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PREFACE

A variety of hazards exist in the laboratories at the Western University of Health Sciences (WesternU). The risks associated with these hazards are greatly reduced or eliminated if proper precautions and practices are observed in the laboratory. To manage these risks, and in response to a heightened concern for safety in the workplace, WesternU

1.3 Comprehensive Laboratory

Chemical or hazard-specific training must be documented and maintained by the Department, Principal Investigator, or Laboratory Coordinator and be available upon request. Appendix A provides an example of a chemical or hazard-specific documentation training form. This form can be modified to fit the needs of the specific department or laboratory.

The Laboratory Safety Office will maintain records of laboratory audits for federal or state regulatory inspections.

2.0 STANDARD OPERATING PROCEDURES

2.1 General Safety Guidelines

Standard operating procedures (SOP) must be readily available to all laboratory employees. The following guidelines have been established to minimize or eliminate hazards as well as

14. Never leave an experiment unattended while it is being heated or is rapidly reacting.
15. Keep equipment back from the edge of the lab bench to prevent spillage.
16. Support all beakers and flasks with clamps. Do not use cracked or chipped glassware.
17. Report any accident, however minor immediately to the PI or LM.

2.2 Eating, Drinking, and Smoking

Eating, drinking, smoking, gum chewing, applying cosmetics, and taking medicine in laboratories is strictly prohibited.

1. Food, beverages, cups, and other drinking and eating utensils should not be stored in areas where hazardous materials are handled or stored.
2. Glassware used for laboratory operations should never be used to prepare or consume food or beverages.
3. Laboratory refrigerators, ice chests, cold rooms, microwave ovens, and so forth should not be used for food storage or preparation.
4. Laboratory water sources and deionized water should not be used for drinking water.
5. Laboratory materials should never be consumed or tasted.
6. Ice from laboratory ice machines are not to be used for human consumption.

2.3 Housekeeping and Maintenance

In the laboratory, keeping things clean and organized can help provide a safer environment. Keep drawers and cabinet doors closed and electrical cords off the floor to avoid tripping hazards. Keep aisles clear of obstacles such as boxes, chemical containers, and other storage items that might be put there. Avoid slipping hazards by cleaning up spilled liquids promptly and by keeping the floor free of loose equipment such as stirring rods, glass beads, stoppers, and other such hazards. Never block or even partially block the path to an exit or to safety equipment, such as a safety shower or fire extinguishers. Use the required procedure as indicated on the SDS and/or SOP for the proper disposal of chemical wastes and solvents.

Supplies and laboratory equipment on shelves should have a clearance from the ceiling so that in case of a fire, the fire sprinkler heads are able to carry out their function. The work area should be kept clean and uncluttered, with hazardous materials and equipment properly stored. Clean the work area upon completion of a task and at the end of the day. The custodial staff is only expected to perform routine duties such as cleaning the floor and emptying the general trash.

In preparation for any maintenance service such as fume hood repair, plumbing, electrical etc., the laboratory staff must prepare the laboratory before the maintenance personnel arrive. Whenever possible remove hazards that maintenance personnel may encounter during their work activities. For example, infectious agents, radioactive materials or chemicals must be moved to a secure area prior to initiation of maintenance work. Additionally, the Principal Investigator or Laboratory Manager *must escort Plant Operations personnel into the laboratory and inform them of the presence of any hazardous materials prior to the work being done.* Laboratory Safety Offices maintenance personnel must be supervised at all times while in the laboratory.

Should emergency assistance be summoned, emergency responders will arrive on the scene and take control of the incident. Cooperate with them to the fullest extent possible.

Accident Reporting

All accidents should be reported to the Principal Investigator, Laboratory Manager and the Laboratory Safety Office. Laboratory incidents resulting in even minor medical treatment or observation must be reported to the EH&S and Risk Management. If an employee was injured, then you must also report the incident to the Workers' Compensation Coordinator in Human Resources. If a student was injured, report the incident to University Student Affairs. The report can be submitted electronically by going to https://webapp.westernu.edu/incident_report/

Facilities should also be notified as they will have to arrange for cleaning of the affected area before the laboratory can be reopened. Prior to reopening, Facilities should consult with EH&S, the PI and Lab Manager to ensure that any work that was required to safely reopen the lab has been completed.

2.5 Audits

Regular laboratory audits will assist the university in its mission to maintain a laboratory environment that is inherently safe for its employees

3.2 Ventilation

The importance of clean uncontaminated air in the laboratory work environment is well known. Ventilation controls should be readily available and easily accessible to ensure that the laboratory air is continuously replaced and that concentrations of toxic substances do not permeate the laboratory and the air is safe to breathe. Additionally, the ventilation system should ensure that the toxic substances are not recirculated from laboratory to laboratory or within the building. There are two main types of ventilation systems, HVAC and local ventilation.

