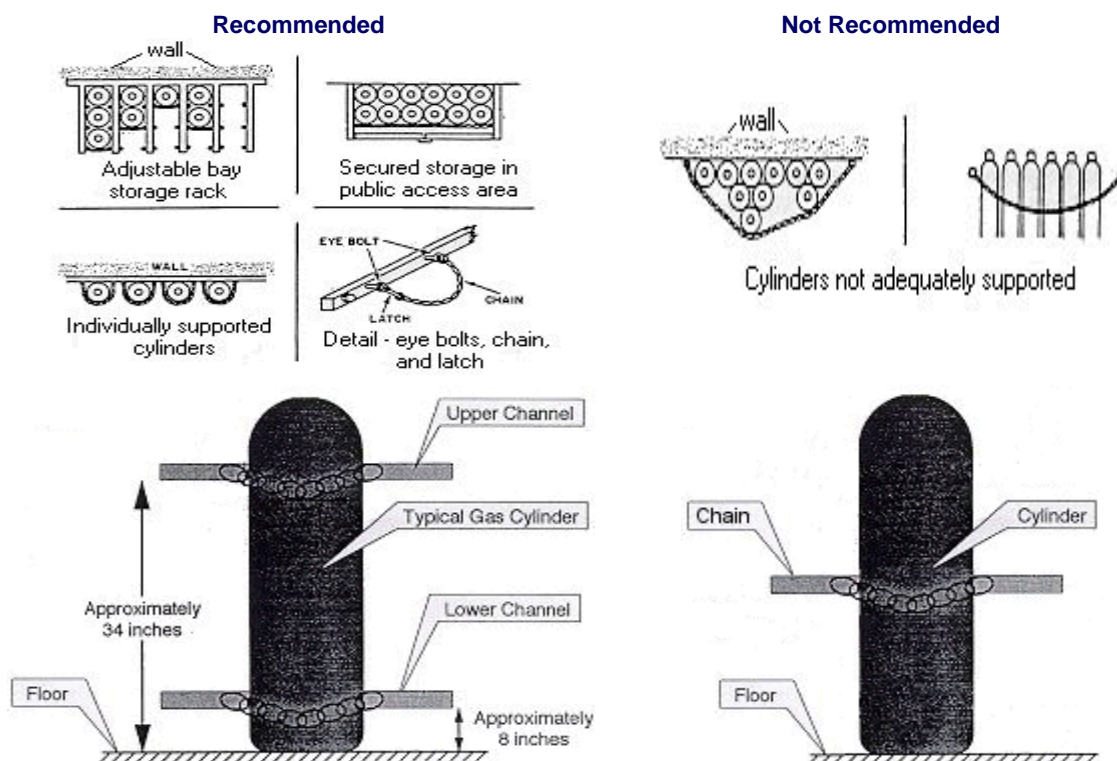
23. Reportable Quantities of Chemicals within Allowable Limits

42 CFR Part 355 Appendix A lists the chemical that are considered to be Extremely Hazardous and the amounts that a facility may possess that are required to be reported to the EPA. Large amounts of these chemicals, even if below the Reportable Quantity (RQ) must be reported to EHS, since the RQ includes the total of all such chemicals in University facilities. A rule of thumb is to notify EHS of amounts > than 10% of the RQ. Appendix III lists the common reagents with low RQ's.

24. Gas Cylinder Secured. Lecture Bottles Stored Upright and Secured.

All cylinders of compressed gas, including empties, must be secured to a lab bench, wall or other fixed structure by a strap, chain, weighted boot, or other device, to prevent falling and possible damage to the regulator valve.

METHODS OF SECURING CYLINDERS



- Diagram from <http://www.ehs.uci.edu/programs/safety/compressgasprog.html>

No cylinder should be moved until the cap is fully screwed in place. Each cylinder's safety cap should be in close proximity to the cylinder stored in the room. Keep cylinder valves closed when not in use. Fittings must be compatible and withstand cylinder pressures. Do not store cylinders in exits or egress routes. NFPA 55 compliance requires a gas cabinet for cylinders that are extremely dangerous or hazardous (Health Hazard 3 or 4 or Health Hazard 2 with no warning properties). In addition, pyrophoric gas cylinders shall be stored in internally sprinkled gas cabinets (6.16.3). Gas cylinders shall be kept away from all flammable, combustible, or incompatible substances, heat, sun, and source of moisture.

