Chemical Hygiene Plan

California State University, Chico

Department of Environmental Health and Safety

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Chemical Hygiene Plan Record of Revisions

Revision	By	Date	Description of Revision
1	MP	12-19-17	5.0 Medical Program added Section 5.3 Pregnant Employees
2	MP	05-23-18	Responsibility of the Chemical Hygiene Committee
3	MP	02-15-19	Add “annual” review requirement to Section 2.1 Responsibilities of EHS.
4	HS	11-12-19	Major reorganization and reword. Added and updated Sections and added Appendices. Removed Section 5.1 Medical Emergency Procedure; List of Absorbent Materials and Uses, and Appendix with CDC/USDA Select Agents and Toxins.

Legend:

MP = Marvin Pratt, Director

HS = Holly Swan, Industrial Hygienist/Environmental Program Manager

1.0 INTRODUCTION

California State University, Chico (the "University") is committed to providing a safe workplace and educational environment for its faculty, staff, students and visitors. To this end, the University has created a Chemical Hygiene Plan (CHP). The CHP is a resource for, and a supplement to, the University Injury and Illness Prevention Plan (IIPP). The IIPP is the comprehensive safety policy for the entire University (all locations, including laboratories). Authority for enforcement of adherence to standards set forth in this Chemical Hygiene Plan rests with the President of the University, as described in the IIPP.

1.1 Purpose

The purpose of the Chemical Hygiene Plan is to outline laboratory work practices and procedures which are necessary to ensure that members of the campus community are protected from the health hazards associated with chemicals with which they work. The Chemical Hygiene Plan is available to assist management, faculty, and supervisors to recognize hazards in the workplace, methods used to minimize potential exposure to hazardous chemicals, and procedures for incidents involving hazardous materials.

1.2 Scope

The Chemical Hygiene Plan applies to all employees who engage in laboratory uses of hazardous chemicals as defined below.

- Laboratory – A facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

- Hazardous Chemical – Any chemical which is classified as a health hazard or simple asphyxiant in accordance with the Hazard Communication Standard (Section 5194 of CCR, Title 8).

2.0 RESPONSIBILITIES

2.1 Environmental Health and Safety (EHS)

Environmental Health and Safety provides training and assistance to help departments and Principle Investigators meet the requirements of the Chemical Hygiene Plan and federal, state, and local regulations. Environmental Health and Safety responsibilities include the following:

- Provide hazard communication and laboratory safety training on an annual basis.
- Dispose of chemical wastes generated from laboratories in accordance with approved disposal methods.
- Periodically perform chemical hygiene and lab safety inspections, maintain inspection records, and notify departments/lab supervisor(s) of the results of these inspections.
- Ensure proper labeling guidelines are followed.
- Coordinate efforts to clean large spills.
- Maintain records of physicians written opinions.
- Maintain records of face velocities of fume hoods.

2.2 Chemical Hygiene Officer (CHO)

The University must designate a Chemical Hygiene Officer. The University's Chemical Hygiene Officer is the Director of Environmental Health and Safety. The CHO's primary duty is to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. In addition, responsibilities of the Chemical Hygiene Officer or their designee will include the following:

- Ensure the CHP is reviewed on an annual basis and updated as needed.
- Provide updates to Chemical Hygiene Committee on federal, state, and local regulations concerning laboratories, chemicals and worker safety issues.
- Provide consultation to Departments regarding program compliance.
- Identify employees who need medical monitoring.
- Determine which employees need exposure monitoring and conduct exposure monitoring when necessary.

2.3 Deans and Department Chairs

It is the responsibility of Deans and Department Chairs to ensure laboratory supervisors and principle investigators are adhering to the requirements within the Chemical Hygiene Plan and all local, state, and federal regulations.

2.4 Laboratory Supervisors/Principle Investigators (PI)

It is the laboratory supervisor and principle investigator's responsibility to institute the Chemical Hygiene Plan and ensure compliance with requirements within their respective laboratories. Responsibilities of each laboratory supervisor/principle investigator includes the following:

- Know current requirements of the CHP and adhere to those requirements.
- Ensure all laboratory work is performed in accordance with the CHP.
- Create standard operating procedures and perform hazard assessments for specific processes and experiments.
- Conduct, within their respective areas of responsibility, formal laboratory inspections.
- Ensure that action is taken to correct work practices and conditions that may result in employee overexposure or the release of toxic chemicals.
- Prepare for accidents that may result in the unexpected exposure to personnel or the environment. This includes stocking laboratories with spill clean-up material.
- Ensure all laboratory workers receive and understand training.
- Ensure all chemicals and waste are labeled according to regulatory standards.
- Monitor the safety performance of laboratory workers to ensure the required safety practices, equipment (including personal protective equipment and engineering controls), and techniques are being appropriately employed.
- Make Safety Data Sheets (SDS's) available to all laboratory workers and students.
- Ensure that proper disposal of unwanted hazardous chemicals and/or hazardous waste is done so with the assistance of EHS.
- Report to EHS all incidents when either of the following occurs:
    - When a laboratory worker is exposed to a hazardous material where symptoms of exposure are evident and/or medical treatment (including first aid) is rendered; or
    - When there is a spill or release of a hazardous substance where personnel in the immediate area cannot clean-up the spill safely.

2.5 Laboratory Workers

Laboratory workers includes those employees who are laboratory assistants, teaching assistants, and student employees. Laboratory workers' responsibilities include the following:

- Understand and comply with the procedures outlined in the Chemical Hygiene Plan.
- Understand and comply with all standard operating procedures which apply to the laboratory in which they are working in.
- Wear appropriate clothing and shoes in the laboratories and chemical stockrooms.
- Develop good personal chemical hygiene habits.
- Understand the function and proper use of all personal protective equipment. Use (wear) personal protective equipment when mandated or necessary.
- Report to the laboratory supervisor any significant problems arising during standard operating procedures.
- Report to the laboratory supervisor all facts pertaining to accidents which occur in the laboratory or if conditions or actions exist that could result in an accident.
- Know the location of the SDS's for the chemicals in the laboratory.
- Receive and understand all laboratory safety training as required.

2.6 Chemical Hygiene Committee (CHC)

The responsibilities of the Chemical Hygiene Committee are as follows:

- Meet twice a year or as needed.
- If requested, will review new procedure or process proposals for approval.

- If requested, will review proposals to change or modify existing procedure or process for approval.
- Discuss, explore, study and resolve problems that arise in the laboratories.
- Prepare meeting minutes and make available to the public.
- Review investigations of laboratory or hazardous area accidents and causes of incidents.
- Submit recommendations to the Chemical Hygiene Officer on laboratory or hazardous area problems.

3.0 PROCUREMENT AND APPROVAL

3.1 Procurement and Distribution

Before a chemical is received, information on the proper handling, storage, and disposal should be known to those who will be handling the chemicals. Safety data sheets (SDS's) shall be maintained so they are easily accessible and shall be referenced when receiving a chemical. No container should be accepted without an adequate identifying label and accompanying SDS.

3.2 Donations of Chemicals

The acceptance of donated chemicals and hazardous substances is strictly prohibited. Only chemicals and hazardous substances that have been purchased from a vendor are allowed on University property.

3.3 Prior Approval for Certain Substances

Some substances needing prior approval from EHS before being purchased include radioactive materials, "listed" regulated carcinogens, and select agents and toxins.

3.3.1 Requirements for Radioactive Materials

To purchase radioactive materials, a PI must obtain prior approval from the Radiation Safety Officer. More information is available in the University's Radiation Safety Manual.

3.3.2 Requirements for "Listed" Regulated Carcinogens

"Listed" carcinogens are the most hazardous class of carcinogen. Cal/OSHA has established extensive regulations governing their distribution, handling, and use. Any PI who wants to purchase a regulated carcinogen that is listed in CCR, Title 8, Section 5209 must get prior approval from the Chemical Hygiene Officer before ordering the substance.