1. Heating, ventilation and air conditioning (HVAC) systems are designed primarily for temperature, humidity, and air quality.
2. Fume hoods are designed to remove the contaminants generated by an experiment or device to the exterior of the building.

It is the responsibility of the Principal Investigator or Laboratory Manager to immediately report any problems with the ventilation systems in the laboratories to Facilities (909-469-5258 (or extension 5258)

3.3 Safety Equipment

All laboratories should be provided with safety showers, eyewashes, and appropriate fire extinguishers. Adequate ventilation, wash sinks, and approved waste disposal receptacles are also necessary. All of these should be conveniently located, properly maintained, and frequently tested and/or cleaned. In accordance with university policy and procedures special consideration should be given to ensure accessibility to safety equipment as well as ease of evacuation of physically disabled individuals.

Fume Hoods

Laboratory air flows should be balanced at the time of fume hood installation and, at minimum, yearly thereafter to achieve designed fume hood face velocities and uniformity of airflow patterns. To assure the safety of the fume hood user, the following guidelines for fume hood use should be observed:

1. Ensure working condition of exhaust fan prior to fume hood use.
2. Always wear safety glasses and a lab coat when working at or near the fume hood.
3. Remove all items from the fume hood which are not necessary for the immediate operation or experiment.
4. Place all equipment necessary for the performance of experiments at least six inches inside the front face of the fume hood.

5. Perfor.23 366.19 Tm[(ETqQBT1P AMCID 5>> BDC BT0.97561 0 0 1 10[(i)5(m)-5r0.979 1 345.55 18

Eyewashes, like safety showers, must be located no more than 10 seconds in time nor greater than this distance 55 feet from the hazard. Their location should be clearly labeled. It is recommended that safety showers and eyewashes be located at least five feet apart in the same room. The ANSI standard Z358.1-2014 requires that eyewashes be activated weekly. It is the responsibility of the Principal Investigator or Laboratory Coordinator to ensure that all eyewash units are checked on a weekly basis. For more information, visit ANSI web site at: <https://ansi.org>

Fire Extinguishers

Fire extinguishers are very important components of safe laboratory operation. Each laboratory should be equipped with the appropriate type for the expected fire emergency and be capable of immediate utilization. Currently the WesternU is utilizing multi-purpose (Class ABC) extinguishers for the majority of laboratories on campus. There are Class D extinguishers in laboratories which work with metals.

Safety Containers for Flammable Liquids

An approved container with a spring-closing lid and spout cover should be used to store flammable liquids. The safety container is designed so that it will safely relieve internal pressure when subjected to fire exposure. The safety container utilized in the laboratories must not exceed 19 L (5 gal) capacity.

These general safety practices should be followed by every individual working with flammables in the laboratory environment.

1. Chemicals in safety cans must be stored in designated storage areas in the laboratory. Storing safety cans in the laboratory work areas, on the floor, or in

Corrosive Storage Cabinets

Corrosives should be kept in corrosive storage cabinets specially designed to hold them. Do not store corrosives in flammable storage cabinets because they are not coated with an epoxy enamel to guard against chemical attack. It is recommended that

Polyethylene trays be used to W U D \ V D U H X V H G W R K R O G W K H V H W \ S H V R I if this is the standard across campus to collect small spills and to provide additional protection from corrosion for the shelves

Biological Safety Cabinets

A biological safety cabinet is the device used to provide containment of infectious splashes or aerosols generated by many microbiological procedures. Three types of biological safety cabinets (Class I, II, and III) are used in microbiological laboratories. Class I and II biological safety cabinets are primary barriers which offer varying levels of protection to laboratory personnel and to the environment (when used with good microbiological techniques).

The Class II biological safety cabinet also provides product protection from external contamination of the materials being manipulated inside the cabinet. The

5. Autoclaved waste must be placed into a red biohazard trash bag before disposal into a dumpster. Contact the Laboratory Safety Office if you have questions about proper autoclaving procedures.

Refrigerators

The storage of flammable or combustible liquid in a domestic refrigerator is prohibited. Flammable liquids that require refrigeration must be stored in a flammable/explosion proof rated refrigerator which properly labeled by the manufacturer. Refrigerators procured for the purpose of flammable liquid storage must be in compliance with the specifications for a Flammable Materials Storage Refrigerator as described in the NFPA Code 45, "Fire Protection for Laboratories Using Chemicals." Existing domestic refrigerators used for storage of flammable liquids can be modified to eliminate sources of ignition within the storage compartment. However, the modification process can be applied only to guide defrost refrigerators. Self-defrosting models cannot be successfully modified to provide even minimum safeguards against vapor ignition.

