



Chemical Hygiene Plan

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Office of Environmental Health & Safety
Campus Resilience and Response
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Table of Contents

Section 1. Purpose.....	1
Section 2. Policy	1
Section 3. Scope	1
Regulatory Requirements	2
Section 4. Roles and Responsibilities.....	3
Responsibilities – Deans, Directors, and Department Chairs	4
Responsibilities – Principal Investigator, Faculty, or Other Laboratory Supervisor	4
Responsibilities – Departmental Safety Coordinator	5
Responsibilities of Environmental Health and Safety and the campus Chemical Hygiene Officer	6
Responsibilities of the Chemical Hygiene Committee	7
Section 5. Chemical Hazard Communication	8
Regulatory Requirements	8
List of Hazardous Substances	9
Hazard Determination	9
Additional Resources	16
Section 6. Classes of Hazardous Chemicals.....	16
Regulatory Requirements	16
Identification and Classification of Hazardous Chemicals.....	17
Section 7. How to Reduce Exposures to Hazardous Chemicals	23
Regulatory Requirements to Hazardous Chemicals	23
Introduction.....	24
Safety Controls	24
Laboratory Safety and Emergency Response Equipment	33
Chemical Exposure Assessment	35
Section 8. Procurement, Chemical Inventory, Labeling, Storage, and Transportation	41
Regulatory Requirements	41
Procurement and Donations	41
Chemical Inventories	42

Chemical Labeling	45
Chemical Storage and Segregation	46
Laboratory Security	53
On-Campus Distribution of Hazardous Chemicals	54
Off-Campus Distribution of Hazardous Chemicals	54
Section 9. Training	55
Regulatory Requirements	55
Introduction.....	55
Types of Training.....	55
Student Training Plans	55
Laboratory-Specific Training.....	56
Documentation of Training	56
Section 10. Lab Evaluations and Compliance	56
Regulatory Requirements	56
Laboratory Safety Evaluations	57
Notification and Accountability	58
Section 11. Hazardous Chemical Waste Management.....	58
Regulatory Requirements	58
Hazardous Waste Program.....	58
Proper Hazardous Waste Management	60
Wastes that Require Special Handling	63
Managing Empty Containers	65
Transportation	65
Accumulation and Disposal.....	65
Drain Disposal	65
Section 12. Accidents, Emergencies, and Chemical Spills	66
Overview and Responsibilities.....	66
Accidents – Sharps Injury Involving Non-infectious Materials.....	69
Accidents – No Chemicals Involved	70
Accidents – Chemical Spill.....	71
Accidents – Fire.....	77

Section 13. Recordkeeping Requirements	77
Section 14. Document Revision History.....	78

Appendix A – General Rules for Laboratory Work

Appendix B – Container Labeling

Appendix C – Regulated Carcinogens

Appendix D – Listed Carcinogens

Appendix E – Chemical Compatibility Chart

Appendix F – Peroxide Forming Chemicals Common to Research

Appendix G – Laboratory Spill Clean-Up Procedures

Appendix H – Chemical Purchasing Guideline

Section 1. Purpose

The Chemical Hygiene Plan (CHP) establishes a formal written program for protecting laboratory personnel against adverse health and safety hazards associated with exposure to potentially hazardous chemicals and must be made available to all employees working with hazardous chemicals. The CHP describes the proper use and handling practices and procedures to be followed by faculty, staff, students, visiting scholars, and all other personnel working with potentially hazardous chemicals in laboratory settings.

The CHP complies with the California Occupational Safety and Health Administration, Title 8, CCR [§5191](#) Occupational Exposure to Hazardous Chemicals in Laboratories. This plan is based on best practices identified in, among other sources, “Prudent Practices for Handling Hazardous Chemicals in Laboratories” published by the National Research Council, the American Chemical Society’s “Safety in Academic Chemistry Laboratories”, and Cal Poly Pomona’s CHP.

Section 2. Policy

The California State Polytechnic University, Humboldt, hereinafter referred to as Cal Poly Humboldt or the University, is committed to providing a healthy and safe working environment for the campus community, free from recognized hazards in accordance with the Office of the Chancellor and Cal Poly Humboldt campus policies. It is essential that all faculty, staff, and students who use chemicals in a laboratory setting become familiar with and exercise this plan.

To ensure compliance with regulatory standards, any material found not to be in conformance with this plan and other Hazardous Waste requirements may be disposed of as hazardous waste at the direction of Environmental Health and Safety (EH&S). In case of life safety matters or imminent danger to life or health, the Director/Manager of EH&S or designee has the authority to order the cessation of the activity until the hazardous condition is abated.

Section 3. Scope

The provisions of this CHP apply to all personnel who work in laboratory settings that use, store, or handle potentially hazardous chemicals and all personnel who work in these facilities. The provisions of the CHP apply to but are not necessarily limited to: faculty, principal investigators, laboratory and stockroom technicians, technical assistants, student employees, registered volunteers, graduate students, building service engineers, and building trades and maintenance staff. This includes students enrolled in a laboratory

class, students providing voluntary unpaid assistance to a faculty or staff member, and students in a laboratory because of a club or other co-curricular activity.

The CHP does not apply to research involving exclusively radiological materials, radiation producing machines, biological materials, or lasers, as these safety procedures and regulatory requirements are outlined in the [Radiation Safety Manual](#) and [Biosafety Manual](#).

Research involving more than one type of hazard must comply with all applicable regulatory requirements and follow guidance outlined in the relevant safety manuals. For the purpose of this document, the laboratory use of hazardous chemicals is defined as the use of hazardous chemicals in a facility under the following conditions:

1. Chemical manipulations are carried out on a scale in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person;
2. Multiple chemical procedures or chemicals are used;
3. The procedure involved are not part of a production process, or in any way simulate a production process; and
4. "Protective laboratory practices and equipment" are available and in common use industry-wide to minimize the potential for employee exposure to hazardous chemicals.

The use of hazardous chemicals on campus which do not meet these conditions shall be managed in accordance with Title 8, CCR [§5194](#), the Hazard Communication standard.

The information presented in the CHP is not intended to be all inclusive. Departments, divisions, or other work units engaged in work with potentially hazardous chemicals that have unusual characteristics or are otherwise not sufficiently covered in the written CHP, must customize the document by adding additional sections addressing the hazards and how to mitigate their risks, as appropriate. Such customizations must receive prior approval from the PI/Laboratory Supervisor and/or Cal Poly Humboldt EH&S. For more information on specific chemical safety topics not covered in the CHP, please contact EH&S at risk-management@humboldt.edu.

Regulatory Requirements

Implementation of the necessary work practices, procedures, and policies outlined in this CHP is required by the following:

- Title 8, CCR [§5191](#), "Occupational Exposure to Hazardous Chemicals in Laboratories"

- Title 8, CCR, [Article 110](#), §5200-5220 regulated carcinogens including, but not limited to:
 - [§5203](#), “Carcinogen Report of Use Requirements”
 - [§5209](#), “Carcinogens”
- Title 8, CCR [§5154.1](#), “Ventilation Requirements for Laboratory – Type Hood Operations”

Other applicable regulations include those promulgated by the U.S. Department of Labor including Title 29 CFR [§1910.1450](#) “Occupational Exposure to Hazardous Chemicals in Laboratories” (the “Laboratory Standard”). EH&S will review and evaluate the effectiveness of this Plan at least annually and update it as necessary.

Section 4. Roles and Responsibilities

Employees and other personnel who work in or maintain (i.e. custodial staff) laboratories have the right to be informed about the potential health hazards of the chemicals in their work areas and to be properly trained to work safely with these substances.

Employees have the right to file a complaint with Cal/OSHA if they feel they are being exposed to unsafe or unhealthy work conditions and cannot be discharged, suspended, or otherwise disciplined by their employer for filing a complaint or exercising these rights. All personnel working with hazardous chemicals are encouraged to report any concerns about unsafe work conditions to EH&S through the risk-management@humboldt.edu email.

Responsibilities for the health and safety of the campus community extend to the highest administrative levels. The President and Vice Presidents are responsible for the implementation of the CSU’s Environmental Health and Safety Policy at all facilities and properties under campus control and adherence with [CSU Executive Order 1039](#). Deans and Department Heads are responsible for establishing and maintaining programs in their areas and for providing a safe and healthy work environment.

The day-to-day responsibility for the management of laboratory safety and adherence to safe laboratory practices rests with the PI/Laboratory Supervisor within individual laboratory units associated departments. All personnel, including PIs/Laboratory Supervisors, employees, and students have a duty to fulfill their obligations with respect to maintaining a safe work environment.

All employees and other personnel working with potentially hazardous chemicals have the responsibility to participate in training on general laboratory safety and review and be

familiar with the contents of the CHP. Those working with chemicals are responsible for staying informed about the chemicals in their work areas, safe work practices and proper personal protective equipment (PPE) required for the safe performance of their job. Failure to comply with these requirements will result in progress disciplinary action in accordance with CSU policy, and may result in temporary suspension of laboratory activities until corrective action is implemented.

Specific duties and responsibilities of personnel who work in areas where potentially hazardous chemical are present have been compiled in the document entitled General Rules for Laboratory Work (Appendix A).

Responsibilities – Deans, Directors, and Department Chairs

Deans, Directors, and Department Chairs are to work with their organizational units to ensure that affected employees are trained on the provisions of the University Chemical Hygiene Plan and are acting to comply with its requirements. These individuals should:

1. Implement the institutional Chemical Hygiene Plan
2. Identify all laboratories and chemical handling areas in their organizational unit
3. Assign Responsible Party/Lab Supervisor for each laboratory/chemical handling area, if one is currently not assigned.

Responsibilities – Principal Investigator, Faculty, or Other Laboratory Supervisor

The PI/Laboratory Supervisor has responsibility for the health and safety of all personnel working in their laboratory who handle hazardous chemicals. The PI/Laboratory Supervisor may delegate safety duties but remains responsible for ensuring that delegated safety duties are adequately performed.

The PI/Laboratory Supervisor is responsible for:

1. Knowing all applicable health and safety rules and regulations, training and reporting requirements, and standard operating procedures associated with chemical safety for regulated substances.
2. Identifying hazardous conditions or operations in the laboratory or other facility containing hazardous chemicals, determining safe procedures and controls, and implementing and enforcing standard safety procedures.
3. Maintaining an updated roster through Risk and Safety Solutions Profile application and conducting a formal Lab Hazard Assessment in order to mitigate hazards within the lab space.

4. Ensuring the availability of all appropriate PPE, after conducting the Lab Hazard Assessment, which properly fits the wearer, training on the selection care, use and proper storage of PPE, and ensuring that all PPE is maintained in working order.
5. Ensuring the Standard Operating Procedures (SOPs) are written and maintained in the Laboratory Safety Manual. Consult EH&S for SOP development support at risk-management@humboldt.edu.
6. Providing prior-approval for the use of hazardous chemicals in the PI/Laboratory Supervisor's laboratory or other facility with hazardous chemicals.
7. Consulting with EH&S on the use of higher risk materials, such as use of particularly hazardous substances, or conducting higher risk experimental procedures so that special safety precautions may be taken.
8. Maintaining an updated chemical inventory through RSS for the laboratory or facility.
9. Ensuring laboratory or other personnel under their supervision have access to and are familiar with the appropriate Safety Manual(s).
10. Training all laboratory or other personnel they supervise to work safely with hazardous materials and maintaining written records of laboratory-specific or other specialized training in appropriate Safety Manual(s). Training must include information on the location and availability of hazard information.
11. Promptly notifying EH&S and/or Facilities Management should they become aware that work place engineering controls (e.g. fume hoods) and safety equipment (e.g. emergency showers/eyewashes, fire extinguishers, etc.) become bypassed, disabled, or non-operational.
12. Promptly reporting accidents and injuries to EH&S. Fatalities and serious injuries must be reported to EH&S immediately to allow for compliance with the Cal/OSHA 8-hour reporting time frame. Any doubt as to whether an injury is serious should result in reporting, regardless of doubt.
13. Providing funding for exposure monitoring and medical surveillance and/or medical consultation and examination for laboratory and other personnel, as required.
14. Informing facilities personnel, other non-laboratory personnel, and any outside contractors of potential laboratory-related hazards when they are required to work in the laboratory environment.

Responsibilities – Departmental Safety Coordinator

Department Safety Coordinators (DSC) are optionally appointed by Deans, Directors, or Department Chairs/Heads to assist them in their duty of maintaining an accident-free environment within the area of their jurisdiction. They receive their authority directly from Deans, Directors, or Department Chairs/Heads and, at their discretion, are thereby limited to specific assigned duties. Their main function is to serve as a resource to their department and to be the department's liaison with the EH&S Office.

Responsibilities of the Departmental Safety Coordinators normally will include, but are not limited to, the following:

1. Assisting the Dean, Director, or Department Chair/Head in the development and implementation of a Health and Safety Program for the School or Department based on regulations and procedures established by the EH&S Office.
2. Receiving and handling internal safety-related complaints and suggestions and assisting in their evaluation within the department.
3. Conducting semesterly inspections of every lab space, or delegating the responsibility to qualified staff.
4. Expediting corrective actions for deficiencies as applicable.
5. Acting as liaison with the EH&S Office on all matters pertaining to inspection, accident/injury investigations, personnel safety training, reports, and technical advisement. Also acting as the primary department resource person for coordinating these activities.
6. Providing guidance and support to the departmental and organizational safety committees.
7. Providing technical assistance to laboratory workers.
8. Facilitating the implementation of the Chemical Hygiene Plan and assisting in establishing a safe work environment by collaborating with EH&S, faculty, other researchers, and lab personnel.
9. Providing guidance on laboratory safety compliance and other technical subjects.
10. Coordinating or providing training on occupational health and safety requirements.
11. Serving as liaison between the laboratory and EH&S in helping maintain safety and regulatory information, including Safety Data Sheets (SDS), ensure that all markings, labeling, and identifications per regulatory requirements are in place.
12. Requesting information and clarification on regulatory requirements from EH&S.
13. Assisting EH&S in evaluating program effectiveness.
14. Assisting in responding to any regulatory actions or investigations.
15. Participating in the development of the department emergency operations plan.
16. Ensuring that all regulatory information is disseminated.
17. Providing access to all department employees for safety concerns without fear of reprisal.
18. Encouraging compliance with the General Rules for Laboratory Work (Appendix A).