3.3.3 Requirements for Possession of CDC and USDA Select Agents and Toxins

The Center for Disease Control and Prevention (CDC) regulates the possession, use, and transfer of select agents and toxins that have the potential to pose a severe threat to public health and safety. The CDC Select Agent Program oversees these activities and registers all laboratories and other entities in the United States that possess, use, or transfer a select agent or toxin. Possession of any of these select agents or toxins requires registration with the CDC (unless amounts are exempt as outlined in the next paragraph of this section). For an up to date list of regulated select agents and toxins please visit (https://www.selectagents.gov/SelectAgentsandToxinsList.html).

The CDC has established a list of select agent toxins which may be possessed without registration (unregulated) with the CDC, provided the maximum (permissible) amounts are not exceeded by each PI. Please refer to the regulatory body's website (https://www.selectagents.gov/PermissibleToxinAmounts.html) for a list of the select

agents that do not require registration when below permissible amounts and each agent's associated maximum permissible amount.

To begin the registration process, contact EHS at 898-5126.

3.3.4 Requirements for Possession of DEA Controlled Substances

DEA Controlled Substances do not need prior approval from EHS; however, the Principle Investigator must follow certain steps which are required by the DEA before purchasing. Please refer to the Controlled Substances guidance documents, *DEA Controlled Substance Protocol* and *DEA Controlled Substance Ordering* form which can be found at the EHS office.

4.0 DETERMINATION OF CONTROL MEASURES

Individual departments are responsible for identifying hazards within their educational and research programs. Multiple methods should be utilized to identify hazards, including, but not limited to:

- Hazard assessments utilizing the Risk and Safety Solutions (RSS) Assessment module.
- Hazardous chemical inventories and SDS referencing.
- Employee and student safety concern notifications.
- Inspections of work practices and areas.
- Incident investigations.
- Employee exposure monitoring.

When performing hazard assessments, the following items should be taken into consideration:

- The toxicity and quantity of chemical(s),
- Routes of entry,
- Possibility of reaction with other chemicals,
- Duration of exposure,
- Level of energy or air contaminant arising from a process, and
- Effectiveness of any control measures.

Based on the findings from these methods, appropriate control measures will be selected and implemented. Hazards will be eliminated or reduced using engineering controls, administrative controls, and/or personal protective equipment, in that order. Guidelines from *Prudent Practices in the Laboratory* by the National Research Council should always be considered when working in a laboratory.

5.0 CONTROL MEASURES

Control measures will be implemented to ensure that no employee be exposed to Cal/OSHA regulated substances above their exposure limit(s) as specified in CCR, Title 8, Section 5155, Table AC-1 "Permissible Exposure Limits for Chemical Contaminants". Safety Data Sheets (SDS) should always be referenced in order to protect human and environmental health.

5.1 Standard Operating Procedure (SOP)

Standard operating procedures are intended to provide laboratory workers with general guidance on how to safely work with a specific class of chemical or hazard. Appendix A of this plan outlines SOPs for use and handling for specific classes of hazards. In some instance multiple SOPs may be applicable for a specific chemical (i.e. both the SOPs for flammable liquids and carcinogens would apply to benzene).

In addition to these SOPs, the subsequent sections summarize control measures that must be utilized in all laboratories regardless of the hazards present.

5.2 Personal Hygiene

It is the responsibility of every employee and student to adhere to these personal hygiene guidelines. Supervisors should oversee that they are implemented.

- Food, beverage, cigarettes, vaping devices, or chewing gum is NOT allowed in laboratories.
- Never eat, drink, smoke, bite fingernails, apply cosmetics or handle contact lenses while in laboratory. Wash your hands after leaving the laboratory and before doing any of these activities.
- Never store food in a laboratory refrigerator or a refrigerator which is used to store chemicals. Refrigerators should be labeled for their intended use.
- Wash promptly whenever a chemical has contacted your skin.
- Never mouth pipette anything or use mouth to start a siphon.
- Avoid inhalation of chemicals. Do not smell or taste chemicals.

5.3 Personal Protective Equipment (PPE)

Individual departments and their PI's are responsible for ensuring appropriate PPE is made available and properly utilized by employees and students. PPE shall be appropriate to mitigate the hazards identified. Reference SDS's for a list of required personal protective equipment. PPE should be inspected before each use to ensure the equipment has not been compromised. If deficiencies in PPE are noted, the equipment should be cleaned, repaired or replaced before use. All PPE must be used, stored, cleaned and maintained in accordance with manufacturer's instructions. Lab areas, with a minimum continuous level of required PPE, must have posted signage specifying minimum PPE to be worn in area at all times.

5.3.2 Eye Protection

It is recommended to refrain from wearing contact lenses when working with chemicals.

Eye and face protection worn when working with chemicals shall meet the requirements of the current American National Standards Institute (ANSI Standard Z87.1). Enough protection against liquid splash is provided by ANSI Z87.1 rated goggles, not safety glasses. Eye protection should include a face shield when the chemical hazard warrants it. Reference the substance's SDS.

5.3.2 Skin, Hand, Body, and Foot Hand Protection

Avoid all skin contact with chemicals. Wear adequate clothing and footwear. Cotton clothing is the best choice. Lab coats are always required when working with chemicals. Remove your lab coat when you leave the laboratory or if it becomes contaminated. Open-toed shoes and sandals are not permitted when working with chemicals. Confine long hair and loose clothing. For an in-depth description of required daily attire refer to the memorandum *Appropriate Daily Work and Learning Environment Attire for Science Lab Areas dated* February 10, 2014, found in Appendix B of this plan.

Gloves must be worn for laboratory procedures where hazards may contact the skin. Wear gloves appropriate for the chemical. Chemical SDS's and the glove's manufacturer should be referenced when selecting gloves. Take degradation, permeation, and breakthrough into consideration. Heat resistant gloves must be used when handing hot objects. Abrasion resistant gloves should be worn for handling broken glass.

5.3.3 Respirators

All employees who wear a respirator must be enrolled in the Respiratory Protection Program prior to donning a respirator. Contact EHS to enroll in the program.

5.4 Emergency and Life-Safety Equipment

Each laboratory employee shall be familiar with the location, application, and correct way to operate emergency and life safety equipment. The equipment must meet regulatory standards and be inspected on a routine basis. Facilities Management and Service (FMS) conducts monthly inspections on emergency eye washes and safety showers to ensure standards are met. Appendix C of this plan describes standard operating procedures for inspecting emergency eyewashes and showers.

Fire extinguishers are inspected monthly, and in addition, receive annual service, both which are provided by FMS. The maintenance, inspection and supply of first-aid kits falls on each department. First-aid kits should only consist of dressing and band-aids.

If an employee notices life-safety or emergency equipment that is past-due for its inspection, is damaged, or malfunctioning it should be reported to FMS immediately.

5.5 Ventilation

Mechanical ventilation systems are utilized on campus as a control measure. Chemicals with an inhalation hazard should be used inside a laboratory-type fume hood. When using biohazard agents or biohazardous materials a biological safety cabinet should be used. At the University

only Class II, Type A2 biosafety cabinets are utilized. Fume hoods and biological safety cabinets are quantitively tested after installation, alterations, maintenance, and at least annually thereafter. An inventory of all laboratory-type fume hoods and biological safety cabinets, and their face velocity testing results, is maintained and kept by EHS.

All laboratory-type fume hoods must have a minimum average face velocity of 100 linear feet per minute with a minimum of 70 linear feet per minute at any one point. It is the responsibility of FMS, in conjunction with EHS, to test face velocities of all fume hoods on campus. The University's fume hood testing procedures can be found in Appendix D of this plan.