Separation Chart for Storage of Dangerous Gases

	Flammable Gas	Non-Flammable Gas	Poison Gas	Corrosive Gas	Oxidizers
Flammable Gas	P	P	X	X	X
Non-Flammable Gas	P	P	P	P	P
Poison Gas	X	P	P	A	DS
Corrosive Gas	X	P	A	DS	A
Oxidizers	X	P	A or X	A	P

P Permitted; items may be stored together
X Incompatible items; do not store together in the same fire compartment (storage facility)
A Incompatible items; separate by minimum of 1 meter distance
DS Defer to Material Safety Data Sheet

*Chart from UBC Safety Manual
http://www.chem.ubc.ca/safety/safety_manual/hazard_chem_gases.shtml

Store lecture bottles upright and secured, as shown below.



Lecture bottle-sized cylinders of the following gases located in laboratory units shall be kept in a continuously mechanically ventilated hood or other continuously mechanically ventilated enclosure.

- All gases that are extremely dangerous (Health Hazard Ratings of 3 or 4)
- All gases that are hazardous (Health Hazard Rating of 2 without physiological warning properties)
- Pyrophoric gases

There shall be no more than 25 lecture bottles stored in each laboratory.

25. Fume Hood Functional and Unobstructed and Not Used as Chemical Storage.

All fumes hoods must have some device indicating air flow. This need not be a quantitative device and can be as simple as a light piece of paper or tape attached to the sash that indicates that air is flowing into the hood. Excessive chemical containers or equipment should not be stored in the hood, particularly near the back of the hooded enclosure. These can impede the flow of air through the hood and can compromise the function of the fume hood. Below is an example of inappropriate use of fume hood.



Fume hoods are not meant to be storage devices (unless specifically designated as such). Storage of incompatible materials and/or hazardous wastes in fume hoods has caused numerous accidents, many of which have caused death or injury. Do not let organic chemicals evaporate in the hood, use a proper waste bottle. Do not leave uncapped bottles of chemicals or waste in a hood. Although individual manufacturers may vary the sash most hoods must be between 6 and 18 inches for proper operation. Fume hood sashes shall not be removed by lab operator. Fume Hoods will be tested once a year by Facilities Management and some form of tag will be provided to indicate the test date and results.

26. Equipment Guards in Place. Vacuum Ballasts/Dewar Flasks Taped or Meshed.

Facilities using power equipment must provide one or more methods to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. These may be barrier guards, electronic safety devices, two-hand tripping devices, etc. In the case of motors with pulleys, belts guards must be in place.

To reduce the risk of flying debris caused by an implosion, use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments. Glass vacuum containers, such as desiccators and flasks, should be wrapped with tape to prevent glass from flying in the event of an implosion or explosion. Use equipment only for its designed purpose.

27. Drains and Sinks Clean, Unobstructed and Appropriately Labeled (if required)

Laboratory sinks should be labeled to remind persons to refrain from disposing of chemicals down the sink. Laboratory sinks should be clean and unobstructed, including glassware. The sink below is unacceptable and will lead to accidents.



A list of chemicals that may be safely disposed in this way can be found in the Chemical Hygiene Manual on the EHS web site. Sinks used for radiological work must be labeled as such and in accordance with the requirements set forth in the University's Radiation Safety Manual.

28. Sharps and Broken Glass Containers Present

Laboratories using sharps are required to have a puncture proof container for the disposal of sharps and syringes. Such a container is required in laboratories using sharps (needles, lancets, etc.) of any kind, whether or not there is a risk of exposure to blood or body fluids. Sharps containers are available from EHS. When the container is full (with appropriate head space), contact EHS for pickup and disposal.

Broken glass should be disposed of in a heavy cardboard box designated for that purpose. A plastic liner (trash bag) should be placed in the box to prevent the box from getting wet. It is not necessary to use broken glass boxes sold by laboratory safety supply houses. When the box is full, tape it shut and place it in the trash. In most campus buildings, this job is outside of the custodial services and must be done by laboratory personnel.

29. No Food or Drink or Evidence of Food or Drink in Laboratory

Neither food nor drink may be consumed or stored (unless such items are laboratory samples) in a laboratory or storage area containing hazardous materials. No indication that food or drink was consumed in the laboratory should be evident, i.e., empty food containers on the benches or in the trash receptacles. Any

refrigerator used to store hazardous materials or samples should be clearly labeled “No Food Storage” or similarly posted.