Responsibilities of Environmental Health and Safety and the campus Chemical Hygiene Officer

EH&S is responsible for administering and overseeing institutional implementation of the Laboratory Safety Program. The campus Chemical Hygiene Officer (CHO) is designated by EH&S, and is qualified by training and experience, to provide technical guidance in the

development and implementation of the provisions of the CHP. In case of life safety matters or imminent danger to life or health, the Director/Manager of EH&S provides technical guidance to personnel at all levels of responsibility on matters pertaining to laboratory use of hazardous materials.

The CHO is a member of EH&S and, with support from other EH&S personnel, is responsible for:

1. Informing PIs/Laboratory Supervisors of all health and safety requirements and assisting with the selection of appropriate safety controls, including laboratory and other workplace practices, personal protective equipment, engineering controls, training, etc.
2. Conducting annual inspections of laboratory spaces and immediately taking steps to abate hazards that may pose a risk to life or safety upon discovery of such hazards.
3. Assisting with hazard assessments, upon request.
4. Helping to develop and implement appropriate chemical hygiene policies and practices.
5. Having working knowledge of current health and safety rules and regulations, training, reporting requirements, and standard operating procedures associated to regulated substances. Such knowledge may be supplemented and developed through research and training materials.
6. Working with research staff to review existing SOPs and assist with developing new SOPs for handling hazardous chemicals.
7. Provide technical guidance and investigation, as appropriate, for laboratory and other types of accidents and injuries.
8. Helping to determine medical surveillance requirements for potentially exposed personnel.
9. Reviewing plans for installation of engineering controls and new facility construction/renovation, as requested.
10. Reviewing and evaluating the effectiveness of the CHP at least annually and updating it as appropriate.

Responsibilities of the Chemical Hygiene Committee

The Chemical Hygiene Committee (CHC) functions as a collaborative effort between colleges and administrative units to promote chemical safety, regulatory compliance, and adherence to the Chemical Hygiene Plan (CHP) procedures. The CHC serves as an advisory body to Environmental Health and Safety (EH&S), fostering a culture of safety and awareness across campus.

The CHC is charged with the following responsibilities:

1. Evaluate and maintain the effectiveness of EH&S safety plans, including but not limited to the Chemical Hygiene Plan, Hazardous Materials Management Plan, and Laboratory and Technical Area Safety Program.
2. Participate in the annual review and updates of these plans to ensure compliance with federal, state, and campus regulations.
3. Assist in disseminating chemical and laboratory safety information among campus departments to ensure compliance with CHP procedures.
4. Promote awareness and provide guidance to laboratory personnel on mitigating hazards associated with chemical use.
5. Assess chemical and laboratory incidents to ensure activities are conducted safely and align with Cal Poly Humboldt policies and applicable regulations.
6. Recommend corrective actions to address deficiencies identified during laboratory inspections.
7. Develop and maintain policies and procedures to ensure individuals working with or near hazardous materials have adequate training and experience to perform their duties safely.
8. Conduct regular meetings at least three times per year.
9. Maintain accurate records of all meetings, including meeting minutes and any actions taken or recommendations made.
10. Ensure representation from academic and administrative units actively engaged in the use or management of hazardous materials.
11. Collaborate with appointed voting and ex-officio members to address safety-related issues arising from teaching, research, industrial operations, and student activities.

Section 5. Chemical Hazard Communication

Regulatory Requirements

Cal Poly Humboldt is responsible for providing information about the hazardous substances on campus, the associated hazards, and the control of these hazards, through a comprehensive hazard communication program that is summarized below. Cal Poly Humboldt has an established Hazard Communication Program that complies with the Cal/OSHA Hazard Communication Standard, Title 8, CCR [§5194](#). The purpose of Cal Poly Humboldt's Hazard Communication Program is to ensure that all employees and, upon request, their personal physicians, have the right to receive information regarding the hazardous substances to which they may have been exposed at work. The requirements of the Hazard Communication Program apply to laboratory environments at Cal Poly Humboldt due to the potential for large scale experiments and for activities that may occur outside of areas where engineering controls are available. Proper hazard communication involves the active participation of the PI/Laboratory Supervisor, the EH&S Chemical Hygiene Officer, and the Laboratory/Safety Coordinator, who are each responsible for

providing consultation and safety information to employees working with hazardous chemicals.

List of Hazardous Substances

Each laboratory group is required to maintain a current chemical inventory that lists the chemicals and compressed gases used and stored in labs and the quantity of these chemicals. Specific information on any associated health or safety hazards must be made readily available to all laboratory personnel, typically through Safety Data Sheets (SDSs).

Hazard Determination

Faculty/Laboratory Supervisors are responsible for verifying if any items on their chemical inventory are subject to the requirements of the hazard communication regulation. The term “hazardous substance” refers to any chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed individuals. Hazardous substances may include, but are not limited to, those chemicals listed in the following:

1. “The Hazardous Substance List”, prepared by the Cal/OSHA Title 8, CCR [§339](#)
2. “Toxic and Hazardous Substances, Air Contaminants”, Title 8, CCR [§5155](#)
3. [“Threshold Limit Values for Chemical Substances in the Work Environment”](#), ACGIH, 2012
4. [“Monographs”](#), IARC, WHO
5. SDSs for reproductive toxins and cancer-causing substances
6. [“Chemicals Known to the State to Cause Cancer or Reproductive Toxicity”](#) (Proposition 65), Title 22, CCR 12000.

Inventory items found on the above list are subject to the requirements outlined below.

Safety Sata Sheets (SDS)

An SDS must be available for each hazardous substance in a laboratory’s chemical inventory. SDSs are available from the CSU online SDS library, through RSS SDS. Pls/Laboratory Supervisors are responsible for keeping SDSs current and making them accessible to all laboratory employees throughout the work day by storing them in a dedicated laboratory safety binder. Electronic copies of SDSs may satisfy this requirement provided that they can be **accessed immediately in the event of an emergency** or can be produced when requested.

New chemical substances synthesized or produced in a laboratory, and used or shared outside of a laboratory suite, require the preparation of an SDS for each synthesized substance. Contact EH&S at risk-management@humboldt.edu for more information on preparing new SDSs.

New Global Harmonization System (GHS) requires the standardization of SDSs. The minimum information required for an SDS is:

1. Identification of the substance or mixture and of the supplier
 - a. GHS product identifier
 - b. Other means of identification
 - c. Recommended use of the chemical and restrictions on use
 - d. Supplier's details (including name, address, phone number, etc.)
 - e. Emergency phone number
2. Hazards Identification
 - a. GHS classification of the substance/mixture and any national or regional information.
 - b. GHS label elements, including precautionary statements. Hazard symbols may be provided as a graphical reproduction of the symbols in black and white or the name of the symbol, e.g. flame, skull and crossbones. Symbols are required to be in a red border/red diamond.
 - c. Other hazards which do not result in classification are not covered by the GHS.
3. Composition/Information on Ingredients
 - a. Substance
 - i. Chemical identify
 - ii. Common name, synonyms, i.e. CAS number, EC number, etc.
 - iii. Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance
 - b. Mixture
 - i. The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of the GHS and are present at or above their cutoff levels.
4. First aid measures
 - a. Description of the necessary measures subdivided according to the different routes of exposure, i.e. inhalation, skin and eye contact, and ingestion.
 - b. Most important symptoms/effects, acute and delayed.
 - c. Indication of immediate medical attention and special treatment, if necessary.

5. Firefighting measures
 - a. Suitable (and unsuitable) extinguishing media.
 - b. Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products).
 - c. Special protective equipment and precautions for firefighters
6. Accidental Release measures
 - a. Personal precautions, protective equipment, and emergency procedures.
 - b. Environmental precautions.
 - c. Methods and materials for containment and cleaning up.
7. Handling and storage
 - a. Precautions for safe handling
 - b. Conditions for safe storage, including any incompatibilities.
8. Exposure controls/personal protection
 - a. Control parameters, e.g. occupational exposure limit values or biological limit values.
 - b. Appropriate engineering controls.
 - c. Individual protection measures, such as PPE.
9. Physical and chemical properties
 - a. Appearance
 - b. Odor
 - c. Odor threshold
 - d. pH
 - e. Melting/freezing points
 - f. Initial boiling point and boiling range
 - g. Flash point
 - h. Evaporation rate
 - i. Flammability (solid, gas)
 - j. Upper/lower flammability or explosive limits
 - k. Vapor pressure
 - l. Vapor density
 - m. Relative density
 - n. Solubility(ies)
 - o. Partition coefficient
 - p. Auto-ignition temperature
10. Stability and reactivity
 - a. Chemical stability
 - b. Possibility of hazardous reactions
 - c. Conditions to avoid (e.g. static discharge, shock or vibration)
 - d. Incompatible materials
 - e. Hazardous decomposition products

11. Toxicological information

- a. Concise but complete and comprehensible description of the various toxicological (health) effects and the available data used to identify those effects, including:
 - i. Information on the likely routes of exposure (inhalation, skin and eye contact);
 - ii. Symptoms related to physical, chemical, and toxicological characteristics;
 - iii. Delayed and immediate effects and chronic effects from short- and long-term exposure; Numerical measures of toxicity (such as acute toxicity estimates)

12. Ecological information

- a. Eco-toxicity (aquatic and terrestrial, where available)
- b. Persistence and degradability
- c. Bio-accumulative potential
- d. Mobility in soil
- e. Other adverse effects

13. Disposal consideration

- a. Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

14. Transport Information

- a. UN Number
- b. UN Proper shipping name
- c. Transport hazard class(es)
- d. Packing group, if applicable
- e. Marine pollutant (Yes/No)
- f. Special precautions which a user needs to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises

15. Regulatory Information

- a. Safety, health and environmental regulations specific for the product in question.

16. Other information including information on preparation and revision of the SDS

Labels, Signs, and Other Forms of Warning

Labeling requirements for all hazardous substances are summarized as follows:

- All containers of purchased hazardous materials or materials intended for distribution must be labeled with the identity of the hazardous substance.
- The label must contain all applicable hazard warning statements.
- The name and address of the chemical manufacturer or other responsible party must be present.
- Manufacturer's product labels must remain on all containers and must not be defaced in any way. Appropriate hazard warning statements and [Proposition 65](#) warning must be present. If not, that information must be added.
- Labels must be legible, in English, and prominently displayed.
- Symbols and/or other language are required for non-English speaking employees, where applicable.
- Secondary containers (such as spray bottles) must be labeled with the appropriate hazard warnings based on the knowledge of the chemicals and physical properties of that substance.
- New synthesized compounds must be labeled with employee's information, chemical name or structure if known, or at a minimum a chemical identification number derived from the employee's lab notebook.
- GHS symbols must be used when applicable when labeling containers

Additional information on container labeling is provided in Appendix B.

Figure 5-1. Global Harmonization System – Hazard Communication Standard Pictograms

Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	Flame  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	Exclamation Mark  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder  • Gases Under Pressure	Corrosion  • Skin Corrosion/Burns • Eye Damage • Corrosive to Metals	Exploding Bomb  • Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle  • Oxidizers	Environment (Non-Mandatory)  • Aquatic Toxicity	Skull and Crossbones  • Acute Toxicity (fatal or toxic)

Laboratory Door Hazard Placards

To support hazard communication and promote safe entry into laboratory spaces, Cal Poly Humboldt utilizes standardized Laboratory Door Hazard Placards. Cal Poly Humboldt is currently in the process of updating the Laboratory Door Hazard Placards across campus. These placards provide essential safety information at a glance for building occupants, laboratory personnel, and emergency responders.

Each placard is posted on the entrance of any room that uses or stores hazardous materials and includes the following elements:

- Principal Investigator name, building, and room number
- Emergency contact information
- Required personal protective equipment
- Summary of current hazards, including:
 - Chemical hazards, shown using both the NFPA 704 diamond (rating health, flammability, reactivity, and special hazards from 0 [minimal] to 4 [severe]) and GHS pictograms for globally harmonized hazard classification
 - Biological hazards, with Biosafety Level (BSL) indicated, if applicable
 - Radiological hazards, with corresponding symbols and severity level
 - Laser hazards, including Class rating, if applicable

These placards are a critical component of the University's Hazard Communication Program and are intended to:

- Enhance day-to-day laboratory safety awareness
- Provide essential hazard information at the point of entry
- Support emergency response planning and decision-making

Examples of the standardized Laboratory Door Hazard Placard and the NFPA 704 rating system used at Cal Poly Humboldt are shown below. These visual aids illustrate the key elements, hazard classifications, and communication features implemented across campus laboratory space.

Employee Information and Training

Employee training on specific workplace hazards must be provided at the time of initial assignment, whenever a new hazard is introduced into the workplace, and whenever employees may be exposed to hazards in other work areas. General Hazard Communication Training is available through CSU Learn under the title "Risk Management – Hazard Communication Certification". Additional employee training is required whenever a new hazard is introduced into the work environment and must be provided when receiving the SDS or other safety information and before the employee starts with said new hazard. All training must be in the appropriate language, educational level, and vocabulary for the personnel, and employees must be given the opportunity to ask questions.

Hazard Assessment

The Hazard Assessment Tool, accessed through Cal Poly Humboldt's RSS portal using myHumboldt login credentials, was developed to broadly identify activities involving chemical and other types of hazards and is an effective method of hazard communication. The Assessment application captures information on the specific type of hazard(s), the location of the hazard(s), the name of the PI/Laboratory Supervisor who oversees the facility and provides guidance for the proper exposure controls (Engineering, Administrative, Personal Protective Equipment, etc.), that should be used by the laboratory personnel to protect themselves against these hazards. Once PPE selection is made, the laboratory is required to conduct and document training for laboratory personnel on the use of PPE.

