Washington University
Environmental Health & Safety Laboratory Inspection Comment Sheet

Signs & Labels

Entrance to Laboratory
Entrance to laboratories must display appropriate warning signs including: “Caution: Toxic/Hazardous Chemicals are used in this workplace” and “Authorized Personnel Only”. Contact information should be posted in a conspicuous location. If the lab contains potentially infectious materials, human cell lines, or radioisotopes, contact EH&S for additional signage.

Refrigerator/Freezer/Microwave/Icemaker
If a refrigerator/freezer or microwave is for laboratory use, it must be labeled with the sticker “Warning: No Food or Drink Allowed”. If the refrigerator/freezer is not designed by the manufacturer for flammable material storage, the sticker “Not Suitable for Flammable Materials” should also be added. For those refrigerator/freezers and microwaves located in designated clean areas, a “Notice: For Food and Drink Only” or “Refrigerator for Food & Drink Only” sticker should be posted. Icemakers must have a “Not for Human Consumption” sticker.

Electrical Hazards
Electrically powered equipment found in the laboratory includes fluid and vacuum pumps, lasers, power supplies, electrophoresis and electrochemical apparatus, x-ray equipment, stirrers, hot plates, heating mantles, microwave ovens and ultrasonicators. Make sure this equipment is labeled properly (with a high voltage label), cords are not damaged, and all laboratory personnel know the location of the electrical panel to shut off power in case of emergency. If at all possible, arrange cords to avoid trip hazards. If cords cannot be arranged to avoid trip hazards, signage warning of this hazard must be posted.

Chemical Storage Areas
Chemical storage cabinets must be labeled with the chemical hazard (flammable, corrosive, oxidizer, etc.) unless cabinet doors allow the contents’ labels to be easily read. Contact your auditor to request the EH&S Chemical Storage Guidelines for detailed guidance on chemical storage.

Carcinogen Areas
Areas where carcinogens are used and stored must be labeled with a carcinogen hazard warning label or symbol.

Chemicals not in primary container
All hazardous chemicals that are removed from the original container and placed in a secondary container must be labeled with:

1. Full chemical name (Ethanol, not EtOH).
   a. In lieu of labeling each container, a one-page list of common abbreviations can be posted near phones, exits, and in the Blue Book.
   b. Do not use the words “waste” or “used” even if you intend to reuse the material.

2. Concentration
3. Hazard Class (Flammable, Corrosive, Carcinogen)
   The hazard class may be written on the bottle, a color code system may be used, or the NFPA diamond stickers may be used. If you are using a unique code system, post the code key chart in the laboratory near phones, exits and in the Blue Book. EH&S has a document outlining a color-coded system; please request a copy if you are interested.

4. Target Organ Information
   Instead of placing target organ information on every secondary container, labs may post signs in their lab near the chemical storage areas stating “See original label or MSDS for target organ information.”
Chemical Hygiene Plan (CHP)/ Training/Awareness

Chemical Hygiene Plan (CHP)
The OSHA Laboratory Standard requires all laboratories to have a CHP. EH&S has provided a template for this plan in the EH&S Blue Book; however, it must be completed with site-specific information. Additionally, the following Appendices must be completed:

1. **Appendix 1 – Eye Wash Fountain Monthly Inspection Record**
   Lab personnel must check the eye wash monthly. The eye wash must be turned on and run for approximately 30 seconds. The inspection record must then be signed and dated. If the testing log is located near the eye wash station, please note this in Appendix 1.

2. **Appendix 2 – Employee Training Records**
   Annual EH&S laboratory safety training is required for the PI and all lab personnel. In addition, the PI is responsible for ensuring that all members of the lab receive annual lab-specific training (on the topics outlined in Appendix 4). The dates of both types of training should be recorded in Appendix 2 and individuals may be asked to log into the Compliance Profile to show proof of training. Training certificates are no longer required but if individuals want to print out proof of training, instructions on printing training histories are available at [http://ehs.wustl.edu/training/Pages/default.aspx](http://ehs.wustl.edu/training/Pages/default.aspx).