All biosafety cabinets (of the Class II, Type A2 variety) must have a minimum inward average face velocity of at least 75 linear feet per minute at the work opening. The certification of ventilation rates (face velocity) of biosafety cabinets is the responsibility of individual departments.

5.6 Housekeeping and Inspections

Inspections of laboratory areas are the responsibility of PI. Inspections should be comprehensive and done on a regular basis. Actions should be taken to correct any deficiencies found during the inspection in a timely manner. The following housekeeping items should be followed:

- Work surfaces and floors should be cleaned regularly and be clear of clutter. Bench tops should be cleaned at the end of an operation or experiment, or at a minimum, at the end of each workday.
- All chemicals must be placed in their assigned storage areas at the end of each workday. Chemicals should not be stored in fume hoods while not in use.
- Spills should be promptly cleaned up. Properly dispose of the spilled chemical and materials used to clean up the spill.
- Contaminated glassware should be cleaned regularly.
- Exits, hallways, stairs, and life safety/emergency equipment must never be blocked.
- Compressed gas cylinders must be secured.
- Label all chemical containers and waste properly.
- Do not store extraneous material(s) in a fume hood. These material(s) will interfere with the air flow and jeopardize the safe operation of the fume hood.
- Fume hood sashes should be closed when not in use.

5.7 Chemical Management

5.7.1 Inventory

The inventory of chemicals kept on-hand should be as small as practical. Economies of scale - buying large or bulk amounts - usually costs more in the long run due to the cost of disposing of old, unwanted chemicals as hazardous waste and seriously increases the potential and severity of fire, explosion and spills. A physical inventory of chemicals on hand should be conducted annually to identify the following:

- Containers which are leaking,
- Containers which are damaged (i.e. corroded, cracked, or dented) and may begin leaking,

- Materials which are unknown (i.e. labels missing or illegible),
- Chemicals which are expired,
- Chemicals which are no longer needed, and
- Chemicals which form peroxides or are considered to be potentially explosive compounds.

Chemicals in damaged or leaking containers must be repackaged into new, sound containers and relabeled, or disposed of. Do not open a bottle containing a peroxide former that has obvious crystal formation; the friction caused by opening a crystallized lid can cause an explosion. A list of unwanted chemicals should be submitted to EHS for pick-up and disposal.

5.7.2 Expiration Dates

Many chemicals lose their usefulness over time due to degradation with age (shelf life). The expiration dates which appear on labels made by chemical manufacturers should be adhered to. For peroxide forming compounds, label with date of opening and test every 3, 6, or 12 months depending on reactivity level. When the material reaches its expiration date, discard or neutralize.

5.7.3 Labeling

Container labeling is important to minimizing accidental exposure to hazardous materials and to prevent accidental mixing of incompatible chemicals. All chemical containers must be labeled with at least the identity of the contents and the hazards those contents present to users. Never remove or deface a label unless it will be replaced with a new one. Fading or damaged labels need to be reattached or replaced before the material becomes unknown. Any substance in an original manufacturer's container that is dated prior to the year 1994, must be evaluated and relabeled to be in compliance with Global Harmonized System (GHS) or discarded. For more information regarding chemical labeling requirements please refer to the CCR, Title 8, Section 5194 "Hazard Communication" standard.

5.7.4 Storage

Chemicals should not be exposed to heat or direct sunlight. Chemicals, when not in use, should not be stored in fume hoods or on bench tops; all chemicals should be placed in their assigned storage areas at the end of each day. Hazardous liquid chemicals should be stored below eye level.

Chemicals should be stored according to their chemical compatibility (their ability to react with each other). Chemicals which can react with each other and create a hazardous condition, such as fire or the generation of a toxic or flammable gas, should be stored apart. The separation should be sufficient enough to prevent the accidental mixing of materials in case of a spill. EHS's website has general guidelines on how to properly segregate chemicals, but the substances' SDSs should always be referenced.

5.7.5 Hazardous Waste Disposal

Chemical wastes must be kept in appropriately labeled containers and meet the following requirements:

- Be of sound construction and in good condition (i.e. not leaking),
- Be clean and free of any contamination,
- Be constructed of material compatible with the waste being stored, and
- Be kept closed at all times except when material is being added or removed. This means with an appropriate screw cap or bung screwed on tight enough not to leak if the container is inverted. A waste drum or bottle which is left open is a citable EPA violation.

In addition to the above requirements the following rules must be adhered to as well:

- Do not overfill containers (more than 80% full).
- Do not mix dissimilar wastes.
- Do not dispose of chemicals in the sink, toilet, or trash can.
- Do not use fume hoods to intentionally evaporate chemicals as a form of disposal.

EHS has a specific label to use for hazardous waste containers. An example of the hazardous waste label is shown in Figure 5.6 below. The label must be filled out completely with the following five pieces of information:

1. The name of the department that generated the waste.
2. The first date at which accumulation of waste starts.
3. The physical state of the waste (either liquid or solid).
4. The hazardous properties of the waste (i.e. flammable, reactive, toxic, corrosive, etc.) and the pH, if applicable.
5. The contents of the waste including the chemical name(s) of the waste material and the proportions of those chemicals if the waste is a mixture (i.e. percent, parts per million, molarity, etc.). An estimation of proportions is sufficient.

Hazardous waste must not accumulate for more than 90 days. To arrange for a chemical waste pickup, a *Request for Removal of Hazardous Waste* must be filled out and sent to EHS within 70 days from accumulation start date.

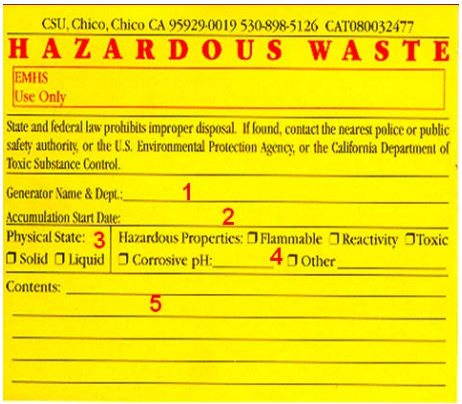


Figure 5.6

5.8 Working with Particularly Hazardous Substances (PHS)

Particularly hazardous substances are classified as acutely toxic chemicals, reproductive toxins, and select carcinogens. Consult the substance's SDS to determine if it meets one of the definitions below for a PHS.

- Acutely toxic chemicals - substances that have an oral LD50 of less than 50 mg/kg, a 24-hour skin contact LD50 of less than 200 mg/kg, and/or an inhalation LD50 of less than 200 ppm or 2000 mg/m^3 for 1 hour.
- Reproductive Toxins - substances which affect reproductive capabilities including chromosomal damage (mutagens), affect the fetus (teratogens), affect the sexual function and fertility in adults, and/or affect the development of offspring.
- Select Carcinogens - substances that are regulated by Cal/OSHA as a carcinogen, are "known to be carcinogens" in the NTP *Report on Carcinogens*, is listed under Group 1 "carcinogenic to humans' by the IARC, or is listed in either Group 2A or 2B by the IARC or under the category "reasonably anticipated to be carcinogens" by the NTP and causes significant tumor incidence in experimental animals in accordance with the criteria listed in CCR, Title 8, Section 5191.

All work that involves handling or transfer of PHS requires approval from the PI. The PI must ensure that the person or team who will be working with PHS understands the hazards and has received adequate training and supervision for the procedure or task. All work with PHS must be done in a designated area of a laboratory.

If a small spill occurs, promptly decontaminate all surfaces that have come in contact with the PHS. Refer to the SDS for assistance with determining an appropriate decontamination method. For safe removal of contaminated waste contact EHS.