Additional Resources

1. "Occupational Exposure to Hazardous Chemicals in Laboratories." California Code of Regulations (CCR) Title 8, [§5191](#).
2. Standard Operating Procedures (SOPs) for handling toxic chemicals (laboratory specific)
3. General information on the signs and symptoms associated with exposure to hazardous substances used in the laboratory or facility (laboratory specific SOPs or SDS).
 - a. Identity labels, showing contents of containers (including waste receptacles) and associated hazards.
 - b. Label hazardous waste containers. See [EH&S website](#) for hazardous waste management information.
 - c. Warnings at areas or equipment where special or unusual hazards exist, i.e. particularly hazardous substances).

Section 6. Classes of Hazardous Chemicals

Regulatory Requirements

Implementation of the necessary work practices, procedures, and policies outlined in this chapter is required by the following:

- Title 8, CCR [§5194](#), "Hazard Communication"
- Title 8, CCR [§5209](#), "Carcinogens"

Other applicable regulations include those promulgated by the U.S. Department of Labor, including Title 29, CFR [§1910.1450](#) “Occupational Exposure to Hazardous Chemicals in Laboratories” (the “Laboratory Standard”).

Identification and Classification of Hazardous Chemicals

Chemicals can be divided into several different hazard classes. The hazard class will determine how a chemical should be stored and handled and what special equipment and procedures are required to use them safely.

Each chemical container, whether supplied by a vendor or produced in the laboratory, must include labels that clearly identify the hazards associated with that chemical. In addition to specific chemical labels, hazard information for specific chemicals can be found by referencing the SDS for that chemical.

It is essential that all laboratory workers understand the types of hazards, recognize the routes of exposure, and are familiar with the major hazard classes of chemicals. In many cases, the specific hazards associated with new compounds and mixtures will not be known, so it is recommended that all chemical compounds be treated as if they were potentially harmful and to use appropriate eye, inhalation, and body protection equipment.

Flammability Hazards

Several highly flammable substances are in common use in campus laboratories. Flammable liquids include those chemicals that have a flashpoint of less than 199.4 degrees Fahrenheit (93 degrees Celsius).

- These materials must be stored in self-closing flammable storage cabinets in aggregate quantities of 10 gallons.
- If less than 10 gallons, flammables can be stored in regular cabinets
- No more than 60 gallons of flammable liquids may be stored inside of an approved flammable liquid storage cabinet.
- Flame-resistant laboratory coats must be worn when working with large quantities (4 liters or more) of flammable materials and/or with procedures where a significant fire risk is present (e.g., when working with open flame or near ignition source).
- Store only compatible materials inside flammable cabinet.
- Particular attention should be given to preventing static electricity and sparks when handling flammable liquids by using electrical grounding and bonding techniques whenever required in accordance with Title 29, CFR [§1910.106](#) and [NFPA 45](#) [Fire Protection for Laboratories Using Chemicals] – Chapter 9, [NFPA 77](#) [Recommended Practice on Static Electricity] – Chapter 11.

Reactivity Hazards

Reactive and explosive substances are materials that decompose under conditions of mechanical shock, elevated temperature, or chemical action, and release large volumes of gases and heat. Some materials, such as peroxide formers, may not be explosive, but may form explosive substances over time. These substances pose an immediate potential hazard and procedures which use them must be carefully reviewed. These materials must also be stored in a separate flame-resistant storage cabinet or, in many cases, in a separate laboratory grade (fire rated) refrigerator or freezer that is designed for flammable/reactive chemicals.

Oxidizing agents are a classification of materials that are non-combustible by themselves but readily yield oxygen or other gases that accelerate combustion. Oxidizing agents react strongly with organic materials, reducing agents, and flammable materials. Oxidizing agents should always be segregated from organic or flammable chemicals, reducing agents, and combustible materials.

Peroxide formers (Appendix F) can only be stored in refrigerators when unopened. Once used, they must be stored in a dry environment.

Pyrophoric chemicals are a special classification of reactive materials that spontaneously combust when in contact with air and require laboratory-specific training. Flame-resistant laboratory coats or other appropriate flame-resistant protection must always be worn when working with pyrophoric chemicals. Follow the [UCLA Procedures for Safe Use of Pyrophoric Liquid Reagents](#) and [Procedures for Safe Use of Pyrophoric Solids](#) when utilizing such materials.

Health Hazards

Cal/OSHA uses the following definition for health hazards:

The term “health hazard” includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

The major classes of “hazardous” and “particularly hazardous substances” and their related health and safety risks are detailed below:

Corrosive Substances

As a health hazard, corrosive substances cause destruction of, or alterations in, living tissue by chemical action at the site of contact

Major classes of corrosive substances include:

- Strong acids – e.g., sulfuric, nitric, hydrochloric acids and hydrofluoric acids
- Strong bases – e.g., sodium hydroxide, potassium hydroxide, and ammonium hydroxide
- Dehydrating agents – e.g., sulfuric acid, sodium hydroxide, phosphorous pentoxide, and calcium oxide
- Oxidizing agents – e.g., hydrogen peroxide, chlorine, and bromine

Symptoms of exposure for inhalation include a burning sensation, coughing, wheezing, laryngitis, shortness of breath, nausea, and vomiting. For eyes, symptoms include pain, blood shot eyes, tearing, and blurring of vision. For skin, symptoms may include reddening, pain, inflammation, bleeding, blistering, and burns.

As a physical hazard, corrosive substances may corrode materials they come in contact with and may be highly reactive with other substances. It is important to review information regarding the materials they may corrode, and their reactivity with other substances, as well as information on health effects. In most cases, these materials should be segregated from other chemicals and require secondary containment when in storage.

Irritants

Irritants are defined as non-corrosive chemicals that cause reversible inflammatory effects on living tissue by chemical action at the site of contact. A wide variety of organic and inorganic compounds, including many chemicals that are in a powder or crystalline form, are irritants. The most common example of an irritant may be ordinary smoke which can irritate the nasal passages and respiratory system. Consequently, eye and skin contact with all laboratory chemicals should always be avoided. Symptoms of exposure can include reddening or discomfort of the skin and irritation to respiratory systems.

Sensitizer

A sensitizer (allergen) is a substance that causes exposed people to develop an allergic reaction in normal tissue after repeated exposure to the substance. Examples of sensitizers include diazomethane, chromium, nickel, formaldehyde, isocyanates, arylhydrazines, benzylic and allylic halides, and many phenol derivatives. Sensitizer exposure can lead to all the symptoms associated with allergic reactions or can increase an individual's existing allergies.

Hazardous Substances with Toxic Effects on Specific Organs

Substances in this category include:

- Hepatotoxins – i.e., substances that produce liver damage, such as nitrosamines and carbon tetrachloride
- Nephrotoxins – i.e., agents that produce kidney damage, such as certain halogenated hydrocarbons
- Neurotoxins – i.e., substances which produce their primary toxic effects on the nervous system, such as mercury, acrylamide, and carbon disulfide
- Agents which act on the hematopoietic system – e.g., carbon monoxide and cyanides which decrease hemoglobin function and deprive the body tissues of oxygen
- Agents which damage lung tissue – e.g., asbestos and silica

Symptoms of exposure to these materials vary, as well as the mechanism of exposure. Personnel working with these materials should review the SDS for the specific material being used, take special note of the associated symptoms and mechanism of exposure, and contact EH&S for assistance if required.

Particularly Hazardous Substances

OSHA recognizes that some classes of chemical substances pose a greater health and safety risk than others. To differentiate this different risk characteristic, OSHA identifies two categories of hazardous chemicals:

1. Hazardous chemicals
2. Particularly hazardous substances

Substances that pose such significant threats to human health are classified as “particularly hazardous substances” (PHSs). The OSHA Laboratory Standard and Cal/OSHA regulation require that special provisions be

established to prevent the harmful exposure of researchers to PHSs, including the establishment of designated areas for their use.

1. Use of containment devices such as fume hoods or glove boxes.
2. Procedures for safe removal of contaminated waste.
3. Decontamination procedures.

Particularly hazardous substances are divided into three primary types:

Acute toxins

Substances that have a high degree of acute toxicity are interpreted by OSHA as being substances that “may be fatal or cause damage to target organs as the result of a single exposure or exposures of short duration.” These chemicals, associated chemical waste, and storage containers must be handled with care to prevent cross contamination of work areas and unexpected contact. These chemicals must be labeled as “Toxic”. Empty containers of these substances must be packed and disposed of as hazardous waste without rinsing trace amounts into the sanitary sewer system.

Reproductive toxins

Reproductive toxins include any chemical that may affect the reproductive capabilities, including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

Reproductive toxins can affect the reproductive health of both men and women if proper procedures and controls are not used. For women, exposure to reproductive toxins during pregnancy can cause adverse effects on the fetus. These effects include embryolethality (death of the fertilized egg, embryo, or fetus), malformations (teratogenic effects), and postnatal functional defects. For men, exposure can lead to sterility.

Examples of embryotoxins include thalidomide and certain antibiotics such as tetracycline. People with childbearing potential should not that embryotoxins have the greatest impact during the first trimester of pregnancy. Since pregnancy is often not detected during this period of high susceptibility, special caution is advised when working with all chemicals, especially those rapidly absorbed through the skin (e.g., formamide). Pregnant people and those intending to become pregnant should consult with their laboratory supervisor, EH&S, and their personal

physician before working with substances that are suspected to be reproductive toxins.

Carcinogens

Carcinogens are chemical or physical agents that cause cancer. Generally, they are chronically toxic substances that cause damage after repeated or long-duration exposure, and their effects may only become evident after a long latency period. Chronic toxins are particularly insidious because they may have no immediately apparent harmful effects. These materials are separated into two classes:

Select carcinogens are materials which have met certain criteria established by the National Toxicology Program (NTP) or the International Agency for Research on Cancer (IARC) regarding the risk of cancer via certain exposure routes. It is important to recognize that some substances involved in research laboratories are new compounds and have not been subjected to testing for carcinogenicity. The following references are used to determine which substances are select carcinogens by Cal/OSHA classification:

- [OSHA Carcinogen List](#)
- [Annual Report on Carcinogens](#) published by the NTP, including all of the substances listed as “known to be carcinogens” and some substances listed as “reasonably anticipated to be carcinogens”
- International Agency for Research on Cancer (IARC), including: All of Group 1 “carcinogen to humans” by the International Agency for Research on Cancer Monographs (IARC) (Volumes 1 – 48 and Supplements 1 – 8)
- Some in Group 2A or 2B, “Reasonably anticipated to be carcinogens” by the NTP and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
 - After inhalation exposure of 6 – 7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m³
 - After repeated skin application of less than 300 mg/kg of body weight per week
 - After oral dosages of less than 50 mg/kg of body weight per day

Regulated Carcinogens fall into a higher hazard class and have extensive additional requirements associated with them. The use of these agents may require personal exposure sampling based on usage. When working with Regulated Carcinogens, the regulatory requirements are very extensive for laboratories that may exceed long term (8 hour) or short term (15 minutes) threshold values for these chemicals.

Chemicals Known to the State of California to Cause Cancer or Reproductive Toxicity (Prop 65)

The Safe Drinking Water and Toxic Enforcement Act of 1986, also known as [Proposition 65](#), requires the State to publish a list of chemicals known to cause cancer and reproductive toxicity. The list is updated regularly and reviewed by two committees that are a part of the Office of Environmental Health Hazard Assessment's Science Advisory Board. The two committees are the Carcinogen Identification Committee (CIC) and Developmental and Reproductive Toxicant (DART) Identification Committee.

Section 7. How to Reduce Exposures to Hazardous Chemicals

Regulatory Requirements to Hazardous Chemicals

Implementation of the necessary work practices, procedures, and policies outlined in this section is required by the following:

- Title 8, CCR [§5191](#), "*Occupational Exposures to Hazardous Chemicals in Laboratories*"
- Title 8, CCR [§5209](#), "*Carcinogens*"
- Title 8, CCR [§5154.1](#), "*Ventilation Requirements for Laboratory-Type Hood Operations*"

Other applicable regulations include those promulgated by the U.S. Department of Labor including Title 29 CFR [§1910.1450](#) "Occupational Exposure to Hazardous Chemicals in Laboratories" (the "Laboratory Standard").

Introduction

Hazardous chemicals require a carefully considered, multi-tiered approach to ensure safety. There are four primary routes of exposure for chemicals which have associated health hazards:

- Inhalation
- Absorption (through the skin or eyes)
- Ingestion
- Injection (skin being punctured by a contaminated sharp object or uptake through an existing open wound)

Of these, the most likely route of exposure in the laboratory is by inhalation. Many hazardous chemicals may affect people through more than one of these exposure modes, so it is critical that protective measures are in place for each of these uptake mechanisms.

Safety Controls

Safety controls are divided into three main classifications:

1. Engineering Controls
2. Administrative Controls
3. Personal Protective Equipment

Elements of these three classes are used in a layered approach to create a safe working environment. The principles of each of these elements are detailed below.

Engineering Controls

Engineering controls include all “built in” safety systems. These controls offer the first line of protection and are highly effective in that they generally require minimal special procedures or actions on the part of the user except in emergency situations. A fundamental and very common example is the laboratory fume hood which is very effective at containing chemical hazards and protecting users from inhalation hazards. Other examples of engineering controls include general room ventilation, flammable material storage units, and secondary containment.

General Laboratory Ventilation

All laboratory rooms in which hazardous materials are used must have fresh air ventilation with 100% of the exhaust venting to the outside. Laboratory rooms should not be part of recycled air systems. In cases where this is not

feasible, a formal hazard evaluation will be made by EH&S to determine what work can be done in the space and under what special conditions or limitations. Laboratory rooms should be kept at negative pressure compared to public areas to prevent the spread of hazardous vapors.

Fume Hoods

Laboratory fume hoods are one of the most important pieces of equipment used to protect laboratory and other workers from exposure to hazardous chemicals. Other methods include vented enclosures for large pieces of equipment or chemical storage, and portable exhaust systems for capturing contaminants near the point of release. Some systems are equipped with air cleaning devices (HEPA filters or carbon absorbers). **Use a laboratory fume hood when working with all hazardous substances.**

In addition, a laboratory fume hood or other suitable containment device must be used for all work with “particularly hazardous substance.” A properly operating and correctly used laboratory hood can reduce or eliminate volatile liquids, dusts, and mists.