3. **Appendix 3 – Hazard Assessment Checklist**
   This checklist should be completed by the PI, Lab Supervisor, or their designee to conduct a laboratory hazard assessment specific to activities in their laboratories. The laboratory hazard assessment helps to identify and mitigate potential hazards to employees. It also helps to identify specific equipment needs, such as engineering controls and personal protective equipment (PPE), to protect employees during work activities. The person conducting the assessment must verify that it is complete and that it has been added to the lab specific training (Appendix 4). EH&S personnel are available to assist you with completing this form or with reviewing it after you have completed it.

4. **Appendix 4 – Lab-Specific Training**
   As a supplement to the CHP, Appendix 4 must be completed or approved by the PI. The example in the book is to only be used as a guide when completing your own outline. The lab-specific training outline should include those items a new employee would need to know to ensure a safe work environment. Some topics to cover would be how to properly work in a fume hood/biosafety cabinet, Appendix 15 of the Bloodborne Pathogens Exposure Control Plan (if applicable), how to handle exempt quantities of select agent toxins, appropriate PPE to ensure adequate protection, emergency procedures for fires, spills, exposures, etc. Maintain documentation of this training (i.e. sign in sheets) in the Blue Book. This training outline must be reviewed annually for accuracy and updated when necessary.

5. **Appendix 15 – Bloodborne Pathogens Exposure Control Plan**
   If the lab works with human blood, tissues, or cell lines the lab must be enrolled in the Bloodborne Pathogens Program. Enrollment involves completing the training checklist found in Appendix 15 (available on the EH&S website) and keeping a copy of the signed Verification of Training in the lab Blue Book. The Appendix 15 training checklist must become part of the lab-specific training (Appendix 4) and be reviewed annually.

6. **IBC Protocol**
   If the lab works with recombinant DNA, infectious microorganisms, replication defective viral vectors, human or animal tissues or cell cultures, biological toxins, or hazardous chemicals in animals or tissue culture the lab must have an approved Recombinant DNA and Hazardous Research Materials Protocol. A copy of the lab’s current protocol and approval letter should be kept in the lab’s Blue Book. For additional information, see the IBC webpage located at [http://ehs.wustl.edu/committees/Pages/IBC.aspx](http://ehs.wustl.edu/committees/Pages/IBC.aspx).

7. **Online Database Tool**
   Every lab must have an inventory of all hazardous chemicals and carcinogens used or stored in the laboratory. This list must be updated on a regular basis (at least yearly). Beginning July 1, 2011, you must use the online database tool provided by EH&S to maintain this inventory. For more information, contact the EH&S Database Administrator at 747-6549.
**EH&S Annual Regulatory Review Session**

WU faculty and staff are required to have annual documented training covering various OSHA and EPA topics. One way to meet this training requirement is to have employees attend an Environmental Health & Safety annual review session. Additionally, web-based training programs are available at [http://ehs.wustl.edu/training/Pages/default.aspx](http://ehs.wustl.edu/training/Pages/default.aspx). EH&S will provide on-site training for groups of 50 or more.

**Engineering Controls**

**Safety Shower**
The safety shower must always be accessible.

**Eye Wash**
The area surrounding the eye wash must stay unobstructed, so that it is possible to turn on the faucet and fully extend the hose.

**Electrical Panels**
Electrical panel doors must be able to open to at least a 90° angle to allow access for Facilities personnel. If equipment blocks an electrical panel yet still maintains access and the panel door is able to open at an angle of at least 90°, a sign must be posted to indicate the location of the blocked panel. Make sure the location of the electrical panel is known by all laboratory personnel.

**Seismic Protection**
All open chemical shelves, regardless of height, should have seismic strips attached. Storing chemicals in cabinets with closed doors is an acceptable alternative to seismic strips. Chemical containers should not be stacked on top of one another.