5.9 Working Alone

Working alone in a laboratory creates increased risk. Avoid working alone whenever possible, especially when performing high hazard operations. Employees must consult with their PI or immediate supervisor before performing any operations after normal working hours or when others will not be present. Individual PI's/supervisor have the final responsibility and authority to determine whether employees may work alone and/or after hours unattended. If an employee is authorized to work alone, it is advised that the employee make arrangements with others in the building to check in periodically. Mobile contact information of the PI or supervisor must be made available to any employee allowed to work alone in the laboratory in case of emergency.

5.10 Unattended Lab Experiment

If a lab experiment will be unattended it is the responsibility of the laboratory worker to notify others of the hazards before entering the lab. On the outside door a sign must be placed with emergency contact information, the phone number for University Police Department and the hazards associated with the unattended lab experiment. A template of the unattended lab experiment sign can be found in Appendix E of this plan.

6.0 EMERGENCY RESPONSE

Emergency procedures, phone numbers, and evacuation routes should be posted in laboratory areas. Exit routes, fire extinguishers, and emergency eyewash and showers must be clearly marked and free of obstructions. Doors to laboratories must be kept closed when not occupied.

The *Hazardous Materials Emergency Information* sheet can be found in laboratory areas and other chemical handling work areas around campus and in Appendix F of this plan. This information sheet should be used as a quick reference guide during an emergency.

6.1 Chemical Spills

There is no defining amount that specifies what a minor or major spill is; it depends on numerous factors – the amount spilled, chemical spilled, and the environment in which it is spilled in. For references sake, a minor chemical spill is a spill or release of hazardous material that laboratory personnel are capable of handling safely without the assistance of safety or emergency personnel. A minor chemical spill becomes a major chemical spill whenever circumstances change so that laboratory personnel can no longer safely handle the situation. The cleanup of a chemical spill should only be done by workers who are familiar with the spilled chemical and its hazards. SDS's should be referenced when there is an accidental spill.

Every location where chemicals are stored should have available a supply of equipment and materials for use in the event of a minor chemical spill. A good rule of thumb is that the quantity of spill response material should be sufficient enough to handle twice the size of the largest container in storage. Spill response materials at a minimum should include:

- Neutralizing agents.
- Absorbents (granular or "pillows").
- Personal protective equipment.
- Scoops and/or pans for picking up granular solids.
- Plastic bags to contain contaminated absorbent.
- A permanent marker to use for labeling the bag of contaminated clean-up materials.

6.2 Accidental Exposures

For a minor incident, reference the SDS for first-aid measures and notify your immediate supervisor. For a major incident, call 911. If assisting a person who has been exposed to a chemical, use appropriate PPE to avoid exposing yourself. Always inform your supervisor if you are ever exposed to a chemical in any way.

6.3 Fire Response

In the event of a fire, leave the area immediately and call 911. Pull a fire alarm on your way out of the area. Fire extinguisher use is not required or expected by any employee, however, if a fire extinguisher is available, you have been trained in its use, and it is safe to do so, an extinguisher may be used on a small fire in its incipient stage.

6.4 Compressed Gasses

Compressed gas cylinders pose a hazard of sudden release of pressure. Following such a release, some cylinders or tanks can be cold enough to freeze skin. Depending on the contents, fire or toxic inhalation hazards can also exist. Leave the area immediately and call 911. Pull a fire alarm on your way out if evacuation of the building is necessary.

6.5 First Aid

First aid consists of washing with soap and water and applying a dressing or band aid. For employees, including student employees, any treatment beyond this requires the person seek professional medical attention and requires the completion and submittal of proper forms to Human Resources Employees Leaves and Workers' Compensation Department (530-898-6771). In the event an academic student is injured, contact Risk Management (530-898-6588).

7.0 MEDICAL SURVELLIANCE

7.1 Medical Monitoring

The University will provide all employees, at no cost to them, without the loss of pay, and at a reasonable time and place, who work with hazardous chemicals, an opportunity to receive medical attention, examination, and/or consultation by a physician or licensed health care professional (PLHCP) under the following circumstances:

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed to in the laboratory;
- Where exposure monitoring reveals an exposure level above the action level (or in the absence of an action level, the exposure limit) to a regulated substance where medical surveillance requirements have already been established (refer to the University's Medical Monitoring Program for individual substance's regulatory standard); and
- Whenever an event takes place in the work area such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure.

The content of the medical examination and the need for any follow-up examinations is determined by the examining PLHCP. The examining PLHCP will be provided the following information:

- The identity of the chemical to which the employee may have been exposed;
- A description of the conditions under which the exposure occurred including quantitative exposure data, if available; and
- A description of the signs and symptoms of exposure that the employee is experiencing, if any.

The PLHCP will submit a written opinion which will include the following information:

- Any recommendation for further medical follow-up,
- The results of the medical examination and any associated tests,
- A notice if any medical condition which may increase the employees' risk as a result of exposure to a hazardous chemical found in the workplace, and
- A statement that the employee has been informed by the physician of the results of the consultation, medical examination, and/or any medical condition that may require further examination or treatment.

The written opinion will not reveal specific findings or diagnoses unrelated to the occupational exposure in which the medical evaluation was intended for.

7.2 Pregnant Employees and Students

It should be noted that because of ethical considerations, virtually no comparable clinical tests have been conducted on humans, however, empirical studies have indicated a causative effect between exposure to some chemicals and reproductive abnormalities.

7.2.1 Employees

Pregnant employees should consider reviewing the potential for exposure to chemicals with their physician. You will need to be prepared to share a list of chemicals which you would likely be exposed to occupationally. In addition, employees should work closely with their supervisor and Human Resources during this time.

7.2.2 Students

The University cannot eliminate all risk factors faced by pregnant students in the classroom laboratory setting. Therefore, a physician's consent is required of all pregnant students to participate in classroom laboratories. Pregnant students who continue to participate in the classroom laboratory are not covered by the University for any exposure they may come in contact with that has the potential or capability to cause harm to the woman or child.

8.0 EMPLOYEE INFORMATION AND TRAINING

The University will provide employees with information and training to ensure that they are aware of the hazards of chemicals present in their work area. Such information and training will be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present, prior to assignments involving new exposure situations and annually thereafter.

8.1 Information

All employees should familiarize themselves with the following information:

- California Code of Regulations, Title 8, Section 5191 "Occupational Exposure to Hazardous Chemicals in Laboratories" and its appendices;
- The University's Chemical Hygiene Plan which can be found on EHS's website;
- Exposure limits for Cal/OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable Cal/OSHA regulation;
- Signs and symptoms associated with exposure to hazardous chemicals used in the laboratory; and
- The location and availability of known reference material on the hazards, safe handling, storage, and disposal of hazardous chemicals found in the laboratory including, but not limited to, safety data sheets received from the chemical supplier.

8.2 Training

Training will include, at a minimum the following elements:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical,
- The physical and health hazards of chemicals in the work area, and
- The measures employees can take to protect themselves from these hazards, such as utilizing appropriate work practices, emergency procedures, and personal protective equipment.

Operators of fume hoods will receive additional training. After the training the fume hood operator should be able to:

- Use the hood and its features safely;
- Determine the date of the last performance test and if the hood performance met the requirements;
- Understand the general hood purpose, airflow characteristics, and potential for turbulent airflow and escape of hazardous substances from the hood; and
- Know where the quantitative airflow monitor or alarm system in located on the hood and how it is used to indicate an inward airflow during hood operation.

9.0 RECORDKEEPING

The University will establish and maintain records for the following:

- Exposure monitoring,
- Medical consultations and examinations (kept by the University's medical provider),
- Physicians written opinions,
- Trainings, and
- Measurements of fume hood face velocities.

Exposure measurements, medical consultations and examinations, and physicians written opinions will be kept in accordance with Section 3204 of Title 8. Training records and ventilation system face velocity testing will be kept for a minimum of 5 years.

