Washington University

Environmental Health & Safety Laboratory Inspection Comment Sheet

This document complements the inspection categories evaluated annually in the Washington University in St. Louis Environmental Health and Safety (EH&S) Laboratory Safety Inspection Checklist.

**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 your EH&S representative 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. Chemical storage cabinets must be compatible with the hazard class. Please refer to the EH&S Chemical Storage Guidelines document.

**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:**
Chemicals removed from their original container and placed in a secondary container must be labeled with:

1. **Full chemical name (Ethanol, not EtOH)**
   a. In lieu of using the full chemical name on 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 a system that meets the secondary container labeling requirements of 29 CFR 1910.1200 is acceptable. Post the code key chart in the laboratory near phones, exits and in the Blue Book. Please refer to the EH&S Chemical Labeling Guidelines document for a recommended color-code system.
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 SDS 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 standardized CHP in the Blue Book and it is available on the EH&S website.

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, please note this in Appendix 1. Eye wash testing logs are provided on the EH&S website.

2. **Appendix 2 – 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. Individuals who want to print training records can find instructions on printing training histories [here](#).

3. **Appendix 3 – Hazard Assessment Checklist:**
The PI, Lab Supervisor, or their designee should 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 (i.e., fume hoods) 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 and/or reviewing this form.

4. **Appendix 4 – Lab Specific Training:**
   As a supplement to the CHP, Appendix 4 must be completed or approved by the PI. The outline in the Blue Book is to only be used as a guide when completing your own lab-specific training. The lab-specific training should include lab standard operating procedures (SOPs) and information employees need to know to ensure a safe work environment. For example, training should include 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 in Appendix 2 of the Blue Book. Lab-specific training must be reviewed annually for accuracy and updated when changes occur.

5. **Bloodborne Pathogens Exposure Control Plan Appendix 15:**
   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 [Appendix 15 Checklist](#) 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. A new signed Verification of Training must be submitted with the lab’s initial IBC Protocol and during each renewal.

6. **Online Chemical Inventory:**
   Every lab must maintain an online inventory of all hazardous chemicals used or stored in the laboratory. Inventories must be updated as needed to reflect chemical storage and use changes, with a minimum annual review and update required. For more information, contact EH&S at 314-362-6816.
7. **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.

**EH&S Annual Laboratory Safety Training:**

WU faculty, staff, students, visitors and anyone working in a laboratory 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 EH&S live training session. Additionally, online training programs are available on the EH&S training webpage. EH&S will provide in-person training for groups of 20 or more. Please contact EH&S if you would like to request an in-person training session.

**Engineering Controls**

**Safety Shower:**

The safety shower must always be accessible.

**Eyewash:**

The area surrounding the eyewash must stay unobstructed, so that it is possible to turn on the faucet and fully extend the hose, if applicable.

**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. All shelving above eye level should have seismic protection. 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:**

Extinguishers must be easily accessible and mounted on the wall or stored in an extinguisher cart or cabinet. Fire extinguishers must be certified annually by an outside company. Extinguishers 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. Class D extinguishers are 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. Storage requirements also apply to lecture bottles.

**Vacuum System Flask Labeling and Protection:**
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. Flasks should be labeled with the contents (e.g. 10% bleach, tissue culture media, etc.) and should not be labeled “waste” or “used.” EH&S strongly recommends the use of in-line filters to protect the house vacuum system.

**Vacuum System Flask Containment:**
If vacuum flasks are kept on the floor, they must be properly contained using non-permeable secondary containment.

**Biosafety Cabinets:**
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.

**Fume Hoods:**
Materials in fume hoods should be kept to a minimum to ensure proper airflow. Airflow slots in the back of the fume hood and the fume hood face must be unobstructed. Any chemical container (including unwanted material/waste) stored in fume hoods must be closed when not in use. Funnels may not be left in unwanted material/waste containers. Unwanted materials/waste may never be intentionally allowed to evaporate in the fume hood. Chemical fume hoods are inspected annually.

**Personal Protective Equipment**

**Protective Clothing:**
Lab coats and/or other appropriate protective clothing identified in the hazard assessment (see Appendix 3) must be worn while working in a laboratory or clinic. Protective 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. Long hair should be tied-back and loose clothing and jewelry should be removed when working with machinery or other equipment with moving parts.

**Selection and Use of Gloves:**
Gloves appropriate to the task must be worn and should be selected based on the hazard assessment (see Appendix 3). For assistance in determining the appropriate chemical protective gloves, please consult glove manufacturer guidelines for chemical resistance. Labs may also contact EH&S at 314-362-6816 for assistance in glove determination. 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 when working with or near hazardous materials in the laboratory. At a minimum, eye protection should consist of plastic safety glasses or prescription glasses with side shields that are ANSI Z87.1 approved. 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 in addition to safety glasses or goggles whenever there is a risk of flying particles or splashes of hazardous materials that may cause serious damage to the eye or skin (e.g. filling liquid nitrogen dewars).

For assistance in selecting the proper eye or face protection, contact EH&S at 314-362-6816.