**Door Closures**
The National Fire Protection Association (NFPA) Standard 45 requires that “…laboratory work units and laboratory work areas in which hazardous chemicals are being used shall be maintained at an air-pressure that is negative relative to the corridors or adjacent non-laboratory areas…” To maintain proper air-pressure in the laboratory, all doors which lead to the corridor must stay closed at all times. This prevents the migration of fire, smoke, and chemical releases from the laboratory space.

**Fire Extinguishers**
All extinguishers must be easily accessible and mounted on the wall or stored in an extinguisher cart or cabinet. The fire extinguisher must be certified annually by an outside company. The extinguisher should be inspected by lab personnel monthly. Verify that the extinguisher is not damaged and the pressure gauge is in the normal range. Initial and date the card attached to the extinguisher for documentation. A Class D extinguisher is required if your research involves work with reactive metals, pyrophoric chemicals or organometallic compounds (i.e. magnesium, sodium, potassium, or metal hydrides).

**Gas Cylinders**
Cylinders of compressed gases should be secured by straps or chains to a wall or bench top, or within a cart or stand. They must be capped when not in use, and a cart must be used to move the cylinder. Cylinders of incompatible gases may not be stored together. Certain gases (e.g. toxic or poisonous by inhalation) may require additional containment or monitoring depending on the quantities used.

**Vacuum System Flasks**
Collection flasks for vacuum systems should be plastic or plastic-coated glass. Otherwise, plastic or wire mesh may be used, or the flask may be taped. If flasks are kept on the floor, they must be properly contained. Flasks should be labeled with the contents (e.g. 10% bleach, tissue culture media, etc.) and should not be labeled “waste” or “used.” In-line filters or a two-flask system (collection flask followed by an overflow flask) should be used to protect the house vacuum system.

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**Biosafety Cabinet**
Biosafety cabinets must be certified annually or when the cabinet is repaired or relocated. For a list of preferred vendors, please see the Resource Management webpage (http://resourcemanagement.wustl.edu/Pages/default.aspx).

**Fume Hood**
Materials in the fume hood should be kept to a minimum to ensure proper airflow. Airflow slots in the back of the fume hood must be unobstructed. Any chemical (including waste) stored in the fume hood must be capped when not in use. Funnels may not be left in the waste bottles. Waste may never be intentionally allowed to evaporate in the fume hood. Chemical fume hoods are inspected annually by EH&S.

**Personal Protective Equipment**

**Clothing Protection**
Lab coats must be worn while working in a laboratory or clinic. Clothing must provide adequate coverage and protection so that there is no skin exposed to hazardous materials. Employees must not take lab coats or other protective clothing home (including for cleaning). Loose clothing, hair, and jewelry must be contained when working with machinery or other equipment with moving parts.

**Selection and Use of Gloves**
Gloves appropriate to the task must be worn. For assistance in determining the appropriate glove material, please contact the glove manufacturer for their chemical break-through information.

Note: If a chemical is not listed in the manufacturer’s reference guide, contact EH&S (362-6816) for further assistance.

Appropriate thermal gloves must be worn when handling extremely hot or cold items. Gloves appropriate for autoclave use are not appropriate for handling cryogenic liquids.

**Eye/Face Protection**
Appropriate eye protection is required while working with hazardous materials in the laboratory. At a minimum, eye protection should consist of plastic safety glasses or prescription glasses with full size side shields. Regular prescription glasses do not provide adequate eye protection.

Splash goggles appropriate to the task must be worn for operations or areas in which significant splash hazards exist. These include (but are not limited to):

- Handling large quantities of hazardous liquids (including infectious or potentially infectious materials)
- Blending/homogenizing
- Handling liquids under pressure or vacuum.
- Handling cryogenic fluids
- Handling highly corrosive or reactive chemicals

Face shields must be worn whenever there is a risk of flying particles or splashes of large quantities of hazardous materials (e.g. filling liquid nitrogen dewars)

For assistance in selecting the proper eye or face protection, contact EH&S at 362-6816.