10.0 PLAN REVIEW AND EFFECTIVENESS

The Chemical Hygiene Plan will be reviewed on an annual basis by the Chemical Hygiene Office to ensure it meets regulatory requirements. The Plan's effectiveness will be evaluated by reviewing accident investigation, safety related complaints, completion of training, and inspections. The plan will be updated as needed.

Appendix A

Standard Operating Procedures by Hazard Class

Standard Operating Procedure

Acutely Toxic Chemicals

Hazard Description: Acutely toxic chemicals are those substances that pose significant adverse health effects for immediate or short-term exposures. The route of exposure that causes the adverse effect may be inhalation, absorption, or ingestion, depending on the chemical. Acutely toxic chemicals could be in solid, liquid, or gas form.

Labeling: Acutely toxic chemicals have a GHS toxicity category of 1 or 2 and are labeled with the following pictogram:

Storage: Storage of acutely toxic chemicals must adhere to the requirements outlined in the Chemical Hygiene Plan.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling acutely toxic chemicals:

- Must be handled in a signed, designated area of the laboratory.
- Must be used in a fume hood if inhalation hazard is present.
- Consider using disposable work surface covers (bench protectors) and dispose daily.
- Immediately close all containers of acutely toxic chemicals after use.
- Do not dispense acutely toxic chemicals directly onto a laboratory balance in the general lab space. Instead, use sealable pre-tared container inside fume hood, then take the sealed container to the balance. Make all adjustments inside a fume hood.

Personal Protective Equipment: Reference SDS

Spill and Decontamination: For spills of solid materials, do not dry sweep. Decontamination procedures vary depending on the material being handled. Reference SDS. All surfaces and equipment should be wiped with the appropriate cleaning agent following dispensing or handling to prevent accumulation of acutely toxic chemical residue.

Standard Operating Procedure

Carcinogens

Hazard Description: Carcinogens are chemicals that are known to cause cancer in humans and/or animals or are suspected of causing cancer. Refer to the Particularly Hazardous Substances section of the Chemical Hygiene Plan for a full definition of "Select Carcinogens". Carcinogenic effects may only become evident after a long latency period and may cause not immediate harmful effects.

Labeling: Labeling must adhere to the requirements outlined in the Chemical Hygiene Plan. Carcinogens have the following GHS "Health Hazard" pictogram:

Storage: Storage of carcinogens must adhere to the requirements outlined in the Chemical Hygiene Plan.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling carcinogens:

- Must be handled in a signed, designated area of the laboratory.
- Carcinogens should be used inside fume hoods or if necessary, a glove box.
- Use disposable work surface covers (bench protectors) in areas where carcinogens chemicals are handled to prevent contamination of work surface.
- Immediately close all containers of carcinogens after use.
- Do not dispense carcinogens directly onto a laboratory balance in the general lab space. Instead, use sealable pre-tared container inside fume hood, then take the sealed container to the balance. Make all adjustments inside a fume hood.

Personal Protective Equipment: Reference SDS.

Spill and Decontamination: For spills of solid materials, do not dry sweep. Reference SDS.

Standard Operating Procedure

Compressed Gases

Hazard Description: All compressed gases pose a physical hazard because of the high pressures inside the cylinder. Damaged cylinders may become uncontrolled rockets or pinwheels and cause severe injury. This danger can happen when unsecured, uncapped cylinder are knocked over causing the cylinder valve to break and high-pressure gas to escape rapidly. Poorly controlled release of compressed gas in chemical reaction systems can cause vessels to burst, create leaks in equipment or hoses, or produce runaway reactions. Compressed gases can be either liquified, non-liquified, or dissolved. Depending on the substance, there may also be additional hazards such as fire, explosion, corrosion, asphyxiation, and toxicity.

Labeling: Labeling must adhere to the requirements outlined in the Chemical Hygiene Plan. Compressed gases must have a label indicating whether the cylinder is full or empty and the following GHS pictogram:

Storage: Storage of compressed gases must adhere to the requirements outlined in the Chemical Hygiene Plan. Cylinders must be secured to wall, floor, or laboratory bench with appropriate cylinder supports. Do not store cylinders with the regulator in place. Cylinder caps should always remain on the cylinder unless a regulator is in place. Cylinders must be stored where they will not become overheated. Avoid storage near radiators, areas in direct sunlight, steam pipes, and heat releasing equipment.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling compressed gases.

- Transport compressed gas cylinders on equipment designed for this function. Never carry or “walk” cylinders by hand.
- Immediately close the cylinder valve after use.
- Leak check gas tubing or piping connections before turning on gas.

Personal Protective Equipment: Reference SDS.

Spill and Decontamination: If you observe or suspect the hazardous or inert gas is leaking attempt to turn off the cylinder at the cylinder valve if it is safe to do so. If you are unable to turn off the gas or have any doubts, evacuate the area immediately. Prevent others from entering the area. Reference SDS.

Standard Operating Procedure

Corrosives (Liquids and Solids)

Hazard Description: Corrosive chemicals are substances that cause visible destruction or permanent changes in human skin tissue at the site of contact. Corrosive chemicals can affect the eyes, skin, and respiratory tract. The main classes of corrosives include strong acids, bases, and dehydrating agents. Liquid corrosives are those with a pH of 4 or lower or a pH of 9 or higher. Solid chemicals are considered corrosive when in solution they fall in the above pH range. A highly corrosive chemical has a pH of 2 or lower or a pH of 12.5 or higher.

Labeling: Labeling must adhere to the requirements outlined in the Chemical Hygiene Plan. Corrosives have the following GHS pictogram:

Storage: Storage of corrosives must adhere to the requirements outlined in the Chemical Hygiene Plan. Specially designed corrosion-resistant cabinets should be used for the storage of corrosive materials. If no corrosion-resistant cabinet is available, store corrosives on plastic trays.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling corrosives.

- When working with highly toxic corrosive chemicals use fume hood.
- Immediately close all containers of corrosive chemicals after use.
- The use of chemical dispensers.
- Perform liquid transfers slowly using a funnel to minimize splash, splatter, and spills.
- Do not pour water into acid. Slowly add acid to water while carefully stirring. Some corrosive chemicals will generate heat and/or release gas on contact with water. Understand the potential for reaction with water before diluting a chemical.
- Reactions involving corrosive chemicals are often exothermic. Use heat-resistant labware and allow extra volume in your vessel to account for expansion and/or foaming.

Personal Protective Equipment: Reference SDS.

Spill and Decontamination: Reference SDS.

Standard Operating Procedure

Cryogens and Dry Ice

Hazard Description: A liquid cryogen is a liquified gas with a boiling point typically below 123 K (-150°C). Dry ice is frozen carbon dioxide. Dry ice sublimates from a solid to a gas at temperatures above -78.5°C.

The following hazards are associated with cryogens and dry ice: burns, asphyxiation, fire hazards, formation of liquid oxygen, pressure hazards, and facility damage.

Labeling: Label all cryogen containers with a cryogen warning and the cryogen's name.

Storage: A dewar is an insulated container used to store and transport liquefied gases. It is insulated by a vacuum between its two walls and is equipped with a pressure relief device. Dewars and delivery lines should be inspected for leaks.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling cryogens.

- Cryogens should only be used in well-ventilated areas.
- Do not touch cryogenic materials, or tools in contact with cryogens, with bare skin or disposable gloves. Use tongs and insulated gloves.

Personal Protective Equipment: Reference SDS. Use cryogen handling insulated gloves. A face shield is required for transferring from any pressurized container.

Spill and Decontamination: Reference SDS. For a small spill of cryogenic liquid, evacuate the area, allow ventilation to dissipate the gas, and contact EHS for oxygen deficiency monitoring prior to reentry.