30. Chemical Hygiene Plan Readily Available (electronic forms are permissible)

EHS provides a Chemical Hygiene Plan on the web. All laboratory personnel should be familiar with the contents of the Chemical Hygiene Plan. Supplementary information in the form of “Standard Operating Procedures” (SOP’s) should be maintained in each laboratory to cover material not addressed in the University plan. For example, SOP’s for X-ray generators, high power lasers, and the handling of select agents or controlled substances should be available in the laboratory when appropriate.

Appendix I

Emergency Phone Numbers

Medical Emergency	911 or 575-2222
Fire Emergency	911 or 575-2222
Police Emergency	911 or 575-2222
Chemical, Biological or Radiological Spill	
During Work Hours	575-5448 7:30 – 5:00
After Work Hours	575-2222
U of A Health Center	575-4451
Poison Control Center	1-800-376-4766
Rape Crisis Hotline	443-2000
Laboratory Supervisor	_____
	(Name and Phone Number)
Alternate Laboratory Supervisor	_____
	(Name and Phone Number)
Building Executive	_____
	(Name and Phone Number)

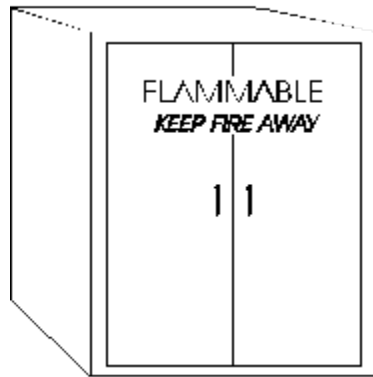
Appendix II. Design, Construction and Capacity of Storage Cabinets

Taken from <http://www.osha.gov/SLTC/smallbusiness/sec8.html>

Not more than 60 gallons of Class I and/or Class II liquids, or not more than 120 gallons of Class III liquids may be stored in an individual cabinet.

This standard permits both metal and wooden storage cabinets. Storage cabinets shall be designed and constructed to limit the internal temperature to not more than 325°F when subjected to a standardized 10-minute fire test. All joints and seams shall remain tight and the door shall remain securely closed during the fire test. Storage cabinets shall be conspicuously labeled, "Flammable - Keep Fire Away."

The bottom, top, door, and sides of metal cabinets shall be at least No. 18 gage sheet metal and double walled with 1½-inch air space. The door shall be provided with a three-point lock, and the door sill shall be raised at least 2 inches above the bottom of the cabinet.



Appendix III. List of common reagents with low Reportable Quantities (RQ's)

Material	Category	RQ in pounds (kg)
Acetone cyanohydrin	A	10 (4.54)
Acrolein	X	1 (0.454)
Acrylonitrile	B	100 (45.4)
Aldrin	X	1 (0.454)
Allyl alcohol	B	100 (45.4)
Ammonia	B	100 (45.4)
Ammonium bichromate	A	10 (4.54)
Ammonium bifluoride	B	100 (45.4)
Ammonium chromate	A	10 (4.54)
Ammonium fluoride	B	100 (45.4)
Ammonium sulfide	B	100 (45.4)
Antimony potassium tartrate	B	100 (45.4)
Arsenic disulfide	X	1 (0.454)
Arsenic pentoxide	X	1 (0.454)
Arsenic trichloride	X	1 (0.454)
Arsenic trioxide	X	1 (0.454)
Arsenic trisulfide	X	1 (0.454)
Barium cyanide	A	10 (4.54)
Benzene	A	10 (4.54)
Benzyl chloride	B	100 (45.4)
Beryllium chloride	X	1 (0.454)
Beryllium fluoride	X	1 (0.454)
Beryllium nitrate	X	1 (0.454)
n-Butyl phthalate	A	10 (4.54)
Cadmium acetate	A	10 (4.54)
Cadmium bromide	A	10 (4.54)
Cadmium chloride	A	10 (4.54)
Calcium arsenate	X	1 (0.454)
Calcium arsenite	X	1 (0.454)
Calcium carbide	A	10 (4.54)
Calcium chromate	A	10 (4.54)
Calcium cyanide	A	10 (4.54)
Calcium hypochlorite	A	10 (4.54)
Captan	A	10 (4.54)
Carbaryl	B	100 (45.4)
Carbofuran	A	10 (4.54)
Carbon disulfide	B	100 (45.4)
Carbon tetrachloride	A	10 (4.54)
Chlordane	X	1 (0.454)
Chlorine	A	10 (4.54)
Chlorobenzene	B	100 (45.4)
Chloroform	A	10 (4.54)
Chlorpyrifos	X	1 (0.454)
Chromic acid	A	10 (4.54)
Coumaphos	A	10 (4.54)
Cresol	B	100 (45.4)
Crotonaldehyde	B	100 (45.4)