**Foot Protection**
Footwear must provide adequate protection from hazardous material spills. Shoes which leave areas of the foot exposed are not appropriate for use in a laboratory.
Respirators
Additional respiratory protection should not be necessary under normal lab operations. However, when effective engineering controls are not feasible or while they are being implemented or evaluated, respiratory protection may be required. Prior to purchasing or wearing a respirator/respiratory protection contact the Respiratory Protection Program Administrator in Environmental Health & Safety to complete a mandatory medical questionnaire, fit test, and training. Training and fit testing must be done on an annual basis or when the health status, physical condition, or job duties of the individual change. Please contact EH&S for assistance (362-6816).

Note: Surgical masks do not provide respiratory protection and should only be used to protect mucous membranes from splashes of infectious material. Use of an N95 respirator requires enrollment in the Respiratory Protection Program.

Hazardous Materials Storage

Hazardous Chemicals
In general, solid materials should be placed on a shelf and liquid materials should be placed in an appropriate storage cabinet. If multiple hazard classes or incompatible materials within a hazard class must be stored in the same area, appropriate secondary containment must be used. All containers must be securely closed when not in use.

Flammables
All flammable liquids should be stored in an approved flammable storage cabinet. Flammable solids should be stored in a designated area of the dry chemical storage shelves, in secondary containment if necessary to maintain segregation.

Acids
Acids should be stored in a designated corrosive storage cabinet or storage area. The acids may be stored in the same cabinet as the bases as long as approved secondary containment is used.

Bases
Bases should be stored in a designated corrosive storage cabinet. The bases may be stored in the same cabinet as the acids as long as approved secondary containment is used.

Oxidizers
Oxidizing agents should be segregated from organic acids, flammable, and combustible materials. Nitric acid, sulfuric acid and perchloric acid are commonly-found oxidizing acids. Nitric acid should be stored in its own containment, while the sulfuric acid and perchloric acid may be stored together in secondary containment.

Toxics
Toxic agents should be segregated from other hazard classes. If toxic agents are stored on the same shelf as other hazard classes, secondary containment must be used.

Potentially Unstable Materials
Potentially unstable materials, including peroxide-forming chemicals, should be dated when opened and disposed of after one year. Some common examples include: Ethyl Ether, 1,4-Dioxane, and Tetrahydrofuran. For a more extensive list of peroxide-forming chemicals, please see: http://ehs.wustl.edu/resources/EHS%20Documents/Safe_Handling_and_Disposal_of_Peroxide_Forming_Chemicals.pdf.

Select Agent Toxins
Certain toxins are subject to Select Agent regulations. Registration with the federal government is not required for exempt quantities of these toxins, but registration with EH&S through a Recombinant DNA and Hazardous Research Materials Protocol is required regardless of quantity. All Select Agent toxins must be kept securely locked and a current, accurate inventory must be kept of acquisition, use, and disposal to ensure that the exempt quantity is never exceeded. A list of Select Agent toxins and their exempt quantities is available online (http://www.selectagents.gov/PermissibleToxinAmounts.html).
**DEA Controlled Substances**

Certain drugs (narcotic and non-narcotic) and chemicals fall under the jurisdiction of the Missouri Bureau of Narcotics and Dangerous Drugs (BNDD) and the US Department of Justice (DOJ) Drug Enforcement Administration (DEA). These drugs and chemicals are known as Controlled Substances and must be maintained under certain restrictions. These materials must be securely locked in a substantially constructed cabinet and access to these materials must be restricted to individuals who have completed a background check through HR. The key to the cabinet housing the Controlled Substances must also be stored in a secure location (locked drawer or on an approved person). Initial and annual physical inventory reconciliations must be performed and current records of acquisition, use, and disposal must be maintained and readily retrievable. For details on each of these requirements, please see the guidance documents and policies available at http://research.wustl.edu/ComplianceAreas/controlledsubstances/policy/instructionsms/Pages/default.aspx.

**Storage Height**

All hazardous chemicals (liquid or solid form) need to be stored below eye level.