For large spills, delivery line failures, tank/dewar or delivery failures, or any other uncontrolled release, immediately evacuate the room and pull the fire alarm to evacuate building.

Standard Operating Procedure

Flammable Liquids

Hazard Description: Flammable and combustible liquids are those which can ignite when exposed to an ignition source at the flashpoint (lowest temperature at which a material can form an ignitable mixture with air and produce a flame) of the liquid. Flammable liquids are defined as those with a flashpoint less than 100°F, while combustible liquids have a flashpoint greater than 100°F.

Labeling: Labeling must adhere to the requirements outlined in the Chemical Hygiene Plan. Flammable liquids have the following GHS pictogram:

Storage: Storage of flammable liquids must adhere to the requirements outlined in the Chemical Hygiene Plan. Flammable liquids must be stored in flammable liquid storage cabinets or refrigerators and be labeled with the words “Flammable”. No more than 10 gallons of flammable liquids may be stored outside of a flammable liquid storage cabinet, at any time in any room. Do no store near ignition sources. Do not store flammable liquids in chemical fume hoods or allow containers of flammable liquids in proximity to heating mantels, hot plates, or torches.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling flammable liquids:

- Immediately close containers of flammable liquids after use and return to storage cabinet.
- Flammable liquids should be used inside fume hoods.
- Shielding is required any time there is a risk of explosion.
- Remove all flammable and combustible materials from the fume hood or workspace when they are not needed for the immediate task.
- To avoid buildup of static electricity that may cause a spark, bond and ground metal or conductive plastic containers.
- Closed systems outside of the fume hood must be vented to a dedicated exhaust that does not recirculate.

Personal Protective Equipment: When there is a high risk of fire, such as those that use large volumes of highly flammable liquids, open flame, and/or pyrophoric materials, a fire-resistant lab coat and other fire-resistant PPE may be required. Reference SDS.

Spill and Decontamination: Put spill cleanup materials in a flammable waste can Reference SDS.

Standard Operating Procedure

Irritants

Hazard Description: Chemical irritants are materials that cause reversible inflammation or irritation to a body surface, including eyes, respiratory tract, skin or mucous membranes, upon contact. Primary irritants exert no systemic toxic action. The degree of irritation depends on the chemical concentration, duration of contact, and personal factors (health status, sensitization). Be aware that some irritants are sensitizers or have delayed symptoms. Sensitizers are chemicals that can cause an allergic reaction upon repeat low level exposures. Breathing chemical irritant gases can also cause the buildup of fluid in the lungs or can interfere with the exchange of oxygen.

Labeling: Labeling must adhere to the requirements outlined in the Chemical Hygiene Plan. Irritants have the following GHS pictogram:

Storage: Storage of irritants must adhere to the requirements outlined in the Chemical Hygiene Plan.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling irritants:

- Before handing an irritant, understand the irritants symptoms and routes of exposure.
- Immediately close all containers of irritants chemicals after use.
- Fume hoods must be used if there is an inhalation hazard present.
- Use disposable work surface covers (bench protectors) in areas where irritant chemicals are handled to prevent contamination surface.
- Do not dispense volatile irritant chemicals directly onto a laboratory balance in the general lab space. Instead, use sealable pre-tared container inside fume hood, then take the sealed container to the balance. Make all adjustments inside a fume hood.

Personal Protective Equipment: Reference SDS.

Spill and Decontamination: Reference SDS.

Standard Operating Procedure

Oxidizer

Hazard Description: Oxidizing chemicals are materials that are not necessarily combustible, may, generally by yielding oxygen, cause or contribute to, the combustion of other material.

Labeling: Labeling must adhere to the requirements outlined in the Chemical Hygiene Plan. Oxidizers have the following GHS pictogram:

Storage: Storage of oxidizers must adhere to the requirements outlined in the Chemical Hygiene Plan. Specially designed corrosion-resistant cabinets should be used for the storage of corrosive materials. If corrosion-resistant cabinets are not available, store on plastic trays. Do not store above eye level. Do not store flammable liquids in chemical fume hoods or allow containers of flammable liquids in proximity to heating mantels, hot plates, or torches.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling oxidizers:

- Immediately close all containers of oxidizers after use.
- Should be used inside a fume hood.
- Perform liquid transfers slowly using a funnel to minimize splash, splatter, and spills.
- Some strong oxidizers will generate heat and/or release gas on contact with water. Understand the potential for reaction with water before diluting a chemical. The water may need to be cooled with continuous stirring while acid is added.
- Reactions involving strong oxidizers are often very exothermic. Use heat-resistant labware and allow extra volume in your vessel to account for expansion and/or foaming. It may be necessary to pre-cool solutions.
- Keep all organic reagents, solvents, paper, and wood away from the area where strong oxidizers will be handled or stored.

Personal Protective Equipment: When there is no hood sash to shield the worker, splash goggles and face shield are required. Specialty gloves are required when prolonged contact or immersion of hands in corrosive liquid is anticipated; when large volumes of corrosive liquids are being transferred; and when adding particularly toxic corrosive chemicals. Reference SDS.

Spill and Decontamination: Use oxidizer specific spill control materials. Never use paper towels or other combustible materials to clean up spills or decontaminate surface. Put spill cleanup materials in a flammable waste can**.** Reference SDS.

Standard Operating Procedure

Peroxide-forming Chemicals

Hazard Description: Peroxide-forming chemicals are a class of materials that can form shock-sensitive and explosive peroxide crystals. When triggered by friction of shock the peroxides can explode. Peroxide-forming chemicals include solids, liquids, and gases. Peroxides form after exposure to air. The rate of peroxide formation is dependent on the specific chemical, the amount of air exposure and whether the chemical contains an inhibitor to retard peroxide formation.

Labeling: Peroxide-formers can have varying GHS pictograms depending on the substance's properties. They may or may not include the following hazard statement: "2.3 Hazards not otherwise classified (HNOC) or not covered by GHS: may form explosive peroxides".

Storage: Storage of peroxide-forming chemicals must adhere to the requirements outlined in the Chemical Hygiene Plan. Peroxide formers must be stored away from light and heat with tightly secured caps. They should be assigned an expiration date based on the storage limitations for the chemical's class and be checked for peroxides every 3, 6, or 12 months depending on the substance's reactivity. Containers must be labeled with dates of receipt, opening, and every time the container is checked for peroxide concentration (see label below).

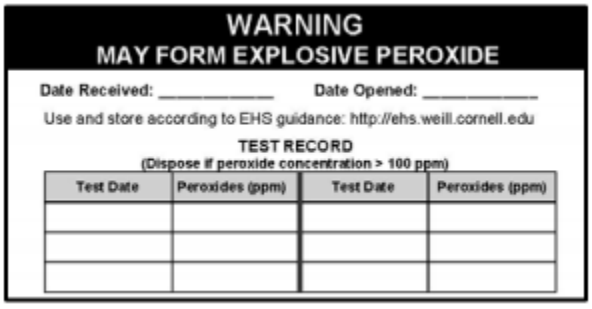
- Class A – Chemicals that form explosive levels of peroxides without concentration. Dispose of three months after opening or before the expiration date if unopened.
- Class B – Chemicals that form explosive levels of peroxides when concentrated through distillation evaporation or exposure to air after opening. Dispose of one year after opening or before the expiration date if unopened.
- Class C – Chemicals which are a hazard due to peroxide initiation of polymerization. Dispose of one year after opening or before the expiration date if unopened.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling PEC's.

- Immediately close all containers of peroxide-forming chemicals after use.
- Never use peroxide-forming chemicals that have expired.
- Work in a glovebox or a fume hood with sash closed as much as possible.
- Any peroxidizable chemical with visible discoloration, crystallization, multiple layers, or liquid stratification should be treated as potentially explosive. Contact EHS immediately.
- Never distill peroxide-formers to dryness. When possible, adding a non-volatile organic compound can dilute the peroxides remaining after distillation.