- Fume hoods are evaluated for operation and certified by Facilities Management on an annual basis. These annual evaluations check the fume hood air flow velocity to ensure that the unit will contain hazardous vapors. Data on annual fume hood monitoring will be maintained in Facilities Link.
- Each fume hood should have a current calibration sticker and a marker indicating the highest sash height to be used when working with hazardous materials. Contact EH&S for a fume hood evaluation if these labels are missing.
- Air flow for fume hood ventilation is measured at nine points. The average of nine readings must be at least 100 linear feet per minute (fpm) with a minimum of 70 fpm for any one measurement. The average face velocity should not exceed 160 fpm.
- Each fume hood must be equipped with at least one type of continuous quantitative monitoring device designed to provide the user with current information on the operational status of the hood. Many hoods also have motion sensors to determine when they are not in active use. These sensors will reduce the fume hood’s air flow as a part of the campus’ energy savings effort.
- When hazardous materials are in a fume hood, but it is not under active use, (e.g., during an unattended reaction or experiment), the

sash should be closed. Fume hoods are not designed for storage of hazardous materials.

Routine maintenance and repairs of fume hoods are conducted by Facilities Management through submitting a work order form. EH&S does not initiate maintenance but will coordinate with Facilities Management to ensure completion. An outside vendor may need to be consulted dependent on the service requested.

General Rules for Fume Hood Use

The following general rules should be followed when using laboratory hoods:

1. Fume hoods must provide an average linear face velocity of 100 fpm with a minimum of 70 fpm at any one location. If the hood is unable to attain the required face velocity, the sash will be lowered until a satisfactory velocity is achieved. The hood shall be marked indicating the maximum sash height.
2. Fume hoods **should not** be used for work involving hazardous substances unless they have a certification label that confirms certification has occurred within the past year. Immediately contact EH&S for fume hood certification.
3. Always keep hazardous chemical more than 6 inches behind the plane of the sash.
4. Never put your head inside a laboratory hood containing hazardous materials. The plane of the sash is the barrier between contaminated air and uncontaminated air.
5. Work with the hood sash in the lowest practical position. The sash acts as a physical barrier in the event of an accident. Keep the sash closed when not conducting work in the hood.
6. Do not make modifications to hoods, duct work, or the exhaust system without first contacting EH&S.
7. Fume hoods **should not** be used as storage areas for chemicals, apparatus, or other materials. Keep it clean and clear. Only materials actively in use should be in the hood. Excessive storage reduces the ability of the fume hood to operate effectively.
8. Fume hood sashes should be closed except when necessary to adjust the apparatus inside the hood or while conducting a

chemical procedure. Fume hood sashes should be closed when fire alarms sound and for energy efficiency.

Chemical fume hoods should be inspected upon installation, renovation, when a deficiency is reported, or a change has been made to the operating characteristics of the hood. Since fume hoods used for regulated carcinogens have additional requirements, such as increased face velocity, contact EH&S if the intended use changes for further evaluation.

Glove Boxes and Ventilation Devices

In addition to fume hoods, some laboratories use contained glove box units for working with reactive chemicals under an inert environment, working with very toxic substances in a completely closed system, or for creating a stable, breeze free system for weighing hazardous or reactive materials. These units can be very effective because they offer complete containment.

Another type of ventilation device is the elephant trunk, or snorkel, which is connected to the exhaust system. This device is effective for capturing discharges from instruments such as gas chromatographs. The intake of the snorkel must be placed very close to the source to be effective. There are newer designs that are mounted on articulating arms, which make the systems more convenient to use.

Other Engineering Controls

In addition to the elements listed above, consideration must be given to providing sufficient engineering controls for the storage and handling of hazardous materials.

- No more than 10 gallons of flammable chemicals may be stored outside of an approved flammable storage cabinet.
- For refrigerated or frozen storage, flammable and explosive materials must be kept in refrigeration units specifically designed for storing these materials. Generally, these units do not have internal lights or electronic systems that could spark and trigger an ignition; additionally, the cooling elements are external to the unit. These units should be labeled with a rating from Underwriters Laboratory or other certifying organization.
- Secondary containment must be provided for corrosive and reactive chemicals and is recommended for all other hazardous chemicals.

Secondary containment should be made of chemically resistant materials and should be sufficient to hold at least 110% the volume of at least the largest single bottle stored in the container.

- Laboratories that use hazardous materials must contain a sink, kept clear for hand washing to remove any final residual contamination.
 - Hand washing is required whenever a staff member who has been working with hazardous materials plans to exit the laboratory or work on a project that does not involve hazardous materials.

Administrative Controls

The next layer of safety controls is Administrative Controls. These controls consist of policies and procedures. They are not generally as reliable as engineering controls in that the user must carefully follow the appropriate procedures and must be fully trained and aware in order to do so.

Laboratory groups should also review their operations to minimize the amounts of hazardous substances in use or to replace them with less hazardous alternatives. Attention must also be paid to the appropriate segregation of incompatible materials.

Standard Operating Procedures

Standard operating procedures (SOPs) that are relevant to safety and health considerations must be developed and followed when laboratory work involved the use of hazardous chemicals (Title 8, CCR [§5191](#) (e)(3)(A)), especially for PHSs. SOPs are written instructions that detail the steps that will be performed during a given experimental procedure and include information about potential hazards and how these hazards will be mitigated. SOPs should be written by laboratory personnel who are most knowledgeable and involved with the experimental process. The development and implementation of SOPs is a core component of promoting a strong safety culture in the laboratory and helps ensure a safe work environment.

While general guidance regarding laboratory work with chemicals is contained in this plan, Faculty/Laboratory Supervisors are required to develop and implement laboratory-specific SOPs for certain hazardous chemicals and PHSs that are used in their laboratories. These SOPs must be submitted and reviewed by the PI prior to implementation. For certain hazardous chemicals, PHSs, or specialized practices, consideration must be

given to whether additional consultation with safety professionals is warranted or required.

Circumstances requiring approval from the PI/Laboratory Supervisor must also be addressed in laboratory-specific SOPs. These circumstances are based on the inherent hazards of the material used, the hazards associated with the experimental process, the experience level of the worker, and the scale of the experiment. Some examples of circumstances that may require prior approval include working alone in a laboratory, unattended or overnight operations, the use of highly toxic gas of any amount, the use of large quantities of toxic or corrosive gases, the use of extremely reactive chemicals (e.g., pyrophoric, water reactive chemicals), or the use of carcinogens.

EH&S is available to assist with the development of SOPs. SOPs must be developed prior to initiating any experiments with hazardous chemicals or particularly hazardous substances and are to be reviewed, approved by PI signature, filed and maintained in the Laboratory Safety Manual where they are accessible to all laboratory personnel.

When drafting an SOP, consider the type and quantity of the chemical being used, along with the frequency of use. The Safety Data Sheet (SDS) for each hazardous chemical or particularly hazardous substance that will be addressed in the SOP should be referenced during SOP development. The SDS lists important information that will need to be considered, such as exposure limits, type of toxicity, warning properties, methods of exposure, and symptoms of exposure. If a new chemical will be produced during the experiment, an SDS will not necessarily be available. In these cases, the toxicity is unknown, and it must be assumed that the substance is particularly hazardous, as a mixture of chemicals will generally be more toxic than its most toxic component.

Personal Protective Equipment

Personal protective equipment (PPE) served as a researcher's last line of defense against chemical exposures and is required by everyone entering a laboratory containing hazardous chemicals.

The PPE policy outlines the basic PPE requirements, which include but are not limited to:

- Full length pants and closed-toe shoes, or equivalent

- Protective gloves, laboratory coats, and eye protection when working with, or adjacent to, hazardous chemicals
- Flame resistant laboratory coats for high hazard materials, pyrophoric materials, and less than or equal to 4 liters of flammables

The primary goal of basic PPE is to mitigate, at a minimum, the hazard associated with exposure to hazardous substances. In some cases, additional, or more protective, equipment must be used.

- If a project involves a chemical splash hazard, chemical goggles are required. Face shields may also be required when working with chemicals that may cause immediate skin damage.
- Safety goggles differ from safety glasses in that they form a seal with the face, which completely isolates the eyes from the hazard.
- If a significant splash hazard exists, heavy gloves, protective aprons and sleeves may also be needed.
- Gloves should only be used under the specific condition for which they are designed, as no glove is impervious to all chemicals. It is also important to note that gloves degrade over time, so they should be replaced as necessary to ensure adequate protection.

EH&S requires each laboratory to complete a Hazard Assessment prior to beginning work and to provide annual updates thereafter. PPE can be selected based on this hazard assessment. Access the online Hazard Assessment tool through the Risk and Safety Solutions (RSS) platform.

How to Use and Maintain PPE

Personal protective equipment should be kept clean and stored in an area where it will not become contaminated. PPE should be inspected prior to use to ensure it is in good condition. It should fit properly and be worn properly. If it becomes contaminated or damaged, it should be cleaned or repaired when possible, or discarded and replaced.

Contaminated Clothing/PPE

In cases where spills or splashes of hazardous chemicals on clothing or PPE occur, the clothing/PPE should immediately be removed and placed in a closed container that prevents release of the chemical. Heavily contaminated clothing/PPE resulting from an accidental spill should be disposed of as hazardous waste. Lightly contaminated laboratory coats should be cleaned and properly laundered, as appropriate. Laboratory

personnel should never take contaminated items home for cleaning or laundering. Persons or companies hired to clean contaminated items should be provided with hazard communication and PPE.

Respiratory Protection (in alignment with the Respiratory Protection Program)

Typically, respiratory protection is not needed in a laboratory. Under most circumstances, safe work practices, small scale usage, and engineering controls (fume hoods, biosafety cabinets, and general ventilation) adequately protect laboratory workers from chemical and biological hazards. Under certain circumstances, however, dedicated respiratory protection may be needed. These situations can include:

- An accidental spill such as:
 - A chemical spill outside the fume hood
 - A spill of biohazardous material outside a biosafety cabinet
- Performance of an unusual operation that cannot be conducted under the fume hood or biosafety cabinet
- When weighing powdered chemicals or microbiological media outside a glove box or other protective enclosure. Disposable filtering face-piece respirators are generally recommended for nuisance dusts. If the chemicals are toxic, contact EH&S for additional evaluation.
- When exposure monitoring indicates that exposures exist that cannot be controlled by engineering or administrative controls.
- As required by a specific laboratory protocol or as defined by applicable regulations.

To ensure employees receive the proper type of respiratory protection when existing controls may not be adequate, employees must be enrolled in the [Respiratory Protection Program](#). Since there are numerous types of respirators available, and each has specific limitations and applications, respirator selection and use ultimately requires pre-approval by EH&S. Respirators can be used on a voluntary basis in alignment with the provisions outlined in the Respiratory Protection Program.

Processes with potential airborne hazards that cannot be eliminated by engineering or administrative controls will not be authorized by EH&S until affected employees can be enrolled into Cal Poly Humboldt's Respiratory Protection Program.

Since wearing respiratory equipment places a physical burden on the user, laboratory worker must be medically evaluated prior to wearing respiratory equipment. Certain individuals (e.g., persons with severe asthma, heart conditions, or claustrophobia) may not be medically qualified to wear a respirator.

Upon enrollment in Respirator Training and Fit Testing, the employee will be sent the appropriate medical questionnaire. The completed medical questionnaire will be evaluated before the employee proceeds with the training. **NOTE: This medical questionnaire is confidential.** The employee will be provided additional information on who to contact for follow-up questions.

After successful completion of the medical evaluation, the employee will be trained and fit tested by EH&S. Training topics include:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator
- Limitations and capabilities of the respirator
- Use of the respirator effectively in emergency situations, including situations in which the respirator malfunctions
- Inspection, don, doff, use and seal checks of the respirator
- Procedures for maintenance and storage of the respirator
- Recognition of medical signs and symptoms that may limit or prevent the effective use of respirators
- The general requirements of the respiratory program

Finally, a quantitative or qualitative fit test is conducted by EH&S for each respirator user. The fit test ensures a proper face to face piece seal for each individual and their mask. Fit testing is done in accordance with Cal/OSHA regulations (Title 8, CCR [§5144](#)).

An annual refresher is required for the medical evaluation, respirator training, and fit testing. In addition to the annual training refresher, a more frequent re-training, fit testing or medical evaluation must be performed when any of the following occur:

- Changes in the workplace or the type of respirator render previous training obsolete

- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill
- Any other situation arises in which reevaluation appears necessary to ensure safe respirator use
- Facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight
- An employee reports medical signs or symptoms related to their ability to use a respirator.

Laboratory Safety and Emergency Response Equipment

New personnel must be instructed in the location of fire extinguishers, safety showers, and other safety equipment before they begin work in the laboratory. This training is considered part of the laboratory specific training that all staff members must attend.

Fire Extinguishers

All laboratories working with combustible chemicals, flammable chemicals, or other potential ignition sources (e.g. lasers) must be outfitted with appropriate fire extinguishers. All extinguishers should be mounted on a wall in an area free of clutter or stored in a fire extinguisher cabinet. Research personnel should be familiar with the location, use and classification of the extinguishers in their laboratory.

Laboratory personnel are not required to extinguish fires that occur in their work areas and should not attempt to do so unless:

- It is a small fire (i.e., small trash can size fire)
- Appropriate training has been received
- It is safe to do so

Per Title 29, CFR [§1910.157\(e\)\(2\)](#), fire extinguishers in the vicinity of the assigned responsible party are subject to monthly visual inspections by any individual associated with the respective area (i.e., PI/Laboratory Supervisor, Department Safety Coordinator, Staff, Laboratory Students/Volunteers, EH&S, etc.)

- Confirm the extinguisher is visible, unobstructed, and in its designated location
- Verify the locking pin is intact and the tamper seal is unbroken. Examine the extinguisher for obvious physical damage, corrosion, leakage, or clogged nozzle.

- Confirm the pressure gauge or indicator is in the operable range or position and lift the extinguisher to ensure it is still full.
- Make sure the operating instructions on the nameplate are legible and facing outward.
- Check the last professional service date on the tag. (A licensed fire extinguisher maintenance contractor must have inspected the extinguisher within the past 12 months)
- Initial and date the back of the tag upon concluding monthly visual inspection.