**Preparedness/Prevention**

**Chemicals on Floor**

At no time should glass containers (empty or full) be stored directly on the floor. If secondary containment is used, the container must be large enough to contain the entire volume of the primary vessel.

**Chemical Spills Evident**

All spills should be cleaned immediately to prevent slipping hazards and further damage to the area affected. If the spill is of a hazardous material and the size is beyond the capability and means of laboratory personnel to clean up, contact security at 2-HELP (Medical School) or 5-5555 (Danforth Campus).

**Housekeeping**

General good housekeeping practices should be used in the laboratories as poor housekeeping increases the chance of accidents and spills. All non-hazardous spills should be cleaned up as quickly as possible. Sharps which have not been in contact with hazardous material must be stored in secondary containment to prevent accidental cuts.

**Fire Sprinkler Clearance**

A minimum of 18 inches of clearance must be maintained below the deflector of the lowest installed fire sprinkler head.

**Unattended Flames**

Open flames must be attended at all times.

**Food/Beverage**

Eating, drinking, gum-chewing, or similar activities within laboratories can result in accidental ingestion of hazardous materials (chemical, radiological, or biological). Good laboratory practice, as outlined by the Occupational Safety and Health Administration (OSHA), the Centers for Disease Control and Prevention (CDC), and the Nuclear Regulatory Commission (NRC), seeks to eliminate this potential route of exposure by forbidding these activities in areas where hazardous materials are present. EH&S will determine on a case-by-case basis if interior office spaces that are separated from the lab space by a closeable door may continue to contain food and drink. If this is allowed, a food/beverage transport policy must be present in the lab Blue Book. If food items are necessary for experiments (e.g. dry milk), they must be labeled “For Lab Use Only” or “Not for Human Consumption.” Evidence of food consumption is also not allowed (e.g. food waste in lab trash cans, dirty dishes in lab sinks, etc.). For complete details, see the policy located at http://ehs.wustl.edu/resources/EHS%20Documents/Critical_Safety_and_Compliance_Factors.pdf.

**Chemical Spill Kit**

All lab personnel should know the location of a chemical spill kit.
Waste Management

Labels
All unwanted material or hazardous waste must have the properly completed EH&S Unwanted Material (blue) or hazardous waste (yellow) label. The label must be completely filled out, including start date. The label must be applied when accumulation begins, not before or after. Full dates must be used on this label (DD/MM/YY). Full chemical names and concentrations must be used; acronyms and chemical formulas are not acceptable. Labels can be obtained from your lab auditor. As of July 1, 2014 contiguous locations must use the blue labels only.

Best Practices
Labs must meet the standards of best practices regarding unwanted material and waste management. While some practices may not currently rise to the level of an automatic failure, neglecting to address these issues could result in additional deduction of points or an automatic failure on future lab inspections.

Segregation of Chemical Waste
All unwanted material or chemical waste must be segregated by hazard class using appropriate secondary containment. Proper secondary containment must be used when incompatible chemicals are stored in the same area. The secondary containers must be of sufficient capacity to contain the contents of the primary container in case of breakage and must be chemically compatible.

Unwanted Material/Chemical Waste Containers Securely Capped or Sealed When Not in Use
Securely capped means if the bottle is tipped, no leakage occurs. Aluminum foil and parafilm do not constitute a secure cap. If zip-top bags are used to contain contaminated pipette tips, the bag must be securely closed. Containers should only be open during filling. Evaporating chemicals is never allowed.

Container Within Regulatory Time Limit
Unwanted material/chemical waste containers must be removed by EH&S within six months (contiguous locations) or one year (non-contiguous locations) of the start date on the label. Because the potential penalties associated with keeping containers for longer than the regulatory time limit are severe, EH&S strongly encourages labs to dispose of their unwanted material or hazardous chemical waste in a timely fashion. Please contact EH&S for evaluation and/or removal of all expired or unused chemicals.

Request for Pickup Form (RFP)
The RFP can be found on the website (http://ehs.wustl.edu) under “Waste Pick-up Forms”. The on-line version is required; faxed requests are no longer accepted. RFPs must be submitted within the regulatory time limit or immediately when full. EH&S must pick up the chemical within 10 calendar days (contiguous locations) or 3 calendar days (non-contiguous locations) of the RFP submission.