Personal Protective Equipment: Reference SDS.

Spill and Decontamination: Reference SDS.


WARNING
MAY FORM EXPLOSIVE PEROXIDE
Date Received: _____ Date Opened: _____
Use and store according to EHS guidance: http://ehs.weill.cornell.edu
TEST RECORD
(Dispose if peroxide concentration > 100 ppm)

Test Date	Peroxides (ppm)	Test Date	Peroxides (ppm)

Standard Operating Procedure

Potentially Explosive Compounds (PEC's)

Hazard Description: PEC's can become explosive over time as a result of contamination, concentration, evaporation, or loss/decomposition of chemical inhibitors. An explosive is any chemical compound or mechanical mixture that, when subject to heat, impact, friction, detonation, or other suitable initiation, undergoes rapid chemical change, evolving large volumes of highly heated gases – typically N_2 or CO_2 – that exert pressure on the surrounding medium. The term applies to materials that either detonate or deflagrate. Before using any PEC, it is essential to understand the potential triggers which leads to explosion or violent decomposition.

Labeling: Labeling must adhere to the requirements outlined in the Chemical Hygiene Plan. In general explosives have the following GHS pictogram; however not all PEC's carry this symbol.

Storage: Storage of PEC's must adhere to the requirements outlined in the Chemical Hygiene Plan. PEC's may require a dedicated refrigerator or blast cage reinforced desiccators. If you find an explosive chemical container that is damaged, bulging, past expiration, leaking or otherwise compromised in any way, do not handle the container. Move away from the area and prevent others from entering the area. Contact EHS immediately.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling PEC's.

- Never return excess chemicals to the original container. Small amount of impurities may be introduced into the container which may cause a fire or explosion.
- Immediately close all containers of PCE's after use and return them to storage location.
- Work in a glovebox or fume hood with sash closed as much as possible.
- The use of blast shield may be necessary in certain cases.
- Avoid use of metal spatulas and needles when working with compounds for which metal ions may catalyze explosive decomposition reactions.
- Avoid the use of ground-glass joints when working with compounds for which friction or mechanical shock may trigger explosion.

Personal Protective Equipment: Cotton or other static-reducing gloves should be considered when working with static-sensitive PEC's. Reference SDS

Spill and Decontamination: Avoid dry sweeping into metal dustpan if PCE is shock sensitive or react with metals. Reference SDS.

Standard Operating Procedure

Pyrophoric Chemicals

Hazard Description: Pyrophoric liquids and solids are defined as such when they are liable to ignite within five minutes after coming into contact with air, even when in small quantities. Pyrophoric gases will ignite spontaneously in air at or below 130° F.

Labeling: Pyrophoric liquids and solids are classified as a Category 1 flammable (pyrophoric gases are classified as Category 1A flammable gas) and will have the following GHS pictogram:

Storage: Storage of pyrophoric chemicals must adhere to the requirements outlined in the Chemical Hygiene Plan.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling pyrophoric chemicals.

- Never return excess chemicals to the original container. Small amount of impurities may be introduced into the container which may cause a fire or explosion.
- Must be handled in a signed, designated area.
- Must be used in a fume hood if inhalation hazard is present.
- Consider using disposable work surface covers (bench protectors) and dispose daily.
- Immediately close all containers of pyrophoric chemicals after use.
- Do not dispense pyrophoric chemicals directly onto a laboratory balance in the general lab space. Instead, use sealable pre-tared container to hold material while using balance.

Personal Protective Equipment: Reference SDS. Unless working in a glove box, it is highly recommended that a fire-resistant lab coat be worn while manipulating quantities of pyrophoric liquids over 10 mL or solids over 1 gram. Consider the use of Nomex/Leather polit's gloves, which provide fire resistance without compromising manual dexterity. These gloves should be worn over nitrile gloves and are recommended during syringe/cannula transfers of pyrophoric liquids.

Spill and Decontamination: For spills of solid materials, do not dry sweep. Decontamination procedures vary depending on the material being handled. Reference SDS. All surfaces and equipment should be wiped with the appropriate cleaning agent following dispensing or handling to prevent accumulation of acutely toxic chemical residue.

Standard Operating Procedure

Reproductive Toxins

Hazard Description: Reproductive hazards are substances which affect the reproductive capabilities including chromosomal damage (mutagens), affect the fetus (teratogens), affect the sexual function and fertility in adults, and/or affect the development of offspring.

Labeling: Labeling must adhere to the requirements outlined in the Chemical Hygiene Plan. Reproductive Toxins have the following GHS "Health Hazard" pictogram:

Storage: Storage of reproductive toxins must adhere to the requirements outlined in the Chemical Hygiene Plan.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling reproductive toxins:

- Must be handled in a signed, designated area of the laboratory.
- Reproductive toxins should be used inside fume hoods or if necessary, a glove box.
- Use disposable work surface covers (bench protectors) in areas where reproductive toxins are handled to prevent contamination of work surface.
- Immediately close all containers of reproductive toxins after use.
- Do not dispense reproductive toxins directly onto a laboratory balance in the general lab space. Instead, use sealable pre-tared container inside fume hood, then take the sealed container to the balance. Make all adjustments inside a fume hood.

Personal Protective Equipment: Reference SDS.

Spill and Decontamination: Reference SDS.

Standard Operating Procedure

Water-Reactive Chemicals

Hazard Description: Water-reactive chemicals are those chemicals, when in contact with water, may emit flammable gases that can form explosive mixtures with air. Such mixtures are easily ignited by ordinary sources of ignition and may result in a blast wave and flames. Some water-reactive chemicals can react vigorously with water to rapidly produce gases which are deadly at low concentrations.

Labeling: The term used for these chemicals by GHS is: "Chemicals Which, in Contact with Water, Emit Flammable Gas". Water-reactive chemicals are labeled with the following pictogram:

Storage: Storage of water-reactive chemicals must adhere to the requirements outlined in the Chemical Hygiene Plan. Water-reactive chemicals must not be stored with aqueous (water-containing) solutions, or near other sources of water such as sinks, water baths, or recirculating chillers. Do not store water-reactive chemicals with flammable materials or in a flammable liquid storage cabinet. Store water-reactive chemicals away from ignition sources.

Handling: In addition to the requirements outlined in the Chemical Hygiene Plan the following should be considered when handling PEC's.

- Never return excess chemicals to the original container. Small amount of impurities may be introduced into the container which may cause a fire or explosion.
- Immediately close all containers of PCE's after use and return to their storage location.
- Work in a glovebox or fume hood with sash closed as much as possible.
- Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction.
- Remove combustible and flammable materials and sources of ignition from the work area.
- Use fresh, dry solvents and thoroughly dried glassware.

Personal Protective Equipment: Reference SDS. Unless working in a glove box, it is recommended a fire-resistant lab coat be worn while manipulating large quantities of water-reactive liquids. Consider the use of Nomex/Leather polit's gloves over nitrile gloves.

Spill and Decontamination: Reference SDS. Once spilled, certain liquid or solid water-reactive chemicals may ignite. Use an appropriate extinguishing agent (do not use water). Do not use water to clean up spills or decontaminate a surface or equipment. Instead use wipers with a dry, non-polar solvent. Be sure all ignition sources are secured before beginning cleanup.

Appendix B

Daily Attire for Science Labs Memorandum

California State University, Chico
Chico, California 95929-0019

Memorandum

Date: February 10, 2014
To: Deans, Chairs, Directors, Managers, Supervisors, and Employees
From: J. Marvin Pratt, Director of Environmental Health and Safety
Subject: Appropriate Daily Work and Learning Environment Attire for Science Lab Areas

Although the University environment is often considered a casual working environment, there is a minimum level of daily attire that is appropriate for many areas at the University. This level of clothing is not to be confused with Personal Protective Equipment (PPE), which is outlined below.