Cupric acetate	B	100 (45.4)
Cupric acetoarsenite	X	1 (0.454)
Cupric chloride	A	10 (4.54)
Cupric nitrate	B	100 (45.4)
Cupric oxalate	B	100 (45.4)
Cupric sulfate	A	10 (4.54)
Cupric sulfate, ammoniated	B	100 (45.4)
Cupric tartrate	B	100 (45.4)
Cyanogen chloride	A	10 (4.54)
2,4-D Acid	B	100 (45.4)
2,4-D Esters	B	100 (45.4)
DDT	X	1 (0.454)
Diazinon	X	1 (0.454)
Dichlobenil	B	100 (45.4)
Dichlone	X	1 (0.454)
Dichlorobenzene	B	100 (45.4)
Dichloropropene	B	100 (45.4)
Dichloropropene-Dichloropropane (mixture)	B	100 (45.4)
Dichlorvos	A	10 (4.54)
Dicofol	A	10 (4.54)
Dieldrin	X	1 (0.454)
Diethylamine	B	100 (45.4)
Dinitrobenzene (mixed)	B	100 (45.4)
Dinitrophenol	A	10 (4.54)
Dinitrotoluene	A	10 (4.54)
Disulfoton	X	1 (0.454)
Diuron	B	100 (45.4)
Endosulfan	X	1 (0.454)
Endrin	X	1 (0.454)
Epichlorohydrin	B	100 (45.4)
Ethion	A	10 (4.54)
Ethylene dibromide	X	1 (0.454)
Ethylene dichloride	B	100 (45.4)
Ferric fluoride	B	100 (45.4)
Ferrous chloride	B	100 (45.4)
Formaldehyde	B	100 (45.4)
Guthion	X	1 (0.454)
Heptachlor	X	1 (0.454)
Hexachlorocyclopentadiene	A	10 (4.54)
Hydrofluoric acid	B	100 (45.4)
Hydrogen cyanide	A	10 (4.54)
Hydrogen sulfide	B	100 (45.4)
Isoprene	B	100 (45.4)
Kepone	X	1 (0.454)
Lead acetate	A	10 (4.54)
Lead arsenate	X	1 (0.454)
Lead chloride	A	10 (4.54)
Lead fluoborate	A	10 (4.54)
Lead fluoride	A	10 (4.54)
Lead iodide	A	10 (4.54)
Lead nitrite	A	10 (4.54)
Lead stearate	A	10 (4.54)

Lead sulfate	A	10 (4.54)
Lead sulfide	A	10 (4.54)
Lead thiocyanate	A	10 (4.54)
Lindane	X	1 (0.454)
Lithium chromate	A	10 (4.54)
Malathion	B	100 (45.4)
Mercaptodimethur	A	10 (4.54)
Mercuric cyanide	X	1 (0.454)
Mercuric nitrate	A	10 (4.54)
Mercuric sulfate	A	10 (4.54)
Mercuric thiocyanate	A	10 (4.54)
Mercurous nitrate	A	10 (4.54)
Methoxychlor	X	1 (0.454)
Methyl mercaptan	B	100 (45.4)
Methyl parathion	B	100 (45.4)
Mevinphos	A	10 (4.54)
Monoethylamine	B	100 (45.4)
Monomethylamine	B	100 (45.4)
Naled	A	10 (4.54)
Naphthalene	B	100 (45.4)
Naphthenic acid	B	100 (45.4)
Nickel ammonium sulfate	B	100 (45.4)
Nickel chloride	B	100 (45.4)
Nickel hydroxide	A	10 (4.54)
Nickel nitrate	B	100 (45.4)
Nickel sulfate	B	100 (45.4)
Nitrogen dioxide	A	10 (4.54)
Nitrophenol (mixed)	B	100 (45.4)
Parathion	A	10 (4.54)
Pentachlorophenol	A	10 (4.54)
Phosgene	A	10 (4.54)
Phosphorus	X	1 (0.454)
Phosphorus pentasulfide	B	100 (45.4)
Polychlorinated biphenyls	X	1 (0.454)
Potassium arsenate	X	1 (0.454)
Potassium arsenite	X	1 (0.454)
Potassium bichromate	A	10 (4.54)
Potassium chromate	A	10 (4.54)
Potassium cyanide	A	10 (4.54)
Potassium permanganate	B	100 (45.4)
Propargite	A	10 (4.54)
Propylene oxide	B	100 (45.4)
Pyrethrins	X	1 (0.454)
Selenium oxide	A	10 (4.54)
Silver nitrate	X	1 (0.454)
Sodium	A	10 (4.54)
Sodium arsenate	X	1 (0.454)
Sodium arsenite	X	1 (0.454)
Sodium bichromate	A	10 (4.54)
Sodium bifluoride	B	100 (45.4)
Sodium chromate	A	10 (4.54)
Sodium cyanide	A	10 (4.54)
Sodium hypochlorite	B	100 (45.4)