Any time a fire extinguisher is used, no matter how brief a period, the PI/Laboratory Supervisor, or most senior laboratory personnel present at the time of the incident, must immediately report the incident to EH&S at risk-management@humboldt.edu, as well as Facilities Management if the extinguisher is missing or needs service.

Safety Showers and Eyewash Stations

All laboratories using hazardous chemicals must have immediate access to safety showers with eye wash station.

- Access must be available in an unlocked location **within 10 seconds or less** for a potentially injured individual and access routes must be kept clear.
- This requirement applies to all areas where during routine operations or emergencies, the eyes or body of an employee may encounter a substance that could cause corrosion, severe irritation, or permanent tissue damage, or is toxic by absorption.
- Safety showers must always have a minimum clearance of 16 inches from the centerline of the spray pattern in all directions. This means that no objects should be stored or left within this distance of the safety shower.
- In the event of an emergency, individuals using the safety shower should be assisted by an uninjured person to aid in decontamination and should be encouraged to stay in the safety shower for **15 minutes** to remove all hazardous material.

Fire Doors

Many areas of research buildings may contain critical fire doors as part of the building design. These doors are an important element of the fire containment system and should remain closed unless they are on a magnetic self-closing or other automated self-closing system.

Safe Laboratory Habits

As detailed above, a safety program must include layers of policies and protective equipment to allow for a safe working environment, but to achieve effectiveness, several fundamental elements must become basic working habits for the research community (Appendix A).

Chemical Exposure Assessment

Regulatory Requirements

It is University policy to comply with all applicable health, safety, and environmental protection laws, regulations, and requirements. Cal/OSHA requires that all employers “measure an employee’s exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance exceed the action level (or, in the absence of an action level, the exposure limit)”. Repeated monitoring may be required if initial monitoring identifies employee exposure over the action level or exposure limit.

Cal/OSHA regulates Permissible Exposure Limits (PELs) for airborne contaminants to which “nearly all workers may be exposed daily during a 40-hour workweek for a working lifetime (of 40 years) without adverse effect”, are based upon an 8-hour Time-Weighted Average (TWA) exposure. Thus, the PELs are the maximum permitted 8-hour TWA concentration of an airborne contaminant without the use of respiratory protection. Cal/OSHA has also defined Short Term Exposure Limits (STELs) as the maximum TWA exposure during any 15-minute period, provided the daily PEL is not exceeded and Ceiling (C) exposures that shall not be exceeded at any time.

Cal/OSHA has listed established PELs, STELs, and Ceiling exposures for chemical contaminants identified in Title 8, CCR [§5155](#) (Airborne Contaminants) Table AC-1. In the absence of a published Ceiling limit, Cal/OSHA requires employee exposure to concentrations above the PEL be controlled to prevent harmful effects. Further, Cal/OSHA has promulgated specific standards covering several regulated carcinogens, which may include an Action Level (AL), triggering medical surveillance requirements or the imposition of a specific Excursion Limit (such as for asbestos) with a unique measurement of the duration of an exposure.

Additionally, the Safety Drinking Water and Toxic Enforcement Act of 1986 requires Cal/EPA to publish annually a list of [Proposition 65](#) chemicals known to the State to cause cancer or other reproductive toxicity.

Exposure Assessment Overview

All employees require protection from exposure to hazardous chemicals above PELs, STELs, and Ceiling concentrations. The profession with expertise in exposure assessment monitoring is Industrial Hygiene. At Cal Poly Humboldt, the person supervising, directing, or evaluating the exposure assessment monitoring must be competent in the practice of industrial hygiene. General questions regarding exposure assessment or industrial hygiene can be directed to EH&S at risk-management@humboldt.edu.

Minimizing exposure may be accomplished using a combination of engineering controls, administrative controls, and PPE, respectively. Assessing exposure to hazardous chemicals may be accomplished through several methods performed by EH&S, including employee interview, visual observations of chemical use, evaluation of engineering controls, use of direct reading instrumentation, or the collection of analytical samples from the employee's breathing zone.

Personal exposure assessment will be performed under either of the following situations:

- Based on chemical inventories, review of Standard Operating Procedures (SOPs), types of engineering controls present, laboratory inspection results and/or review of the annual Hazard Assessment tool, EH&S determines whether an exposure assessment is warranted or
- User of a hazardous chemical has concern or reason to believe exposure is not minimized or eliminated through use of engineering controls or administrative practices (such as transfer of chemical through double needle performed entirely in a fume hood) and the potential for exposure exists. The user should then inform his or her PI/Laboratory Supervisor, who will in turn contact EH&S at risk-management@humboldt.edu. EH&S will then determine the best course of action in assessing employee exposure, including visual assessment, air monitoring, medical evaluation, examination, or medical surveillance.
- In the event of any serious injury or exposure, including chemical splash involving dermal or eye contact, immediately call 911 from a campus phone or call Cal Poly Humboldt Campus Police at **707-826-5555** from a campus phone or cell phone and obtain medical treatment immediately. Do not wait for an exposure assessment to be performed before seeking medical care.

Exposure Assessment Protocol

EH&S conducts and/or contracts exposure assessments for members of the campus community. Employees have a right to observe testing, sampling, monitoring, or measuring of employee exposure. They are also allowed access to the records and reports related to the exposure assessment. Exposure assessments may be performed for hazardous chemicals, as well as for physical hazards including noise and heat stress to determine if exposures are within PELs or other appropriate exposure limits that are considered safe for routine occupational exposure. The costs of exposure monitoring are the responsibility of the lab, department, and organization where the personnel are employed. General protocol in conducting an exposure assessment may include the following:

- Employee interviews
- Visual observation of chemical usage and/or laboratory operations
- Evaluation of simultaneous exposure to multiple chemicals
- Evaluation of potential for absorption through the skin, mucus membranes, or eyes
- Evaluating existing engineering controls (such as measuring face velocity of a fume hood)
- Use of direct reading instrumentation; and
- Collection of analytical samples of concentrations of hazardous chemicals taken from the employees breathing zone, or noise dosimetry collected from an employee's shirt collar or various forms of radiation dosimetry.

If exposure monitoring determines an employee exposure to be over the action level (or the PEL) for a hazard for which OSHA has developed a specific standard (e.g. lead), the medical surveillance provisions of that standard shall be followed. It is the responsibility of the PI/Laboratory Supervisor to ensure that any necessary medical surveillance requirements are met. When necessary, EH&S will make recommendations regarding adjustments to engineering controls or administrative procedures to maintain exposure below any applicable PEL. Where the use of respirators is necessary to maintain exposure below PELs, Cal Poly Humboldt will recommend the proper respiratory equipment and training. Respirators will be selected and used in accordance with the requirements of Title 8, CCR [§5144](#) and the University's Respiratory Protection Program.

In assessing exposure to hazardous chemicals for which Cal/OSHA has not published PEL, STEL, or Ceiling exposure, EH&S defers to the Threshold Limit Values (TLVs) established by the American Conference of Governmental Industrial Hygienists (ACGIH), Recommended Exposure Limits (RELs) established by the

National Institute of Occupational Safety & Health (NIOSH), or other applicable regulatory thresholds for exposure if none other exist. Please contact EH&S at risk-management@humboldt.edu for more information regarding these chemicals.

Notification

EH&S will promptly notify the employee and their PI/Laboratory Supervisor of the results in writing after the receipt of any monitoring results. EH&S will establish and maintain an accurate record of any measurements taken to monitor exposures for each employee. Records, including monitoring provided by qualified vendors, will be managed in accordance with Title 8, CCR [§3204](#) “Access to Employee Exposure and Medical Records”.

Exposure Assessment Use to Determine and Implement Controls

EH&S will use any of the following criteria to determine required control measures to reduce employee’s occupational exposure:

- Verbal information obtained from employees regarding chemical usage
- Visual observations of chemical use or laboratory operations
- Evaluation of existing engineering control measures or administrative practices
- Recommendations expressed in Safety Data Sheets
- Regulatory requirements of Cal/OSHA
- Recommendations from professional industrial hygiene organizations
- Direct reading instrumentation results
- Employee exposure monitoring results; and/or
- Medical evaluation, examination, and/or surveillance findings

Particular attention shall be given to the selection of safety control measures for chemicals that are known to be extremely hazardous. Per Cal/OSHA Title 8, CCR [§5141](#) “Control of Harmful Exposure to Employees”, the control of harmful exposures shall be prevented by implementation of control measures in the following order:

- Engineering controls, whenever feasible
- Administrative controls whenever engineering controls are not feasible or do not achieve full compliance and administrative controls are practical; and
- Personal protective equipment, including respiratory protection, during:
 - The time period necessary to install or implement feasible engineering controls

- When engineering and administrative controls fail to achieve full compliance
- In emergencies
- As an extra precaution/option for employees

Medical Evaluation

All employees, student workers, medical health services volunteers, or laboratory personnel who work with hazardous chemicals shall have an opportunity to receive a free medical evaluation, including supplemental examinations which the evaluating physician determines necessary, under the following circumstances:

1. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which an employee may have been exposed in a laboratory
2. Where personal monitoring indicates exposure to a hazardous chemical is above a Cal/OSHA Action Level (AL) or Permissible Exposure Limit (PEL) or recommended exposure levels established by the National Institute for Occupational Safety & Health (NIOSH) or the American Conference of Governmental Industrial Hygienists (ACGIH) in the event Cal/OSHA has not established an AL or PEL for a particular hazardous chemical
3. Whenever an uncontrolled event takes place in the work area such as a spill, leak, explosion, fire, etc., resulting in the likelihood of exposure to a hazardous chemical
4. Upon reasonable request of the employee to discuss medical issues and health concerns regarding work-related exposure to hazardous chemicals.

All work-related medical evaluations and examinations will be performed by a licensed medical facility. Evaluations and examinations will be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

Information to Provide the Clinician

At the time of the medical evaluation, the following information shall be provided:

1. Personal information such as age, weight, and University employee ID number
2. Common and/or IUPAC name of the hazardous chemicals to which the individual may have been exposed
3. A description of the conditions under which exposure occurred
4. Quantitative exposure data, if available

5. A description of the signs and symptoms of exposure that the employee is experiencing, if any
6. A copy of the SDS of the hazardous chemical in question
7. History of exposure including previous employment and non-occupational (recreational) hobbies
8. Any additional information helpful in assessing or treating an exposure or injury such as a biological component of exposure or the existence of an antitoxin
9. Pay Status at the time of exposure/injury

Physician's Written Opinion

For evaluation or examinations required by Cal/OSHA, the employer shall receive a written opinion from the examining physician which shall include the following:

1. Recommendation for further medical follow-up
2. Results of the medical examination and any associated tests, if requested by the employee
3. Any medical condition which may be revealed in the course of the examination which may place the employee at an increased risk as a result of exposure to a hazardous chemical found in the workplace
4. A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment

Confidentiality & Individual's Access to Personal Medical Records

All patient medical information is protected by California and federal law and is considered strictly confidential. The medical facility is prohibited from disclosing any patient medical information that is not directly related to the work-related exposure under evaluation and should not reveal any diagnosis unrelated to exposure.

Any patient information disclosed by the medical facility to the employee's supervisor will be limited to information necessary in assessing an employee's return to work, including recommended restrictions in work activities, if any.

Any patient information disclosed by the medical facility to EH&S will be limited to information necessary to develop a course of exposure monitoring, or perform hazard assessments and incident investigations, if appropriate.

The medical facility will otherwise disclose patient medical information only as required by California and Federal law, such as for Worker's Compensation Insurance claims. Each employee has the right to access his/her own personal medical and exposure records. The medical facility will provide an employee with a copy of his/her medical records upon written request.

Medical Surveillance

Medical surveillance is the process of using medical examinations, questionnaires, and/or biological monitoring to determine potential changes in health as a result of exposure to a hazardous chemical or other hazard. Certain Cal/OSHA standards require clinical examination as part of medical surveillance when exposure monitoring exceeds an established Action Level or PEL.

Section 8. Procurement, Chemical Inventory, Labeling, Storage, and Transportation

Regulatory Requirements

Implementation of the necessary work practices, procedures, and policies outlined in this section is required by the following:

- Title 8, CCR [§ 5164](#), “Storage of Hazardous Substances”
- Title 8, CCR [§ 5191](#), “Occupational Exposures to Hazardous Chemicals in Laboratories”
- Title 8, CCR [§ 5194](#), “Hazard Communication”
- Title 8, CCR [§ 5209](#), “Carcinogens”
- Title 8, CCR [§ 5154.1](#), “Ventilation Requirements for Laboratory-Type Hood Operations”
- Assembly Bill [2286](#)

Procurement and Donations

Cal Poly Humboldt's EH&S, under CSU [Executive Order 1039](#), is responsible for reviewing and approving the purchase of chemicals, biologicals, radiological materials, and certain equipment that may pose occupational, health, or regulatory risks. The intent of this pre-approval process is to ensure safe acquisition, proper storage, and regulatory compliance before hazardous materials or sensitive equipment arrive on campus.

Pre-Approval Requirement

The materials listed in Cal Poly Humboldt's List of Chemicals, Materials, & Equipment Requiring EH&S Pre-Approval Prior to Purchase (Appendix H) require pre-approval from EH&S prior to requesting purchase through P2P, the University's official procurement system. These materials **cannot** be purchased with a Pro-card. All campus purchasers, including PIs, research staff, laboratory managers, and procurement personnel must obtain pre-approval from EH&S prior to purchasing the listed materials.

Materials and Equipment Requiring Approval

The current EH&S pre-approval requirements include but are not limited to the following materials:

- Cal/OSHA regulated carcinogens, controlled substances, and DEA precursor chemicals
- Highly toxic gases, pyrophoric or water-reactive chemicals, peroxide formers, explosives, and DHS chemicals of interest
- Biological hazards (human blood, OPIM, RG2/3 agents, GMOs, select agents/toxins)
- Radioactive materials, radiation-emitting devices, and Class 3B/4 lasers
- Specialized equipment such as biosafety cabinets, fume hoods, AEDs, drones, emergency generator, and pressure vessels

The list is maintained by EH&S and is available in Appendix H. Reach out to EH&S at risk-management@humboldt.edu with any questions regarding applicable purchases.

