Laboratory Safety Manual

WSU Health Science Campuses

This manual is a summarization of the WSU Laboratory Safety Standard and intends to better reflect the needs of the WSU Health Sciences Campuses. The Laboratory Safety Standard is the primary resource that shall be followed whenever possible on all WSU campuses. However, differences in equipment, facilities, resources, and waste management, as well as the challenge of extensive open lab space necessitate small changes. Furthermore, this summary has been crafted for ease of reading and lacks the extensive references to federal and state regulations found in its parent document. When in doubt or when seeking additional information, refer to the Laboratory Safety Standard.

General Rules

All teaching, research, and clinical laboratories at WSU are subject to the Laboratory Safety Standard, whether those working within the laboratories are students or employees of the university.

- All laboratories must have a current Chemical Hygiene Plan for each laboratory area. Any adjoining spaces count as a single laboratory, but separate spaces require separate hygiene plans.
- Use equipment only for its designed purpose.
- Do not work alone in the laboratory if procedures being conducted are hazardous.
- Be alert and report or correct unsafe conditions in your laboratory. Report to your PI, supervisor or the Environmental Health & Safety office in you cannot correct unsafe conditions.
- Know the locations of emergency equipment in your area, including fire extinguishers and the gas emergency shut-off valve.
- Do not use expired materials.
- Know how to obtain additional help in an emergency and familiarize yourself with emergency procedures.
- Know the safety precautions that apply to the work being done. Use appropriate ventilation systems (fume hoods, biosafety cabinets, etc.).
- Know the types of protective equipment available, including face shields, gloves and other special clothing or footwear. Use the proper type for each job.
    - Appropriate eye protection must be worn when working with chemicals.
    - Avoid use of contact lenses in the laboratory. If you wear contact lenses, you must also wear goggle or a face shield.
    - Wear cut or puncture resistant gloves when handling glass tubing.
    - Do not use broken glassware; clean up any broken glass with a broom and dust pan.
    - Skin contact with chemicals should be avoided. Do not taste or smell chemicals.
    - Wash hands well before leaving the laboratory.
- Appropriately use, label, store, and transport gas cylinders
- Combine Reagents in the appropriate order to minimize violent chemical reactions.
- Mouth pipetting is not permitted; use pipet bulbs or an aspirator.

- Food and drink are prohibited from being stored, handled or consumed in laboratories. Glassware or utensils that have been used for laboratory operations must never be used to prepare or consume food or beverages.

Chemical Procurement, Storage, and Distribution

- Maintain a chemical inventory as part of your Chemical Hygiene Plan
    - Update the inventory as new chemicals are received
    - Remove old or consumed chemicals on an annual basis
- All containers shall be adequately labelled in accordance with GHS labelling standards, including the chemical name, the hazard pictogram, and the appropriate signal word.
- Waste containers shall be adequately labelled, and properly closed and stored
- Peroxidizable chemicals must be dated when received and disposed of in the Chemical Hygiene Plan.
- When storing chemicals, sort by hazard first. Secondary strategies such as alphabetization can only be used after hazards are properly segregated.
- Hazardous chemicals should be stored in cabinets fitted with auxiliary local ventilation.
- Follow the 1 glove rule when transporting chemicals—do not touch common surfaces such as doorknobs with gloved hands.

Housekeeping

- Stairs, hallways, and mechanical spaces are not storage spaces.
- Do not store any supplies or place furniture within 3’ of electrical cabinets.
- Never block access to exits, emergency equipment or emergency controls.
- Keep floors clear of clutter so that housekeeping staff can clean. Minimize clutter.
- Keep chemical storage to a minimum. Discard or recycle unused chemicals.
- Small, nonhazardous spills should be cleaned up immediately by laboratory personnel.
- It is the waste generator’s responsibility to properly dispose of all chemical and non-chemical waste.

Medical Surveillance

Employees who suspect they have symptoms of overexposure to hazardous chemicals will be evaluated at a reasonable time and place without cost to the employee by or under direct supervision of a licensed physician.

Symptoms of overexposure can be found in the chemical’s SDS.

Personal Protective Equipment (PPE)

General Requirements

- Wear appropriate clothing for the task conducted
- Always protect skin, eyes, and when applicable, respiratory tracts using lab coats, gloves, goggles/face shields and respirators.
- Avoid loose apparel and remove jewelry that can catch easily.

- Remove lab coats before leaving the lab.
- Long pants or floor length skirts are to be worn at all times in the laboratory.
- Open toed shoes or sandals are not permitted in the laboratory.
- Immediately remove contaminated PPE, place in a labelled bag, and launder or dispose of as hazardous chemical waste.

Gloves

The FDA has banned powdered gloves on January 19, 2017. Latex gloves may cause allergic reactions up to and including anaphylaxis. Alternate materials are recommended and should be selected based on the hazards associated with work performed.