Infectious Waste Management
All infectious waste must be placed in a red bag and put into a biological container provided by EH&S (Medical School) or the Biology or Engineering Department (Danforth Campus). Tissue culture materials, including dishes and flasks, should be disposed of as infectious waste rather than as general trash. Although these materials are not always infectious, housekeeping or other personnel may not be able to differentiate infectious from non-infectious tissue culture waste and may not remove trash containing these items. Liquid infectious waste should be treated with a 10% final concentration of bleach for 20 minutes prior to drain disposal. Sharps containers must be purchased from a vendor. There is a charge associated with biological and infectious waste disposal. Please contact EH&S (362-6816) for account setup and details. If you choose to autoclave infectious waste prior to disposal in the general trash, you must validate your autoclave weekly using biological indicators (not chemical indicators or autoclave tape) and keep a written log of the validations.

Sharps
All metal sharps must be disposed of in an approved sharps container. It is Washington University’s policy to NOT recap needles. Please place used needles, scalpels, and razor blades which have come in contact with potentially infectious material directly into a sharps container. Metal sharps contaminated with radioactive material should be placed in a closeable, puncture-resistant container and treated as radiological waste. Sharps contaminated with hazardous chemicals
should be placed in a closeable, puncture-resistant container and labeled and submitted as unwanted material (contiguous locations) or chemical waste (non-contiguous locations). Non-contaminated sharps should be placed in a closeable, puncture-resistant container with a blue Unwanted Material label (contiguous locations) or yellow waste label (non-contiguous locations) describing the contents as “non-hazardous sharps” and submitted for pickup.

**Waste Stream**
Labs should only have one container per waste stream at a time in the lab. Waste must be kept at or near the point of generation and cannot be moved to a different room for storage.

**Acutely Toxic/P-Listed Chemicals**

**Peroxide-Forming Compounds**
Potentially unstable materials, including peroxide-forming chemicals, should be dated when opened and disposed of after one year. Some common examples include: Ethel Ether, 1’4-Dioxane, and Tetrahydrofuran. For a more extensive list of peroxide-forming chemicals, please see [http://ehs.wustl.edu/resources/EHS%20Documents/Safe_Handling_and_Disposal_of_Peroxide_Forming_Chemicals.pdf](http://ehs.wustl.edu/resources/EHS%20Documents/Safe_Handling_and_Disposal_of_Peroxide_Forming_Chemicals.pdf).

**Broken Glass, Pipettes & Pipette Tips**
All broken glass, pipette tips and plastic pipettes that are not contaminated with radioactive, infectious or hazardous chemical materials need to be disposed of in the broken glass box or a sturdy cardboard box lined with a plastic bag for the protection of Housekeeping staff. Boxes must not weigh more than 60 pounds.

**Emergency Procedures**

**Emergency Telephone List**
An emergency telephone list should be posted on or near each telephone. Phone numbers that need to be included on this are Security, EH&S, Radiation Safety, Employee Health, Workers’ Compensation and a laboratory safety contact.

**Fire Evacuation Route**
All employees must know where to evacuate in case of fire, including your designated meeting point. In most cases employees will evacuate laterally to an adjacent building, not to the outside. Information on evacuation routes and emergency assembly points is available at [http://emergency.wustl.edu](http://emergency.wustl.edu).

**Use of Fire Extinguishers**
All employees should know how to use a fire extinguisher. An easy way to remember is the acronym PASS:
- **Pull** the pin
- **Aim** the nozzle
- **Squeeze** the trigger
- **Sweep** from side to side at the base of the fire

**Injury/Spill Procedures**
All employees should know proper procedures for an injury or a chemical/biological spill.

**Contacting Security**
All employees should know how to contact security:
- Danforth Campus – WUPD – 935-5555
- Medical School Campus – Protective Services – 362-4357 (2-HELP)