Donations and Gifts

Donations or gifts of hazardous materials or hazardous/regulated equipment from off-campus sources are not permitted without written EH&S approval. Principal Investigators and Laboratory Supervisors are responsible for ensuring proper storage and controls are in place before accepting such items.

Chemical Inventories

Chemical inventories are used to provide the required information to the fire department, ensure compliance with fire code storage limits, and homeland security reporting thresholds. The chemical inventory can also be used in an emergency to identify potential hazards for emergency response operations and more.

Faculty members and other supervisors with chemicals are required to use the campus chemical inventory system (RSS) to maintain a current, accurate, and complete chemical inventory that includes the materials that are toxic, oxidizing, corrosive, reactive, carcinogenic, or flammable, as well as any liquids and gases under pressure including liquid nitrogen tanks and compressed air cylinders stored in the rooms to which they are assigned or allowed to be used. At a minimum, each chemical inventory owner or EH&S will conduct an annual inventory reconciliation. Additionally, if your inventory changes by over 10% or is moved into a new room, an inventory update needs to be completed by the responsible party.

The information maintained in the inventory includes the name of the chemical, the concentration, the chemical abstracts number, the size of the container, the number of identical containers, the amount on hand, the physical state, the type of the container, whether it is pure or a mixture and both the storage pressure and temperature.

The chemical inventory list should be reviewed prior to ordering new chemicals and only the minimum quantities of chemicals necessary for the research should be purchased. As new chemicals are added to the inventory, each laboratory group can confirm that they have access to the SDS for that chemical. Where practical, each chemical should be dated so that expired chemicals can be easily identified for disposal.

The Department of Homeland Security (DHS) requires a report to be submitted within 60 days of specific chemicals that exceed set threshold aggregate amounts. As a result, everyone who has chemicals at Cal Poly Humboldt must update the online inventory for each of the 325 chemicals within 60 days of when they are received or consumed/disposed

Many materials should not be entered into the chemical inventory, per the table below (not all inclusive). If you are unsure what to include, please contact EH&S.

What to Include in Your Inventory	What Not to Include
All chemicals and chemical products (except those listed to the right)	Retail products used and stored in amounts and frequencies typical to ordinary household usage
All compressed and liquefied gases	Etiologic agents (bacteria, viruses, select agents, and toxins)
Lubricants, fuels, and oils (motor oil, gasoline, diesel, vacuum pump oil)	Biological culture media, agar, serum proteins, albumin
Aerosol lubricants	Enzyme preparations
Paints including spray-paints	Non-hazardous buffers
Pesticides and biocides	Radioactive materials (unless mixed with hazardous chemicals)

What to Include in Your Inventory	What Not to Include
	Pre-packed test kits for medical labs

Chemical Inventory Maintenance

Chemical storage areas should be periodically evaluated to ensure that the chemical inventory is properly maintained and that chemicals are stored safely. **All unneeded Title 8, CCR §339 listed hazardous substances, aged (≥ 10 years), expired, or compromised chemical containers showing visible damage or deterioration must be discarded as hazardous waste through the Hazardous Waste Management Program. Use the [Hazardous Waste Pickup Request Form](#) to request a pickup.**

Criteria for Chemical Disposal

EH&S will recommend that the Responsible Party, Department, or College dispose of chemicals that meet any of the following criteria:

1. Expired or Near Expiration
 - a. Chemicals that have exceeded their manufacturer's expiration date or are nearing expiration should be promptly disposed of to prevent degradation or potential hazards
2. Time-sensitive or Decomposing Chemicals
 - a. Chemicals that become hazardous over time, including peroxide-forming chemicals and other unstable compounds, must be regularly assessed. If they exceed the recommended best management practices for storage, they should be disposed of immediately.
3. Compromised Chemical Containers or Contents
 - a. Chemicals exhibiting poor condition or visible signs of degradation must be removed from inventory. Attributes that indicate the need for disposal include:
 - i. Cloudiness in liquids
 - ii. A change in color
 - iii. Evidence of liquids in solids or solids in liquids
 - iv. Evidence of "puddling" material around the exterior of containers
 - v. Pressure build-up within containers
 - vi. Obvious deterioration, corrosion, or damage to containers, such as cracks, leaks, or rust
4. Aged Chemicals (Over 10 years from initial receipt)

- a. Any chemical that is 10 years old or older from the date of receipt must be reviewed for disposal, as prolonged storage increases the likelihood of container failure and hazardous degradation.

Access to hazardous chemicals, including toxic and corrosive substances, should always be restricted. These materials must be stored in laboratories or storerooms that are kept locked when laboratory personnel are not present. Locked storage cabinets or other precautions are always recommended, and in some cases may be required in the case of unusually toxic or hazardous chemicals. Unusually toxic chemicals may include those that are immediately dangerous to life or health. For guidance on storage requirements, please contact EH&S at risk-management@humboldt.edu

On termination or transfer of laboratory personnel, all related hazardous materials should be properly disposed of or transferred to the laboratory supervisor or designee.

To facilitate improved inventory management and reporting, Cal Poly Humboldt has implemented the systemwide Risk and Safety Solutions Chemicals application, as per Chancellor's Office policy. Information on how to use Chemicals is available through Risk and Safety Solutions and further guidance can be requested from EH&S. This program will allow Cal Poly Humboldt to comply with both long standing and new regulations requiring chemical inventory maintenance and reporting.

Cal/OSHA Title 8, CCR [§5194\(e\)\(1\)](#) requires that employers develop and maintain a list of hazardous chemicals known to the workplace. This is a long-standing regulatory requirement and is an important component of our lab safety evaluations. Assembly Bill 2286 mandates the development of the California Environmental Reporting System (CERS) and requires all regulated businesses to use the internet to electronically submit chemical inventories.

In order to facilitate compliance with the electronic reporting requirement, each lab group is always required to maintain an up-to-date chemical inventory through Risk and Safety Solutions.

Chemical Labeling

All containers (including diluted chemical solutions and those with abbreviations) of hazardous materials must be labeled with the identity of the hazardous substance and all applicable hazard warning statements or abbreviations. If abbreviations are used, a list of the abbreviations used, the full chemical names, and the hazards warning statement associated with each must be prominently displayed in each room.

- All containers not actively being used in a transfer or reaction must be labeled, including water.
- New synthesized compounds must be labeled with the appropriate hazard warnings based on the knowledge of the chemical and physical properties of that substance.
- Labels must be legible, in English, and clearly displayed.
- Secondary containers (such as spray bottles) must be labeled with the identity of the substance and appropriate hazard warnings.
- Symbols and/or other languages may be provided for non-English speaking employees or students.
- Use the symbols in the Globally Harmonized System of Classification and Labeling of Chemicals.
- Peroxide forming chemicals (e.g. ethers) must be labeled with a date on receipt and the date when the bottle is first opened. For the containers without a manufacturer supplied expiration date, these chemicals are only allowed a one-year shelf life and must be disposed of as waste within one year of receipt or six months of opening. These chemicals can degrade to form shock sensitive, highly reactive compounds and should be stored and labeled very carefully.
- Particularly Hazardous Substances require additional labeling to identify the specific hazard associated with each of these chemicals (carcinogen, reproductive toxin, acutely toxicant). In addition, the storage area where they are kept must be labeled with the type of hazard. These chemicals should be segregated from less hazardous chemicals to help with proper access control and hazard identification.

Chemical Storage and Segregation

Establish and follow safe chemical storage and segregation procedures for your laboratory. Storage guidelines are included for materials that are flammable, oxidizers, corrosive, water reactive, explosive, and highly toxic. The specific SDS should always be consulted when doubts arise concerning chemical properties and associated hazards. All procedures employed must comply with Cal/OSHA, Fire Code, and building code regulations. Always wear appropriate PPE (e.g. laboratory coat, safety glasses, gloves, safety goggles, apron) when handling hazardous chemicals. Be aware of the locations of the safety showers and emergency eyewash stations. Each laboratory is required to provide appropriate laboratory-specific training on how to use this equipment prior to working with hazardous chemicals. The section below lists chemical safety storage priorities.

Safe Chemical Storage Priorities

Keep in mind that most chemicals have multiple hazards and a decision must be made as to which storage area would be most appropriate for each specific chemical. First you must determine priorities:

1. **Flammability.** When establishing a storage scheme, the number one consideration should be the flammability characteristics of the material. If the material is flammable, it should be stored in a flammable cabinet.
2. **Isolation.** If the material will contribute significantly to a fire (e.g. oxidizers), it should be isolated from the flammables. If there were a fire in the laboratory and response to the fire with water would exaggerate the situation, isolate the water reactive material away from contact with water.
3. **Corrosivity.** Next look at the corrosivity of the material, and store accordingly.
4. **Toxicity.** Finally, consider the toxicity of the material, with attention paid to regulated materials. In some cases, this may mean that certain chemicals will be isolated within a storage area. For example, a material that is an extreme poison but is also flammable, should be locked away in the flammable storage cabinet to protect it against accidental release.

There will always be some chemicals that will not fit neatly into one category or another, but with careful consideration of the hazards involved, most of these cases can be handled in a reasonable manner. Reference the Flinn Scientific Shelf Storage Pattern Guidelines for more information.

General Recommendations for Safe Storage of Chemicals

Each chemical in the laboratory should be stored in a specific location and returned there after each use. Acceptable chemical storage locations may include corrosive cabinets, flammable cabinets, laboratory shelves, or appropriate refrigerators or freezers. Fume hoods should not be used as general storage areas for chemicals, as this may seriously impair the ventilating capacity of the hood.

- Chemicals should not be routinely stored on bench tops or stored on the floor.
- Additionally, bulk quantities of chemicals (i.e., larger than one-gallon) should be stored in a separate storage area, such as a stockroom or supply room.
- Laboratory shelves should have a raised lip along the outer edge to prevent containers from falling.
- Hazardous liquids, toxic or corrosive chemicals should not be stored on shelves above eye-level. Chemicals which are highly toxic or corrosive should be in unbreakable secondary containers.
- Chemicals must be stored at an appropriate temperature and humidity level and should never be stored in direct sunlight or near heat sources, such as laboratory ovens.
- Incompatible materials should be stored in separate cabinets, whenever possible. If these chemicals must be stored in one cabinet, due to space

limitations, adequate segregation and secondary containment must be ensured to prevent adverse reactions.

- All stored containers and research samples must be appropriately labeled and tightly capped to prevent vapor interactions and to alleviate nuisance odors. Flasks with only septa, cork, rubber, or glass stoppers should be avoided due to the potential for leaking.

Laboratory refrigerators and freezers must be labeled appropriately with “No Food/Drink” and must never be used for the storage of food or drinks intended for human consumption. Freezers should be defrosted periodically so chemicals do not become trapped in ice formations. Never store peroxide formers (e.g. ether) in a refrigerator not specifically designed for storage of flammable liquids.

Flammable and Combustible Liquids

In general, flammables should not be stored alongside combustible materials like paper and packaging nylon bags. Large quantities of flammable or combustible materials should not be stored in the laboratory. The Fire Code limits specific volume of flammable materials or other classes of hazardous chemicals depending on the original design and construction of the facility and varies from building to building at Cal Poly Humboldt.

- In most B occupancy labs, the maximum total quantity of Class 1A, 1B, and 1C flammable liquids must not exceed 60 gallons, which must all be stored in a flammable storage cabinet.
- The maximum quantity allowed to be kept outside a flammable storage cabinet, safety can, or approved refrigerator/freezer is 10 gallons per room.
- Class 1A solvents, such as ethyl ether, should be purchased only in one gallon (4 liter) or smaller containers. Because of the extreme flammability of the Class 1 liquids, only quantities needed for immediate use should be stored.
- Examples of equipment that can be used for storage include flammable storage cabinets, flammable storage refrigerators or freezers that are designed and UL approved for the storage of flammable substances, or approved safety cans or drums that are grounded.
- Always segregate flammable or combustible liquids from oxidizing acids and oxidizers.
- Flammable materials must never be stored in domestic-type refrigerators/freezers and should not be stored in a refrigerator/freezer if the chemical has a flash point below the temperature of the equipment.

Flammable or combustible liquids must not be stored on the floor or in any exit access.

- Handle flammable and combustible substances only in areas free of ignition sources and use the chemical in a fume hood whenever practical.
- Only the amount of material required for the experiment or procedure should be stored in the work area.
- Always transfer flammable and combustible chemicals from glass containers to glassware or from glass container/glassware to plastic. Transferring these types of chemicals between plastic containers may lead to a fire hazard due to static electricity. The transfer of flammable liquid from 5 gallon or larger metal containers should not be done in the laboratory.

Hazard Classification for Flammable Liquids			
Class	Flash point	Boiling point	Examples
I-A	Below 73°F (23°C)	Below 100°F (38°C)	Diethyl ether, pentane, ligroin, petroleum ether
I-B	Below 73°F (23°C)	At or above 100°F (38°C)	Acetone, benzene, cyclohexane, ethanol
I-C	73-100°F (23-38°C)	--	P-xylene
Hazard Classification for Combustible Liquids			
II	101-104 (39-60C)	--	Diesel fuel, motor oil, kerosene, cleaning solvents
III-A	141-199F (61-93C)	--	Paints (oil base), linseed oil, mineral oil
III-B	200F (93C) or above	--	Paints (oil base), neatsfoot oil

Pyrophoric and Water Reactive Substances

Since pyrophoric substances can spontaneously ignite on contact with air and/or water, they must be handled under an inert atmosphere and in such a way that rigorously excludes air and moisture. Some pyrophoric materials are also toxic, and many are dissolved or immersed in a flammable solvent. Other common hazards include corrosivity, teratogenicity, or peroxide formation.

Only minimal amounts of reactive chemicals should be used in experiments or stored in the laboratory. These chemicals must be stored as recommended in the SDS. Reactive material containers must be clearly labeled with the correct chemical name, in English, along with a hazard warning.