- Gloves shall be worn whenever working with chemicals, rough or sharp-edged objects, or materials at extreme temperatures.
- Glove material shall be selected based on the hazards involved.
- Regularly inspect gloves for discoloration or tears and discard if defects are found.
- Change gloves frequently and do not reuse disposable gloves.
- Do not use expired gloves.
- Double-layer gloves when very hazardous chemicals are handled.

Respirators

- All respirators use at WSU comes under the requirements of the WSU Respiratory Protection Program, including routine and non-routine operations, emergency response, and work in confined spaces. WSU EH&S will assist you with meeting the requirements of the WSU Respiratory Protection Program. Do not use respirators without first meeting these requirements.
- Respirators may be required when working outside of a fume hood. Consult your chemical hygiene plan.

Recordkeeping

- Chemical Hygiene Plans shall be reviewed annually, updated as necessary, and available to all employees in the laboratory.
- Chemical inventories must be maintained and current
- EH&S maintains records of any EH&S provided safety and health training. Further training should be documented internally.

Signage and Labelling

Labels

Hazardous chemicals must be labelled following GHS labelling protocols, whether in primary or secondary containers. Labels must include:

1. The chemical or common name (not the chemical symbol)
2. The hazard pictogram
3. The signal word (warning or danger)

Laboratory warning placards

Doors shall be labelled with the hazards associated with the laboratory space. This includes regulated signage for radiation, laser warnings, and biohazards symbols, as well as the minimum PPE required before entry.

Stickers and Equipment Labels

- Emergency response numbers (e.g. fire, police, 911) shall be placed by each telephone
- Location signs shall be posted for all showers, eyewash stations, fire extinguishers, first aid equipment, exits, and other safety equipment.
- Laboratory faucets shall be labelled as "non-potable"
- Warning signs shall be posted in areas or on equipment where special or unusual hazards exist.

Chemical Spill Cleanup

- Employees may clean up minor chemical spills only when **ALL** the following conditions are met
    - The chemical is known and the spill can be cleaned in ten minutes or less
    - Employees are trained to safely clean up chemical spills
    - Employees can wear the same PPE that they wear during normal activities
    - The chemical does not have a ceiling limit in WAC 296-841 or create an Immediate Danger to Life and Health
- Spill Kit materials are disposed of as hazardous chemical waste
- Employees are not allowed to clean up mercury spills.
- Call 911 if the clean up requirements cannot be met for any reason; notify the WSU Chemical Hygienist of the spill (86699)

Training, Information, and Factsheets

- Chemical hazard information must be provided to employees BEFORE work begins. This includes:
    - The contents of the Laboratory Safety Standard
    - Location and availability of the Chemical Hygiene Plan
    - Permissible Exposure Limits
    - Signs and symptoms of overexposure, safety data sheets
    - Laboratory safety references
    - Labelling requirements.
- Employee training shall include:
    - Methods and observations that may be used to detect hazardous chemicals
        - SDS sheet information
        - Environmental sampling where appropriate
    - Physical and health hazards of chemicals in the work area including hazardous communications and blood borne pathogens if applicable.
    - Measures employees can take to protect themselves including PPE
    - The Chemical Hygiene Plan

- EH&S laboratory safety training may fulfill part of this requirement. Principle Investigators must provide the majority of this training.

Hazardous Waste Disposal

Waste containers are supplied by the Office of Research and standardized across labs on campus. SOPs for identifying and disposing of waste as the appropriate type have been attached to each bin. Container colors reflect different waste types.

- Red—Biohazardous Waste
    - Biohazardous waste includes human body fluids such as blood, semen or vaginal secretions, and cerebral spinal fluid, as well as unfixed human tissue.
- Orange—Pathological Waste
    - Pathological waste includes any animal or fixed human body parts including organs and body fluids.
- Yellow—Radioactive Waste
    - Radioactive waste is handled by the Pullman Office of Radiation.
    - Radioactive materials must be tracked from time of purchase until disposed of as waste.
    - All radioactive waste must be generated within the University.
- Blue—Broken Glass Waste
    - Broken glass waste is for non-contaminated glassware.
- Purple—Solid Chemical Waste
    - Solid chemical waste is for the disposal of lab objects such as gloves or weigh boats contaminated with hazardous chemicals.
- White—Autoclavable Waste
    - Autoclavable waste includes any disposable labware contaminated with potentially biohazardous materials, culture plates and media, and tubing.

Chemical Waste

- Print and attach the “Dangerous Waste” label to any waste containers. Labels can be found on the Spokane EH&S website.
- Segregate and store waste by type in accordance with the Chemical Hygiene Plan; use waste containers appropriate to the waste type.
- Contact EH&S (86699) and fill out the Chemical Collection Request Form to schedule waste pickup.
- Do not store waste for extended periods. Regularly schedule removals to prevent buildup of unnecessary chemicals in the laboratory.