While PPE requirements are often outlined in Material Safety Data Sheets (MSDS's), daily attire is not typically addressed. However, OSHA does require that employers provide a safe working environment for their employees. California OSHA addresses this in a general manner in the General Industry Safety Orders in Section 3383(b), which in part states, "Clothing appropriate for the work being done shall be worn." The publication *Prudent Practices in the Laboratory* produced by the National Research Council, has become an industry standard, is incorporated in the University's Chemical Hygiene Plan, and is widely recognized by OSHA as detailing acceptable practices. Appropriate daily wear is detailed in *Prudent Practices in the Laboratory* as:

- Clothing that fully covers the body.
- Shoes that cover the entire foot, provide a stable platform, and have rubber or similar slip resistant soles.
- Socks that cover the ankle.
- Lab coats (considered PPE).

The manager or supervisor who oversees the area should review daily attire for science lab areas (any areas where lab type work is being performed or chemicals are being stored) for appropriateness to ensure that increased levels of clothing or PPE are not required. For instance, when working with pyrophoric chemicals, lab coats and other clothing should be made of flame-resistant materials. Employees who are not dressed in appropriate daily wear shall not be permitted to work in lab environments.

Personal Protective Equipment is equipment or clothing that the employees would not typically wear when they leave the work area, and would include items like lab coats, eyeglasses, face shields, aprons, and like equipment. Proper selection of PPE requires a hazard evaluation be completed, employees (including student employees) be trained on proper wear and care of PPE, and that the employer provide PPE at no cost to the employees.

cc: Belle Wei, Provost and Vice-President for Academic Affairs
Lorraine B. Hoffman, Vice-President for Business and Finance
Drew Calandrella, Vice-President for Student Affairs
Richard Ellison, Vice-President for University Advancement
Sharyn Abernatha, Assistant Vice-President for Staff Human Resources

Appendix C

Emergency Eyewash and Shower Monthly Inspection Checklist

Department of Environmental Health & Safety

Emergency Eyewash/Shower Checklist - Monthly

Accessibility

☐ Unit installed within 10 seconds from the hazard and on the same plane

☐ Pathway is clear of obstructions

☐ Unit location is marked by highly visible sign

☐ Activator is easy to locate and accessible

☐ Area around unit is well-lit

External Condition

☐ Unit free of broken or missing parts

☐ Eyepiece covers are in place (eyewash and eye/face wash only)

☐ Unit protected against freezing

Equipment Discharge - Discharge unit to flush line and ensure the following:

☐ Unit can be activated in 1 second or less with foot or one-handed control

☐ Flow removes eyepiece covers (eyewash and eye/facewash only)

☐ Once activated, remains on without requiring the use of operator's hands

☐ Water temperature is tepid, 60-100°F

☐ Flushing pattern is dispersed throughout

☐ Water velocity is adequate, not too aggressive or too low

☐ Maintain minimum fluid flushing pressure – see table below

Eyewash	Eye/facewash combo	Shower
0.4 GPM for 15 minutes	3 GPM for 15 minutes	20 GPM for 15 minutes

☐ Does flushing fluid needs to be changed or supplemented (self-contained/portable units only)

Quality Control

☐ Initial and date card on unit and your departments tracking spreadsheet

☐ Report any obstructions, damage, improper flow, or any other potential problems to supervisor

Appendix D

Fume Hood Testing Procedures

Department of Environmental Health & Safety

Fume Hood Testing Procedures

1. Turn on the fume hood.
2. Position the sash at normal operating height (designated by markings on both sides of the hood opening).
3. Check the visual indicator to ensure its functioning properly.
4. Turn on anemometer and follow manufacturer's instructions on operation.
5. Divide the sash opening into 1 square foot sections and take a reading in the middle of every square foot section – see example below. The readings should be taken in the plane of the sash. Make sure your body is not obstructing the flow of air. When the readings are fairly constant take a measurement.

<- 48 in. ->

<- 24 in. ->				
	X	X	X	X
	X	X	X	X

6. Record each reading on the Fume Hood Inspection spreadsheet. Average face velocities and record.
7. Fill out and affix a Safety Approval Sticker on the fume hood in plain sight.
8. If a fume hood does not meet the minimum face velocity requirements, place an "Out of Service/Do Not Use" sign on it. Report malfunctioning hoods to Facilities Management and Services.

Appendix E

Unattended Lab Experiment Sign Template

California State University Chico, Department of _____

EMERGENCY CONTACT INFO

PRIMARY (Dept. Chair): _____

SECONDARY (PI): _____

Research Student(s): _____

University Police Department: 898-5555

INFO FOR EXPERIMENT IN PROGRESS

DATE POSTED:_____ROOM(PHSC):_____ HOOD:_____

HAZARDS (check all that apply)

❑ Low Hazard	❑ Reactive with Water_____
❑ Acid_____	❑ Reactive to Shock_____
❑ Base_____	❑ Inhalation Hazard_____
❑ Oxidizer_____	❑ Toxic (if swallowed)_____
❑ Flammable_____	❑ Biohazard_____
❑ Heavy Metal_____	❑ Radioactive_____
❑ Reactive with Air_____	❑ Compressed Gas_____

Contents (general or specific):_____

Notes:

Appendix F

Hazardous Material Emergency Information Sheet

HAZARDOUS MATERIALS EMERGENCY INFORMATION

FIRES: In the event of a fire, leave the area immediately and call 911. Pull a fire alarm on your way out of the area. Fire extinguisher use is not required or expected by any employee. However, if a fire extinguisher is available and if you have been trained on how to use one, they can be used on a small fire in its incipient stage.

CHEMICAL SPLASHES: If chemicals get splashed into your eyes or on your body, immediately rinse and/or flush the affected area with water using the emergency eyewash or emergency shower as applicable. Continue to flush the affected area for 15 minutes while someone else calls 911 and retrieves the Material Safety Data Sheet (MSDS) for the material involved.

INGESTION OF CHEMICALS: If chemicals are accidentally ingested, call 911 immediately and stay in communication with the operator. Be able to identify the materials which were ingested. Retrieve the Material Safety Data Sheet (MSDS) for the material involved.

CHEMICAL SPILLS AND RELEASES

LARGE SPILLS AND / OR HIGH HAZARD SPILLS: For large spills or spills of highly hazardous materials, leave the area immediately and call 911. Pull a fire alarm on your way out if evacuation of the building is necessary to prevent injury to others.*
NOTE: The EHS department is not a hazmat spill cleanup team but does have a contract in place with a vendor who will respond to hazmat spills on campus. The EHS department will coordinate with this contractor as necessary.

SMALL SPILLS AND/OR LOW HAZARD SPILLS: Only attempt to clean up spills for which you have the appropriate equipment, training, and level of comfort. For advice and/or help with non-emergency spills, call Environmental Health and Safety (EHS) at 898-5126. Hazardous wastes resulting from spills or spill cleanup activities need to be packaged in sealed containers and labeled promptly with hazardous waste labels.

COMPRESSED GASES: These all pose a hazard of sudden release of pressure. Following such a release, the cylinders or tanks can be cold enough to freeze skin. More importantly, depending on their contents, fire or toxic inhalation hazards can exist. Leave the area immediately and call 911. Pull a fire alarm on your way out if evacuation of the building is necessary to prevent injury to others.*

PHONE NUMBERS

Emergencies ---------- 911
University Police ---------- 898-5555
Poison Control Center ---------- 1(800)222-1222
Environmental Health and Safety ---------- 898-5126

* Minimum evacuation distance is at least 100 feet from the affected building./