Suitable storage locations may include inert gas-filled desiccators or glove boxes. However, some pyrophoric materials must be stored in a flammable substance approved freezer. If pyrophoric or water reactive reagents are received in a specially designed shipping, storage, or dispensing container (such as the Aldrich Sure/Seal packaging system), ensure that the integrity of that container is maintained. Ensure that sufficient protective solvent, oil, kerosene, or inert gas remains in the container while pyrophoric materials are stored. Never store reactive chemicals with flammable materials or in a flammable liquid's storage cabinet.

Storage of pyrophoric gases is described in the California Fire Code, [Chapter 64](#). Gas cabinets, with remote sensors and fire suppression equipment, are required. Gas flow, purge and exhaust systems should have redundant controls to prevent pyrophoric gas from igniting or exploding. Emergency back-up power should be provided for all electrical controls, alarms, and safeguards associated with the pyrophoric gas storage and process systems.

Never return excess reactive chemical to the original container. Small amounts of impurities introduced into the container may cause a fire or explosion. For storage of excess chemical, prepare a storage vessel in the following manner:

- Dry any new empty containers thoroughly
- Insert the septum into the neck in a way that prevents atmosphere from entering the clean dry (or reagent filled) flask
- Insert a needle to vent the flask and quickly inject inert gas through a second needle to maintain a blanket of dry inert gas above the reagent
- Once the vessel is fully purged with inert gas, remove the vent needle then the gas line. To introduce the excess chemical, use the procedure described in the handling section of the SOP
- For long-term storage, the septum should be secured with copper wire or a hose clamp
- For extra protection, a second same-sized septa (sans holes) can be placed over the first
- Use "Parafilm M" or equivalent around the outer septa and remove the Parafilm M and outer septum before accessing the reagent through the primary septum.

Oxidizers

Oxidizers should be stored in a cool, dry place and kept away from flammable and combustible materials, such as wood, paper, Styrofoam, most plastics, flammable organic chemicals, and away from reducing agents, such as zinc, alkaline metals, and formic acid.

Examples of oxidizers (e.g. oxygen, ozone, hydrogen peroxide, and other inorganic peroxides; fluorine, chlorine, and other halogens; nitric acid and nitrate compounds persulfuric acids; chlorite, chlorite, perchlorate, and other analogous halogen compounds; hypochlorite and other hypohalite compounds, including household bleach; hexavalent chromium compounds such as chromic and dichromic acids and chromium trioxide, pyridinium chlorochromate, and chromate/dichromate compounds; permanganate compounds; sodium perborate; nitrous oxide; silver oxide; osmium tetroxide; Tollens' reagent; 2,2'-dipyridylsulfide).

Peroxide Forming Chemicals

Peroxide forming chemicals (Appendix F) should be stored in airtight containers in a dark, cool, and dry place and must be segregated from other classes of chemicals that could create a serious hazard to life or property should an accident occur (e.g., acids, bases, oxidizers). The containers should be labeled with the date received and the date opened. This information, along with the chemical identity, should face forward to minimize container handling during inspection. These chemicals must also be tested and documented for the presence of peroxides periodically. Minimize the quantity of peroxide forming chemicals stored in the laboratory and dispose of peroxide forming chemicals before peroxide formation.

Carefully review all cautionary material supplied by the manufacturer prior to use. Avoid evaporation or distillation, as distillation defeats the stabilizer added to the solvents. Ensure that containers are tightly sealed to avoid evaporation and that they are free of exterior contamination to crystallization. Never return unused quantities back to the original container and clean all spills immediately.

If old containers of peroxide forming chemicals are discovered in the laboratory (greater than two years past the expiration date or if the date of the container is unknown), do not handle the container. If crystallization is present in or on the exterior of a container, do not handle the container. Secure it and contact EH&S at risk-management@humboldt.edu to arrange the appropriate pick-up and disposal.

Corrosives

Store corrosive chemicals (i.e. acids, bases) below eye level and in secondary containers that are large enough to contain at least 110% of the total volume of liquid stored or the volume of the largest container, whichever is greater. Acids must always be segregated from bases and from active metals (e.g., sodium, potassium, magnesium) at all times and must also be segregated from chemicals which could generate toxic gases upon contact (e.g., sodium cyanide, iron sulfide).

Specific types of acids require additional segregation. Mineral acids must always be kept away from organic acids and oxidizing acids must be segregated from flammable and combustible substances. Perchloric acid should be stored by itself, away from other chemicals. Picric acid is reactive with metals or metal salts and explosive when dry and must contain at least 10% water to inhibit explosion

Special Storage Requirements – Compressed Gas Cylinders

- Compressed gas cylinders that are stored in the laboratory must be chained or strapped to the wall or other stable building member, with the safety cap in place to prevent failing caused by contact, vibration, or seismic activity
- Single non-combustible straps or the use of chains are acceptable given that when tightly secured at minimum two-thirds the height of the cylinder, above the midpoint, but below the shoulder, with the cylinder having less than one inch of lateral movement in any direction
- The cylinders are preferred to be restrained by two chains or non-combustible straps; one chain/strap must be placed at one-third from the top of the cylinder, and the other placed at one-third from the bottom of the cylinder
- Bolted “clam shells” may be used in instances where gas cylinders must be stored or used away from the wall. Store liquefied fuel-gas cylinders securely in the upright position. Cylinders are not to be stored in a horizontal position. Do not expose cylinders to excessive dampness, corrosive chemicals or fumes.

Certain gas cylinders require additional precautions. Flammable gas cylinders must use only flame-resistant gas lines and hoses which carry flammable or toxic gases from cylinders and must have all connections wired. Compression oxygen gas cylinders must be stored at least 20 feet away from combustible materials and flammable gases.

Gas cylinder connections must be inspected frequently for deterioration and must never be used without a regulator. Never use a leaking, corroded, or damaged cylinder and never refill compressed gas cylinders. When stopping a leak between

cylinder and regulator, always close the valve before tightening the union nut. The regulator must be replaced with a safety cap when the cylinder is not in use. Move gas cylinders with the safety cap in place using carts designed for this purpose.

Special Storage Requirements – Liquid Nitrogen

Since liquid nitrogen containers are at low pressure and have protective rings mounted around the regulator, they need to be affixed to a permanent fixture such as a wall to prevent them from walking or rolling into the egress path in an earthquake.

Additional protection considerations should be addressed when storing liquid nitrogen in a laboratory.

- The primary risk to laboratory personnel from liquid nitrogen is skin or eye thermal damage caused by contact with the material
- Nitrogen expands 696:1 when changing from a cryogenic liquid to a room temperature gas
- The gases are usually not toxic, but if too much oxygen is displaced, asphyxiation is a possibility
- Always use appropriate PPE to include thermally insulated gloves when handling liquid nitrogen. Face shields may be needed in cases where splashing may occur

Laboratory Security

Recently, regulatory agencies have been implementing rules to ensure chemical security. While many of these rules are for large manufacturing facilities, it is critical that chemicals be secured to prevent theft from campus laboratories. Numerous federal agencies are involved in the maintenance of laboratory security, including the Drug Enforcement Agency, Federal Bureau of Investigations, and Department of Homeland Security. It is each laboratory's responsibility to prevent and report any theft of chemicals from their laboratory.

Aspects that should be considered when evaluating laboratory security should include:

- Existing threats based on the history of the institution (e.g., theft of laboratory materials, sabotage, data security breaches, protests)
- The attractiveness of the institution as a target, and the potential impact of an incident
- Chemicals, biological agents, radioactive materials, or other laboratory equipment or materials with dual-use potential

- Sensitive data or computerized systems
- Animal care facilities
- Infrastructure vulnerabilities (e.g. accessible power lines, poor lighting)
- Security systems in place (e.g. access control, cameras, intrusion detection)
- Access controls for laboratory personnel (e.g. background checks, authorization procedures, badges, key controls, escorted access)
- Institutional procedures and culture (e.g. tailgating, open laboratories, no questioning of visitors)
- Security plans in place
- Training and awareness of laboratory personnel

Labs can increase their security by simply keeping lab doors closed and locked when unoccupied, maintaining a current and accurate chemical inventory, training personnel on security procedures, and controlling access to keys. Labs should report any suspicious activity to Cal Poly Humboldt Campus Police at **(707) 826-5555** and EH&S at risk-management@humboldt.edu.

On-Campus Distribution of Hazardous Chemicals

Precautions must be taken when transporting hazardous substances between laboratories.

- Chemicals must be transported between stockrooms and laboratories in break-resistant secondary containers such as commercially available bottle carriers made of rubber, metal, or plastic that include carrying handle(s) and which are large enough to hold the contents of the chemical container in the event of breakage
- When transporting cylinders of compressed gases, always secure the cylinder with straps or chains onto a suitable hand truck and protect the valve with a cover cap.
- Avoid dragging, sliding, or rolling cylinders and use a freight elevator when possible.

Off-Campus Distribution of Hazardous Chemicals

The transportation of hazardous chemicals and compressed gases over public roads, or by air, is strictly governed by international, federal, and state regulatory agencies, including the U.S. Department of Transportation (DOT) and the International Air Transport Association (IATA). Any person who prepares and/or ships these types of materials must ensure compliance with pertinent regulations regarding training, quantity, packaging, and labeling. Without proper training and packaging, it is illegal to ship hazardous materials. Those who violate the hazardous materials shipment regulations are subject to criminal investigation and penalties.

Individuals who wish to ship or transport hazardous chemicals, compressed gases, or biological materials off-campus, must contact EH&S at risk-management@humboldt.edu for review and approval.

Section 9. Training

Regulatory Requirements

Environmental Health and Safety training shall conform to the requirements defined in CSU [Executive Order No. 1039](#). Implementation of the necessary work practices, procedures, and policies outlined in this chapter is also required by the following:

- Title 8, CCR [§5191](#), “Occupational Exposures to Hazardous Chemicals in Laboratories”
- Title 8, CCR [§ 5194](#), “Hazard Communication”
- Title 8, CCR [§ 5209](#), “Carcinogens”

Other applicable regulations include those promulgated by the U.S. Department of Labor including Title 29, CFR [§1910.1450](#) “Occupational Exposure to Hazardous Chemicals in Laboratories” (the “Laboratory Standard”).

Introduction

Effective training is critical to facilitate a safe and healthy work environment and prevent laboratory accidents. All Faculty/Laboratory Supervisors must participate in formal safety training and ensure that all their employees have appropriate safety training before working in a laboratory. Contact EH&S for further consultation on training requirements.

Types of Training

All laboratory personnel must complete general laboratory safety training and lab specific training before:

1. Beginning work in the laboratory
2. Prior to new exposure situation
3. As work conditions change

Student Training Plans

Training plans are categorized based on hazard assessments and hazard exposure to implement supplemental training topics based on exposure. Assignment of additional training is the responsibility of supervisors and should be based on hazard exposure.

Laboratory-Specific Training

Faculty/Laboratory Supervisors must also provide laboratory-specific training. Topics that require specific training include:

- Location and use of the Chemical Hygiene Plan, IIPP, SDSs, and other regulatory information
- Review of the IIPP and Emergency Management Plan, including location of emergency equipment and exit routes
- Specialized equipment
- SOPs
- PPE
- Specialized procedures and protocols
- PHSS, including physical and health hazards, potential exposure, medical surveillance, and emergency procedures
- Each person working in a laboratory or technical area receives a site-specific orientation

Documentation of Training

Accurate recordkeeping is a critical component of health and safety training. Per OSHA regulations, departments or laboratories are responsible for documenting health and safety training, including safety meetings, one-on-one training, and classroom and online training. Documentation should be maintained in the Laboratory Safety Manual.

Student training records shall be maintained by the hosting College and/or department as applicable, determined by the Dean or department head. Training records shall be maintained for a period of three (3) years, with the exception that hazardous waste training shall be maintained for three (3) years following departure from the campus.

A training history for all laboratory employees is available to Faculty/Laboratory Supervisors upon request. This document can serve as an official record of laboratory safety training conducted by EH&S and others.

Section 10. Lab Evaluations and Compliance

Regulatory Requirements

Implementation of the necessary work practices, procedures, and policies outlined in this chapter is required by Title 8, CCR [§5191](#), “Occupational Exposures to Hazardous Chemicals in Laboratories”.

Other applicable regulations include those promulgated by the U.S. Department of Labor including 29 CFR [§1910.1450](#) “Occupational Exposure to Hazardous Chemicals in Laboratories” (the “Laboratory Standard”).

Laboratory Safety Evaluations

EH&S is required to develop a comprehensive laboratory safety evaluation program to assist laboratories and other facilities that use, handle, or store hazardous chemicals to maintain a safe work environment. This program helps to ensure compliance with regulations and to fulfill Cal Poly Humboldt’s commitment to protecting the health and safety of the campus community.

As part of this laboratory safety program, EH&S conducts periodic inspections of laboratories and other facilities with hazardous chemicals to ensure the laboratory is operating in a safe manner and to ensure compliance with all federal, state, and university safety requirements. The primary goal of lab evaluations is to identify both existing and potential accident-causing hazards, actions, faulty operations, and procedures that can be corrected before an accident occurs. EH&S has the authority to suspend or restrict any operation that presents a significant (real or potential) imminent hazard associated with life safety, or the health and welfare of campus personnel or the public until that hazardous condition or activity is abated.

The laboratory safety evaluation is comprehensive in nature and investigates all key aspects of working with hazardous chemicals. While inspections are a snapshot in time and cannot identify every accident-causing mistake, they do provide important information on the overall operation of a laboratory. They can also help to identify weaknesses that may require more systematic action across a broader spectrum of laboratories, and strengths that should be fostered in other laboratories. Laboratory evaluation categories include:

- Documentation and Training
- Emergency and Safety Information
- Fire Safety
- General Safety
- Use of PPE
- Housekeeping
- Chemical Storage
- Fume hoods
- Chemical waste disposal and transport
- Seismic safety
- Mechanical and electrical safety

Planned, focused assessments are also conducted. Examples of these include industrial hygiene assessments and unannounced PPE inspections. Once the evaluations are completed, EH&S issues a Laboratory Evaluation Report via RSS Inspect. The report identifies deficiencies in the laboratory, both critical and non-critical. Critical deficiencies are those that have the potential to lead to serious injuries or be of critical importance in the event of an emergency. These deficiencies must be immediately corrected. Non-critical deficiencies must be corrected within 30 days. A copy of the most recent Laboratory Evaluation Report should be maintained as part of the records inside the Laboratory Safety Manual.