3.4 Personal Protective Equipment

Clothing

Loose or torn clothing can fall into chemicals or become ensnared in equipment and moving machinery. Aprons, lab coats, and other protective clothing, preferably made of chemically inert material, should be readily available and utilized in a laboratory environment. Hair should also be restrained because loose hair can catch fire or dip into chemical solutions. A laboratory coat or an apron should be worn when working with hazardous materials. This is particularly important if personal clothing leaves skin exposed. Since many synthetic fabrics can adhere to the skin when burning, and thereby increase the severity of a burn, cotton is the preferred laboratory clothing fabric. Shorts and open toe shoes should never be worn in the laboratory.

Eye and Face Protection

Laboratory work may require eye and face protection to reduce the possibility of chemical exposures due to splashes. Eye protection is required of everyone who enters a chemical work area. The type of eye protection needed depends on the circumstances. Typically, safety goggles that protect the top, bottom, front and sides of the eyes is mandatory. Safety goggles should not be worn in conjunction with contact lenses, except for therapeutic reasons. If contact lenses are worn, co-workers should all be aware of this, in case an accident

variety of gloves on the market to choose from depending on the chemical, the instrumentation, and the environment in which the hazardous material will be handled.

The following link that can be used as a guideline on proper glove selection.
http://www.aps.anl.gov/Safety_and_Training/User_Safety/gloveselection.html

Respirators

In a laboratory environment, respirators may sometimes be relied on if the engineering controls and laboratory design do not adequately limit the potential exposure to hazardous air contaminants. Individuals planning to use respiratory protection should contact EH&S for consultation. The proper selection and type of respirator used should be based on a thorough analysis of the specific activity planned. The EH&S will assist the respirator user in evaluating their individual circumstances. In addition, all individuals who wear respirators, other than dust mask as a personal preference, must first be medically approved by an

conditions E \ W K H Radiation Health Branch in the California Department of Public Health. Any questions related to usage of radiological materials are to be directed to the X Q L Y H U V L W \ T V 5 D G L D W D n e . W a l t e r s A t d e w a l t e r s @ w e s t e r n u . e d u .

All Authorized Users must follow good health physics work practices in the labs and maintain regulatory compliance.

In collaboration with the Radiation Safety Officer (RSO) EH&S is charged with the responsibility for providing certain health physics services and Principal Investigator consultations as well as radioactive waste disposal for the campus. The specific duties and responsibilities under state and federal law and university policy regarding radiation hazards are detailed in the Radiation Safety Guide available online at <https://www.westernu.edu/research/regulatory-affairs/research-radiation-safety/>

Animal Research Committee

It is the responsibility of each Principal Investigator who wishes to use live animals to secure prior approval from Institutional Animal Care and Use Committee (IACUC). For more information on IACUC, please go to <http://www.westernu.edu/research/regulatory-affairs/research-iacuc/>

Dangerous Drugs and Controlled Substances

Certain drugs and controlled substances (i.e. narcotics) are regulated by the Drug Enforcement Administration (DEA). Researchers who desire to work with these substances must secure registrations from the DEA. Contact the Laboratory Safety Office for further information.

Human Subjects

It is the responsibility of each Principal Investigator to identify all research involving the use of human beings as subjects of research and register the research protocol with the Committee for the Protection of Human Subjects. More information can be found at <http://www.westernu.edu/research/regulatory-affairs/institutional-review-board/>

Particularly Hazardous Chemicals

The Laboratory Safety Office urges all chemical users to read and understand the SDS before using the specific chemical in question. Certain chemicals have been recognized by the International Agency for Research on Cancer (IARC) and other research bodies to cause or promote cancer in human beings. Pre-approval may be required from the Laboratory Safety Office

4.0 SAFE HANDLING REQUIREMENTS IN THE LABORATORY

The majority of laboratory accidents are due to human error. Operational requirements for safe handling of hazardous materials in the laboratory when followed, reduce the chance of an accident due to human error. It is the responsibility of each laboratory employee and student to become familiar with the safe handling requirements in the laboratory described in this section. However, the Principal Investigator is responsible for ensuring their employees have sufficient knowledge to

4.3 Compressed Gas Hazards

There are generalized practices that have been established to protect laboratory employees against physical hazards. These include compressed gas cylinder safety tips. *A training module is available at the following link:*

Compressed Gas Cylinder Safety

The following must be followed for the transporting, storing, and use of compressed gas cylinders.