Sodium nitrite	B	100 (45.4)
Sodium selenite	B	100 (45.4)
Strontium chromate	A	10 (4.54)
Strychnine	A	10 (4.54)
TDE	X	1 (0.454)
2,4,5-TP acid	B	100 (45.4)
2,4,5-TP acid esters	B	100 (45.4)
Tetraethyl lead	A	10 (4.54)
Tetraethyl pyrophosphate	A	10 (4.54)
Thallium sulfate	B	100 (45.4)
Toxaphene	X	1 (0.454)
Trichlorfon	B	100 (45.4)
Trichloroethylene	B	100 (45.4)
Trichlorophenol	A	10 (4.54)
Trimethylamine	B	100 (45.4)
Uranyl acetate	B	100 (45.4)
Uranyl nitrate	B	100 (45.4)
Vinylidene chloride	B	100 (45.4)
Xylene (mixed)	B	100 (45.4)
Zinc cyanide	A	10 (4.54)
Zinc phosphide	B	100 (45.4)

Appendix IV Regulatory References

The following describe the regulatory literature governing each item on the laboratory audit. The numbering is the same as that used above and as that used on the laboratory audit sheets.

1. Laboratory Access Control Appropriate.

In general, this audit detail requires complying with APC&E Regulation #23, Section 265 – Interim Status Standards of Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Subsection B – General Facility Standards, 265.14 – Security, and all applicable University of Arkansas Policy and Procedures.

2. Arkansas Dept of Labor Poster Displayed in Prominent Location.

The poster required is titled “Arkansas Department of Labor Notice to Employer and Employee, Act 556 of 1991, Public Employees’ Chemical Right To Know Act.” It is available in either the lab’s Departmental Office or from the University Office of Environmental Health & Safety.

In general, this audit detail requires complying with Arkansas Act 556 of 1991 and all applicable University of Arkansas Policy and Procedures.

3. Emergency Telephone Numbers Posted.

In general, this audit detail requires complying with APC&E Regulation #23, Section 262- Standard Applicable to Generators of Hazardous Waste, Subsection C – Pre Transport Requirements, 262.30 - 262.36 and all applicable University of Arkansas Policy and Procedures.

4. Safety Hazard Warnings Posted.

In general, this audit detail requires complying with the Arkansas Fire Prevention Code as based on the International Building Code by the International Code Council, Chapter 10 – Means of Egress, part 1003.2.10 and all applicable University of Arkansas Policy and Procedures.

5. Fire Extinguishers Inspected, Charged, Mounted, and Appropriately Labeled.

In general, this audit detail requires complying with National Fire Codes as compiled by the National Fire Protection Association, NFPA 10 – Standard for Portable Fire Extinguishers, Chapters 5 and 6, and all applicable University of Arkansas Policy and Procedures.

6. First-aid Kit Available and Adequately Stocked.

OSHA Regulation Standard 1910.151.b requires "Adequate first aid supplies shall be readily available." The contents must at least be able to treat minor injuries that occur in the workplace. However, there are no specific requirements on the contents.

American National Standards Institute (ANSI) compliant first aid kit requires a minimum fill according to standard ANSI Z308.1-1998. Even though this requirement is not yet mandatory in every state, it is advisable to find a kit that already meets these standards.

This is how OSHA responded to this specific question:

Question 2: Are there any specific interpretations for the term "readily available"?