**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:**
Respiratory protection should not be necessary under normal lab operations. However, when effective engineering controls (i.e., fume hoods) are not feasible or while they are being implemented or evaluated, respiratory protection may be required. Prior to purchasing or wearing a respirator contact the Respiratory Protection Program Administrator in EH&S 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 at 314-362-6816. 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 (i.e., filtering facepiece) requires enrollment in the Respiratory Protection Program. Voluntary use of respiratory protection is acceptable upon completion of the required form and medical evaluation, if applicable. Please contact EH&S at 314-362-6816 for assistance.

**Hazardous Materials Storage/Handling**

**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. Cold rooms are not appropriate for storage of flammables.

**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, sulfuric and perchloric acid should each be stored in its own 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 as outlined in Guidelines for Safe Handling and Disposal of Peroxide Forming Chemicals. Some common examples include: Ethyl Ether, 1,4-Dioxane, and Tetrahydrofuran. Refer to the above document for a more extensive list of peroxide-forming chemicals.

Other unstable materials may include air and water reactive chemicals and shock sensitive chemicals. These should be handled per manufacturer guidelines found in the SDS and per requirements outlined in the lab specific safety training and relevant SOPs. Please refer to the Policy on Safe Use of Pyrophoric/Water-Reactive Reagents and Protocol for Safe Use of Pyrophoric/Water-Reactive Reagents for additional information.

Select Agent Toxins:
Certain toxins are subject to Select Agent regulations. Registration with EH&S through a Recombinant DNA and Hazardous Research Materials Protocol is required regardless of quantity, though registration with the federal government is not required for exempt quantities of these toxins. 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 permissible toxin amounts can be found at the Federal Select Agent Program website.

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

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. Initial and annual physical inventory reconciliations must be performed and current records of acquisition, use, and disposal must be maintained and readily retrievable. Please refer to the OVCR Controlled Substances webpage for additional information.

Preparedness/Prevention

Chemicals on Floor:
At no time should glass containers (empty or full) be stored directly on the floor. If glass containers need to be stored on the floor, then non-permeable secondary containment must be used. The secondary container must be large enough to contain the entire volume of the primary vessel.
Chemical Spills Evident:
All non-hazardous spills should be cleaned immediately to prevent slipping hazards and further damage to the area affected. If a hazardous material is spilled and the size is beyond the capability and means of laboratory personnel to clean up, contact security at 314-362-4357 (Medical School) or 314-935-5555 (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.). Please refer to the Eating, Drinking, and Related Activities Policy for additional information.

Chemical Spill Materials:
All lab personnel should know the location of available chemical spill materials. If a hazardous material is spilled and the size is beyond the capability and means of laboratory personnel to clean up, contact security at 314-362-4357 (Medical School) or 314-935-5555 (Danforth Campus).

Waste Management

Labels:
All unwanted material or hazardous waste must have the properly completed EH&S unwanted material (blue) or 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 (e.g., MM/DD/YY). Full chemical names and concentrations must be used; acronyms and chemical formulas are not acceptable. Labels can be obtained from your lab auditor. Contiguous locations must use the blue labels only. Please refer to the Chemical Waste/Unwanted Material Management Checklist.

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/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 materials 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):**
Waste pick-ups must be requested using the online pick-up request form. Waste pick-up request forms must be submitted within the regulatory time limit or immediately when full. EH&S must pick up the unwanted material/waste within 10 calendar days (contiguous locations) or 3 calendar days (non-contiguous locations) of the waste pick-up submission.

**Biological Waste Management:**
All biological waste must be placed in a red bag and put into a biological container provided by EH&S (Medical School) or Biology Department (Danforth Campus). For WU labs in Barnes buildings, Barnes EH&S collects infectious waste. Although these material are not always infectious, tissue culture materials, including dishes and flasks, should be disposed of as biological waste rather than as general trash. 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 at 314-362-6816 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 red, biohazard 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 materials 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 have less than 55 gallons total of unwanted materials. 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:**
Labs working with P-listed chemicals should collect all lab waste associated with the chemical, including container rinsate, and dispose of it through the chemical waste stream. For detailed instructions, please call EH&S at 314-362-6816.

**Peroxide-Forming Compounds:**
Potentially unstable materials, including peroxide-forming chemicals, should be dated when opened and disposed as outlined in the Safe Handling and Disposal of Peroxide Forming Chemicals document. Some common examples include: Ethel Ether, 1’4-Dioxane, and Tetrahydrofuran. Refer to the above document for a more extensive list of peroxide-forming chemicals.

**Broken Glass, Pipettes & Pipette Tips:**
All broken glass, pipette tips and plastic pipettes that are not contaminated with radioactive, biological or 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 40 pounds. For more information, please refer to the EH&S Policy for Recycling of Empty Containers and Other Materials in Laboratories.

**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 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. This information should be included and reviewed in the lab-specific training (Appendix 4).

**Contacting Security:**
All employees should know how to contact security:

- Danforth Campus – WUPD – 314-935-5555
- Medical School Campus – Protective Services – 314-362-4357 (HELP)
- Barnes Buildings – Washington University employees working in Barnes buildings should contact WU Protective Services and identify themselves as WU employees.