Compressed Gas Cylinders Identification

1. The contents of any compressed gas cylinder should be identified clearly so as to be easily, quickly, and completely determined by any laboratory personnel.
2. A durable label should be provided by the supplier that cannot be removed from the compressed gas cylinder.
3. No compressed gas cylinder should be accepted for use that does not identify its contents legibly by name.
4. Color-coding is not a reliable means of identification; cylinder colors vary from supplier to supplier, and labels on caps have no value because many caps are interchangeable.
5. If the labeling on the gas cylinder becomes unclear or defaced so that the contents cannot be identified, the cylinder should be marked "contents unknown" and the manufacturer/supplier contacted regarding appropriate procedures.

Gas Cylinders Transportation

1. Cylinders transported by truck must be fastened securely in an upright position so that they will not fall or strike each other.
2. Cylinders should not be transported without safety caps. A cylinder's cap should be screwed all the way down on the cylinder's neck ring and should fit securely. Do not lift cylinders by the cap. The cap is for valve protection only.
3. Cylinders should not be transported with the regulator attached to the cylinder.

Compressed Gas Cylinders Storage

1. Cylinders should not be allowed to drop nor be struck violently.
2. Cylinders should be properly secured at all times whether attached to a wall, cylinder truck, cylinder rack, or post. Two straps are required and must be placed at 1/3 and 2/3 of the cylinder height above the floor.
3. Liquefied flammable gas cylinders should be stored in an upright position or such that the pressure relief valve is in direct line (connected directly) with the vapor space of the cylinder (top of cylinder).
4. Caps used for valve protection should be kept on the cylinders at all times except when the cylinder is actually being used or charged.
5. Cylinders should not be used for rolling, supports, or any purpose other than the transportation and supply of gas.

5.2 Injury and Illness

For medical treatment due to a major injury received in a laboratory environment, Campus Security is to be notified by calling 909-706-3000 or extension 3000 and 911 should be called.

For minor injuries, first aid kits should be accessible and fully equipped for use. First aid kits are only recommended for incidents that do not require emergency care. The kits should be periodically checked by the Laboratory Manager or Principal Investigator to ensure the availability of proper first aid treatment supplies in case of an accident. It is the Principal Investigator's responsibility to:

1. Always have the first aid equipment readily available.
2. Keep essential supplies in the first aid kit at all times.

It is the faculty, staff, or student's responsibility to notify the Principal Investigator and/or the Laboratory Manager if they become ill or injured from exposure to any chemical, biological, or radiological agent utilized in the laboratory. The following procedures should be followed:

1. Document the work related injury or illness by completing an online Incident Report. The form is available on the intranet at https://webapp.westernu.edu/incident_report/
2. Ensure that the injured person(s) receive prompt medical treatment.
3. Employees must contact the Office of Human Resources in order to be directed to the appropriate facility for medical evaluation or treatment.
4. Students can seek medical attention at the PCC Medical Center (if available), an Urgent Care, local hospital, or primary care physician.

For more detailed information on workplace illness and injuries refer to the WesternU

Accident Reporting

All accidents should be reported to the Principal Investigator, Laboratory Manager and the Laboratory Safety Office. Laboratory incidents resulting in even minor medical treatment or observation must be reported to the EH&S and Risk Management. If an employee was injured, then you must also complete the on-line Incident Report form to report the incident to the Workers' Compensation administrator in Human Resources. If a student was injured, report the incident to University Student Affairs. The report can be submitted electronically by going to https://webapp.westernu.edu/incident_report/

Facilities should also be notified by calling 909-469-5258 (or ext. 5258) as they will have to arrange for cleaning of the affected area before the laboratory can be reopened. Prior to reopening, Facilities should consult with EH&S, the PI and Lab Manager to ensure that any work that was required to safely reopen the lab has been completed.

Appendix A – CHEMICAL OR HAZARD SPECIFIC TRAINING FORM

A copy of the Laboratory Specific Training Form `FRPPRQO\NQRZQ DV 6231V` can be obtained online from the `3 FROOHFWL YHtites: JnsCdWtRe\` forms can be found at: www.Westernu.edu/research/safety/documents under Forms.

Appendix B – LABORATORY SAFETY AUDIT CHECKLIST

A copy of the Laboratory Safety Audit Checklist can be obtained online from the Research and % L R W H F K w @ S i e B J w @ www.Westernu.edu/research/safety/documents or by calling the Laboratory Safety Office.