Reply: The term "readily available" is not defined in the standard. However, responding in a timely manner can mean the difference between life and death. Therefore, the person who has been trained to render first aid must be able to quickly access the first aid supplies in order to effectively provide injured or ill employees with first aid attention. The first aid supplies should be located in an easily accessible area, and the first aid provider generally should not have to travel through several doorways, hallways and/or stairways to access first aid supplies.

In general, this audit detail requires complying with standard #29 CFR (Code of Federal Regulations), Part 1910 – Occupational Safety and Health Standards, Subpart K – Medical and First Aid, standard 1910.151 – Medical Services and First Aid, Appendix A, and all applicable University of Arkansas Policy and Procedures.

7. Safety Shower Accessible, Operational and Tested Monthly.

OSHA 29 CFR 1910.151

Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate use.

ANSI Z358.1

This national consensus standard provides details on emergency eyewash and shower equipment. The basic requirement is to have emergency showers and eyewashes within 10 seconds travel distance of a hazard.

(OSHA references the ANSI standard as a guideline for interpretation of the OSHA standard)

8. Eye-Wash Station Accessible, Operational and Flushed Weekly.

OSHA 29 CFR 1910.151

Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate use.

ANSI Z358.1

This national consensus standard provides details on emergency eyewash and shower equipment. The basic requirement is to have emergency showers and eyewashes within 10 seconds travel distance of a hazard.

9. Personal Protective Equipment Available and in Good Working Condition.

In general, this audit detail requires complying with standard #29 CFR (Code of Federal Regulations), Part 1910 – Occupational Safety and Health Standards, Subpart I – Personal Protective Equipment, standard 1910.132 – General Requirements, and all applicable University of Arkansas Policy and Procedures.

10. Work Areas Clean and Orderly.

In general, this audit detail requires complying with standard #29 CFR (Code of Federal Regulations), Part 1910 – Occupational Safety and Health Standards, Subpart J – General Environmental Controls, standard 1910.141 – Sanitation, and all applicable University of Arkansas Policy and Procedures.

In general, this audit detail requires complying with APC&E Regulation #23, Hazardous Waste Management, Section 264 – Standard for owners and Operators of Hazardous Waste Treatment, Storage, Subsection C – Preparedness and Prevention, 264.35 – Required Aisle Space, and all applicable University of Arkansas Policy and Procedures

Work Areas Adequately Illuminated.

In general, this audit detail requires complying with standard #29 CFR (Code of Federal Regulations), Part 1910 – Occupational Safety and Health Standards, Subpart R – Special Industries, standard 1910.261(a)(2), and all references to American National Standard Practice for Industrial Lighting – A11.1 – 1965 (R-1970), and all applicable University of Arkansas Policy and Procedures.

11. Refrigerator properly labeled (e.g. No Food, No Solvents) and spark-proof where appropriate.

These requirements are based on the Fire Protection for Laboratories using Chemical Code, NFPA-45, the Flammable and Combustible Liquids Code, NFPA-30 and the National Electric Code, NFPA-70.

12. Electrical Panels and Switch Covers in Place and Breakers Labeled. No Frayed/ Cracked Electrical Cords.

State buildings codes and Arkansas Department of Labor require that these covers be in place and that breakers are labeled. If such deficiencies are noted, they should be promptly reported to Facilities Management.

Federal OSHA Regulation Standard 1926.416(b) and Arkansas Department of Labor state restrictions on use of electrical cords.

13. MSDS Readily Available.

In general, this audit detail requires complying with standard #29 CFR (Code of Federal Regulations), Part 1910 – Occupational Safety and Health Standards, Subpart Z – Toxic and Hazardous Substances, standard 1910.1200 – Hazard Communication, and all applicable University of Arkansas Policy and Procedures.

14. Hazardous Material Spill-kit Available.

40 CFR 260 - Hazardous Waste Management System: General

Also, OSHA Law CFR 1910.00-1910.180,
Subtitle HM-126.F.

15. Working Reagents Properly Labeled. Peroxides Display Received and Open Date.

Arkansas “Right to Know Act” In general, this audit detail requires complying with Arkansas Act 556 of 1991 and all applicable University of Arkansas Policy and Procedures

29 CFR 1910.1200

CCOHS, “OSH Answers: How Do I Work Safely with Organic Peroxides?“,
<http://www.ccohs.ca/oshanswers/prevention/orgperox.html>

16. Hazardous Waste Properly Labeled

In general, this audit detail requires complying with APC&E Regulation #23, Section 262- Standard Applicable to Generators of Hazardous Waste, Subsection C – Pre Transport Requirements, 262.30 - 262.36 and all applicable University of Arkansas Policy and Procedures.