Sharps Disposal

- Sharps, including needles, scalpel blades, and lancets must be disposed of in a designated biohazardous sharps container.
- Do not overfill container. Dispose of as biohazardous waste when full and request a new container.
- Do not recap needles on syringes after use.
- Do not separate needles from syringes prior to disposal.

Inspections

- Principle Investigators shall regularly perform laboratory inspections
- The Office of Research will conduct periodic safety inspections and inspections upon request
- Washington Department of Health and Safety, the Fire Department, and other regulatory agencies may also conduct safety inspections.

Safety Data Sheets

Safety Data Sheets must be kept on file and accessible to employees 24/7. WSU Health Science mandates the use of MSDSonline due to our shared lab space, but labs are welcome to keep hard copies in addition to the digital MSDSonline submissions.

Carcinogens

Chemical carcinogens require special handling in laboratory spaces. If you are working with a known carcinogen, consult the Laboratory Safety Standard Section II.N. The Listed and Specific Carcinogen section contains 22 chemicals for which there are extensive health and safety requirements. For all other carcinogens, follow your Chemical Hygiene Plan and take the following precautions:

- Signs must be posted at all entrances to areas where carcinogens are used.
- Experiments must be conducted in a hood or glove box.
- Employees must thoroughly wash hands, arms, and necks after working with carcinogens.

Floor Plans

Floor plans must be prominently posted within each laboratory floor or room displaying safety equipment and features, as well as evacuation routes.

Safety Equipment

DO NOT BLOCK ACCESS TO SAFETY EQUIPMENT
Washington state requires employee access to first aid supplies.

Eye wash stations, drench hoses, and safety showers

- Stations should be within 50 feet of your workstation.
- Use eye wash stations for corrosives, irritants, toxic or skin absorptive chemicals in the eyes. For all other exposure use showers or drench hoses.
- Rinse for at least 15 minutes or according to the SDS.

Flammable liquid storage cabinets

- No more than 60 gallons of class I or class II, and no more than 120 gallons of class III combustible liquids per storage cabinet.
- No more than 3 cabinets in the same fire area unless they are separated by >100 feet
- Cabinets must be labelled “Flammable—Keep Fire Away.”
- Flammable cabinets should be used exclusively for flammable chemicals.
- Whenever possible, vent flammable cabinets.

Flammable storage refrigerators or freezers

Below room-temperature storage of flammable chemicals requires a specifically designed, explosion proof refrigerator or freezer.

Fire Extinguishers

- Laboratories are equipped with fire extinguishers appropriate to the hazards present. If you do not have an ABC fire extinguisher, contact facilities.
- Use of fire extinguishers requires annual fire extinguisher training.

Ventilation

Fume Hoods

Perchloric acid is extremely harmful to standard fume hood fans and gaskets. Consult EH&S to ensure your hood is appropriate for work with perchloric acid prior to beginning work.

- Work with the sash drawn as far down as possible to prevent splash, explosion, and fume related injuries and to reduce air flow interference
- Any sliding windows on hood sashes should be kept closed when working in the hood.
- Fume hoods are not for storage. Keep chemicals in a ventilated cabinet
- Fume hoods are not for waste disposal by evaporation. Chemicals which evaporate must be scrubbed or absorbed before exhaust leaves the building.
- Hoods must be certified annually
- Have a plan for fume hood failure, including:
    - Procedures for warning others that the fume hood has failed
    - Instructions to evacuate if remaining in the laboratory is dangerous
    - Instructions to cease experimental processes that require a fume hood at any point
    - Instructions for alternate facilities
- Use explosion-proof equipment when working with flammable vapors or liquids in fume hoods

Other ventilation systems

- Any local exhaust systems in a laboratory should be designed by a ventilation engineer
- Do not attach hoods, cabinets, or snorkels to existing fume hood ducts without first consulting facilities
- Glove boxes operating under positive pressure must be tested prior to use and should have a method for monitoring system integrity
- Some rooms, such as isolation chambers or clean rooms, operate under pressure to maintain sterility and isolation. Procedures for entry and exit must be written out and employees must be trained prior to use.
- Environmental rooms such as cold rooms or warm rooms are closed air circulation systems. Do not work with hazardous chemicals in closed air systems.
- Magnetic latches or breakaway handles should be installed to allow trapped persons to exit environmental rooms
- Volatile flammable solvents should not be used in cold rooms

- Volatile acids can corrode cold room cooling coils, leading to chemical leaks which can cause asphyxia. Avoid acids in cold rooms.

Facilities Services

- Facilities employees (housekeeping, electricians, plumbers, HVAC technicians, etc.) must be informed of the hazards they may encounter in laboratory workspaces
- Equipment or spaces must be decontaminated by laboratory personnel prior to facilities work.
- Whenever practical, equipment being disposed of should be decontaminated prior to disposal.