17. Hazardous Materials Containers Closed and in Good Condition.

In general, this audit detail requires complying with APC&E Regulation #23, Section 265-Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Subsection I – Use and Management of Containers, 265.170 – 265.178 and all applicable University of Arkansas Policy and Procedures.

HW Signage – Reg 23 Section 262.34 (c) (1) (ii) states the generator (UofA) “marks his containers either with the words Hazardous Waste or other words that identify”.

Keep closed Signage – CAO LIS 05-143 – Order item #4 states “the UofA will post signs reminding workers to close container in satellite accumulation area(s)”. In response to this consent administrative order item we agreed to use the wording on the signs you see in labs: Hazardous Waste Accumulation Area, All containers must be Labeled, Dated, Closed.

18. Chemical Inventory Available and Up to Date

The OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

19. Hazardous Chemical List and Hazard Signs Appropriately Posted

NFPA 704

20. Laboratory Reagents Properly Stored, Chemical Storage Cabinets Labeled Properly.

In general, this audit detail requires complying with APC&E Regulation #23, Section 265-Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Subsection I – Use and Management of Containers, 265.170 – 265.178 including Appendix V - Examples of Incompatible Materials and all applicable University of Arkansas Policy and Procedures.

21. Flammable Chemicals Stored in Flammable Liquids Cabinet. Total Solvents Outside < 25 Gallons.

In general, this audit detail requires complying with APC&E Regulation #23, Section 262- Standard Applicable to Generators of Hazardous Waste, Subsection C – Pre Transport Requirements, 262.30 - 262.36 and all applicable University of Arkansas Policy and Procedures.

OSHA 29 CFR 1910.106

NFPA 30

Other source: <http://www.chem.yale.edu/safety/safetymanual.html>

22. Hazardous Waste Stored No Longer than 3 Working Days.

In general, this audit detail requires complying with APC&E Regulation #23, Section 262.34 Standard Applicable to Generators of Hazardous Waste

23. Reportable Quantity Chemicals Within Allowable Limits.

42 CFR Part 355 Appendix A lists the chemical that are considered to be Extremely Hazardous and the amounts that a facility may possess that are required to be reported to the EPA. Large amounts of these chemicals, even if below the Reportable Quantity (RQ) must be reported to EHS, since the RQ includes the total of all such chemicals in University facilities. A rule of thumb is to notify EHS of amounts > than 10% of the RQ.

24. Gas cylinders secured.

OSHA 29 CFR 1910.101

NFPA 30

NFPA 55

25. Fume Hood functional and unobstructed.

OSHA 1910.1450 Appendix A

National Research Council Prudent Practices in the Laboratory, Handling and Disposal of Chemicals,

NFPA (National Fire and Protection Agency)

ANSI/AIHA (American National Standards Institute / American Industrial Hygiene Association)

N.I.H. (National Institutes of Health) National Institutes of Health Fume Hood Containment Testing

NIOSH (National Institute for Occupational Safety and Health)

ACGIH (American Conference of Governmental Hygienists Industrial Ventilation A Manual of Recommended Practice

26. Equipment guards in place. Vacuum Ballasts/Dewar Flasks Taped or Meshed.

In general, this audit detail requires complying with standard #29 CFR (Code of Federal Regulations), Part 1910 – Occupational Safety and Health Standards, Subpart O – Machinery and Machine Guarding, standard 1910.212 – General requirements for all Machines, and all applicable University of Arkansas Policy and Procedures.

29 CFR 1910.1450

27. Drains and Sinks Clean, Unobstructed, and Appropriately Labeled (if required).

University of Arkansas Policy and Procedures
EPA 265.170

28. Sharps and Broken Glass Containers Present

OSHA 29 CFR 1910.1030 Bloodborne Pathogens Standard.

29. No Food or Drink or Evidence of Food or Drink in Laboratory.

In general, this audit detail requires complying with standard #29 CFR (Code of Federal Regulations), Part 1910 – Occupational Safety and Health Standards, Subpart J – General Environmental Controls, standard 1910.141 - Sanitation, and all applicable University of Arkansas Policy and Procedures.

30. Chemical Hygiene Manuals

OSHA 29 CFR 1910.1450 App A and 1910.119 Laboratory Safety Standard