Notification and Accountability

The annual laboratory inspections require faculty, laboratory supervisors, and other responsible parties take appropriate and effective corrective action upon receipt of written notification of evaluation findings.

- Critical deficiencies are required to be corrected within 48 hours
- Non-critical deficiencies must be corrected within 30 days

Failure to take corrective actions within the required timeframe will result in an escalation of the notification to the EH&S Director, Department Chair, Associate Dean, Dean, and Provost respectively. Depending on the severity of the deficiency, the EH&S Director, in consultation with the Department Chair, Associate Deans, Dean, and Provost, may temporarily suspend research activities until the violation is corrected. In some cases, the PI may be required to provide a corrective action plan to EH&S prior to recommencement of research activities.

Section 11. Hazardous Chemical Waste Management

Regulatory Requirements

In California, hazardous waste is regulated by the Department of Toxic Substance Control (DTSC), a division within the California Environmental Protection Agency (Cal/EPA). Federal EPA regulations also govern certain aspects of hazardous waste management, since most waste is treated and disposed out of state. These hazardous waste regulations are part of the Resource Conservation and Recovery Act (RCRA). Local enforcement authority is administered by Los Angeles County Department of Environmental Health.

Hazardous Waste Program

The EH&S Hazardous Waste program manages the shipment and disposal of all hazardous waste generated on campus. Each laboratory employee must comply with the campus

Hazardous Waste Management Program requirements and all applicable regulations. Hazardous waste weekly pick-up service is provided to all Cal Poly Humboldt hazardous waste generators in research buildings on campus. Laboratory personnel are responsible for identifying hazardous waste, segregating, labeling, and storing it properly in the laboratory. Laboratory clean-outs and disposal of high hazard compounds must be scheduled at well in advance. The PI/Laboratory Supervisor is responsible for coordinating the disposal of all chemicals from their laboratories prior to closing laboratory operations.

Definition of Hazardous Waste

Federal and State regulations define hazardous waste as a substance which poses a hazard to human health or the environment when improperly managed. A chemical waste is considered hazardous if it is either listed on one of the lists found in Federal or State regulations or if it exhibits one or more of the four following characteristics:

- **Toxic** – a chemical that poses a hazard to health or the environment
 - Has an acute oral LD50 less than 2,500 mg/kg
 - Has an acute dermal LD50 less than 4,300 mg/kg
 - Has an acute inhalation LC50 less than 10,000 ppm as a gas or vapor
 - Has an acute aquatic 96-hour LC50 less than 500 mg/l
 - Has been shown through experience or testing to pose a hazard to human health or the environment because of its ability to cause cancer or mutation (carcinogen, mutagen, teratogen), acute toxicity, chronic toxicity, bio-accumulative properties, or persistence in the environment
- **Reactive** – reactive wastes are those wastes that are unstable, explosive, and capable of detonation or react violently with water
- **Ignitable** – ignitable wastes generally are liquids with a flash point below 60C or 140C (however, just because a material has a higher flash point, it still cannot be drain disposed)
- **Corrosive** – corrosive wastes are generally aqueous wastes with a pH less than or equal to two (2) or greater than or equal to 12.5

The EPA definition of hazardous waste also extends to the following items:

- Abandoned chemicals
- Unused or unwanted chemicals
- Chemicals in deteriorating containers
- Empty containers that have visible residues
- Containers with conflicting labels
- Unlabeled or unknown chemicals

Chemicals not in frequent use must be carefully managed to prevent them from being considered a hazardous waste. This is especially true for certain compounds that degrade and destabilize over time and require careful management so that they do not become a safety hazard.

Extremely Hazardous Waste

Certain compounds meet an additional definition known as “extremely hazardous waste”. This list of compounds includes carcinogens, pesticides, and reactive compounds, among others (e.g. formaldehyde, chloroform, and hydrofluoric acid). The Federal EPA refers to this waste as “acutely hazardous waste” but Cal/EPA has published a more detailed list of extremely hazardous waste.

Note: While there is some overlap with the list of Particularly Hazardous Substances, the extremely hazardous waste list is specific to hazardous waste management.

Proper Hazardous Waste Management

Training

All personnel who handle, manage, or dispose of hazardous waste must complete training prior to working with these materials. The EH&S Hazardous Waste Management training course covers the hazardous waste program requirements and includes training on container labeling.

Waste Identification

All the chemical constituents in each hazardous waste stream must be accurately identified by knowledgeable laboratory personnel. This is a critical safety issue for both laboratory employees and the waste technicians that handle the waste once it is turned over to EH&S. Mixing of incompatible waste streams has the potential to create violent reactions and is a common cause of laboratory accidents.

If there is uncertainty about the composition of a waste stream resulting from an experimental process, laboratory workers must consult the PI/Laboratory Supervisor, the Chemical Hygiene Officer, or EH&S. In most cases, careful documentation and review of all chemical products used in the experimental protocol will result in accurate waste stream characterization.

The manufacturer’s SDS provides detailed information on each hazardous ingredient in laboratory reagents and other chemical products, and includes the

chemical, physical, and toxicological properties of that ingredient. The RSS SDS library provides an extensive library of research chemicals. Waste streams that have a large percentage of ingredients listed as proprietary information should be discussed with the Hazardous Waste Supervisor.

Labeling

[Hazardous waste labels](#) must be placed on the hazardous waste container upon the **start** of accumulation. Each label must be completed accurately and updated as the contents of the waste container change. Product names or abbreviations for waste container constituents should not be used. Additional on-site guidance and support from EH&S is available upon request.

Pickup

Hazardous waste pickup must be scheduled using the [Hazardous Waste Pickup Request Form](#). Hazardous waste technicians will respond to coordinate pickup.

Storage

The hazardous waste storage area in each laboratory is considered a Satellite Accumulation Area (SAA). According to EPA requirements, this area must remain under the control of the persons producing the waste. This means that it should be located within an area that is supervised and is not accessible to the public. Other SAA requirements include:

- Hazardous waste containers must always be labeled with a generator tag
- Waste must be collected and stored at or near the point of generation
- The maximum amount of waste that can be stored in a SAA is 55 gallons of a hazardous waste or 1 quart of acutely/extremely hazardous waste. If you reach these volumes for acutely/extremely hazardous waste, you must have the waste removed within 3 days of reaching these set volumes
- All hazardous waste containers in the laboratory must be kept closed when not in use
- Hazardous waste streams must have compatible constituents, and must be compatible with the containers in which they are stored
- Hazardous waste containers must always be stored in secondary containment
- Containers must be in good condition with leak proof lids
- Containers must be less than 80% full
- Dry wastes must be double-bagged in clear, 3-mil plastic bags

- Do not dispose of chemicals by pouring them down the drain or placing them in the trash

Segregation

All hazardous materials must be managed in a manner that prevents spills and uncontrolled reactions. Stored chemicals and waste should be segregated by hazard class. Examples of proper segregation are:

- Segregate acids from bases
- Segregate oxidizers from organics and flammables
- Segregate cyanides from acids

Segregation of waste streams should be conducted in a similar manner to segregation of chemical products (Appendix E).

Incompatible Waste Streams

Mixing incompatible waste streams or selecting a container that is not compatible with its contents, is a common cause of accidents in laboratories and waste storage facilities. Reactive mixtures can rupture containers and explode, resulting in serious injury and property damage. All chemical constituents and their waste byproducts must be compatible for each waste container generated (Appendix E). Labels must be updated immediately when a new constituent is added to a mixed waste container so that others in the laboratory will be aware and manage it accordingly

Some common incompatible waste streams include:

- Oxidizers added to any fuel that can create an exothermic reaction and explode. The most frequent is acids oxidizing flammable liquids. For this reason, all flammable liquids are pH tested before they are consolidated.
- Piranha etch solution is a specific waste stream that contains sulfuric acid and hydrogen peroxide, which form a reactive mixture that is often still fuming during disposal. For this waste stream, and other reactive mixtures like it, vented caps are necessary.

Wastes that Require Special Handling

Unknowns

Unlabeled chemical containers and unknown/unlabeled wastes are considered unknowns, and additional fees must be paid to have these materials analyzed and identified. These containers must be labeled with the word “unknown”.

Peroxide Forming Chemicals

Peroxide forming chemicals, or PFCs, include several substances that can react with air, moisture, or product impurities, and undergo a change in their chemical composition during normal storage.

- The peroxides that form are highly reactive and can explode upon shock or spark. Peroxides are not particularly volatile and thus tend to precipitate out of liquid solutions
- It is particularly dangerous to allow a container of these materials to evaporate to dryness, leaving the crystals of peroxide on the surfaces of the container
- Each container of peroxide forming chemicals should be dated with the date received and the date first opened.

There are three classes of peroxide forming chemicals, with each class having different management guidelines. A review of the safety information provided by the manufacturer can be used as a guide to manage PFCs.

- Ensure containers of PFCs are kept tightly sealed to avoid unnecessary evaporation, as this inhibits the stabilizers that are sometimes added.
- Visually inspect containers periodically to ensure that they are free of exterior contamination or crystallization. PFC containers must be disposed of prior to expiration date.
- If old containers of peroxide forming chemicals are discovered in the laboratory, (greater than two years past the expiration date or if the date of the container is unknown), do not handle the container. Secure the area and contact EH&S at risk-management@humboldt.edu.
- If crystallization is present in or on the exterior of a container, do not handle the container. Secure the area and contact EH&S at risk-management@humboldt.edu.

Dry Picric Acid

Picric acid (also known as trinitrophenol) must always be kept hydrated, as it becomes increasingly unstable as it loses water content. When dehydrated, it is not only explosive but also sensitive to shock, heat, and friction. Picric acid is highly reactive with a wide variety of compounds (including many metals) and is extremely susceptible to the formation of picrate salts.

- Be sure to label all containers that contain picric acid with the date received, and then monitor the water content every 6 months.
- Add distilled water as needed to maintain a consistent liquid volume.
- If old or previously unaccounted for bottles of picric acid are discovered, do not touch the container.
- Depending on how long the bottle has been abandoned and the state of the product inside, even a minor disturbance could be dangerous.
- Visually inspect the contents of the bottle without moving it to evaluate its water content and look for signs of crystallization, signs of evaporation, or the formation of solids in the bottle, do not handle the container and contact EH&S at risk-management@humboldt.edu immediately. Secure the area and restrict access to the container until it can be evaluated by EH&S personnel.

Explosives and Compounds with Shipping Restrictions

A variety of other compounds that are classified as explosives or are water or air reactive are used in research laboratories. These compounds often have shipping restrictions and special packaging requirements.

- When disposing of these compounds, employees must ensure that they are stored appropriately for transport.
- Flammable metals must be completely submerged in oil before they are brought to a waste pick-up.
- Many pyrophoric and reactive compounds can be stabilized using a quenching procedure prior to disposal. Chemicals classified by the Department of Transportation (DOT) as explosives e.g., many nitro- and azo-compounds) will require special packaging, shipping, and may require stabilization prior to disposal.
- Consult with EH&S for disposal considerations of these compounds.

Managing Empty Containers

Empty containers that held Extremely Hazardous Waste must be managed as hazardous waste. Do not rinse or reuse these containers.

All other hazardous waste containers, if they are less than 5 gallons in size, should either be reused for hazardous waste collection, or should be cleaned and discarded or recycled. Contact EH&S at risk-management@Humboldt.edu for guidance on rinsing and repurposing empty containers.

- Proper cleaning involves triple rinsing the container, with the first rinse collected as hazardous waste.
- The labels should be completely defaced (remove or marked out completely).
- Empty containers 5 gallons in size or more should be disposed of through the Hazardous Waste Program.

Transportation

It is a violation of DOT regulations to transport hazardous waste in personal vehicles or to carry hazardous waste across campus streets that are open to the public. As a result, EH&S operates a Hazardous Waste Program to provide pick-up services for all hazardous waste generators. These requested pick-ups are for all hazardous waste generators on campus. Special pick-ups are available upon request through EH&S.

Accumulation and Disposal

Frequent disposal will ensure that hazardous waste accumulation areas in labs are managed properly and that accumulation limits are not exceeded. Cal Poly Humboldt's EH&S Hazardous Waste Program allows hazardous chemical waste to be stored in a laboratory for up to 90 days. Once a waste container is 80% full or near the 90-day time limit, it should be requested for pickup through the [Hazardous Waste Pickup Form](#). Affix the compliant hazardous chemical waste label to all generated waste.

Drain Disposal

Cal Poly Humboldt does not permit drain disposal of chemical waste, unless a specific dilution and/or neutralization method for a consistent waste stream has been reviewed and approved by EH&S. This applies to weak acid and base solutions. Hazardous waste regulations specify that materials with a pH between 2.0 and 12.5 are not hazardous wastes in their own right. However, drain disposal of these materials is still not permitted, because local waste water discharge requirements have more restrictive pH thresholds. In

addition, acid and base neutralization is considered waste treatment, a process that is strictly regulated by Cal/EPA.

Drain disposal of properly disinfected infectious or biohazardous liquids is acceptable, if disinfection is conducted as specified by the EH&S Bloodborne Pathogen Program requirements, and the liquids disposed contain no other hazardous constituents.

Section 12. Accidents, Emergencies, and Chemical Spills

Overview and Responsibilities

In California, hazardous waste is regulated by the Department of Toxic Substance Control (DTSC), a division within the California Environmental Protection Agency (Cal/EPA). Federal EPA regulations also govern certain aspects of hazardous waste management, since most waste is treated and disposed out of state. These hazardous waste regulations are part of the Resource Conservation and Recovery Act (RCRA). Local enforcement authority is administered by Los Angeles County Department of Environmental Health.

Faculty, and any other University employee, graduate student, or designee who supervises students have the responsibility to respond to a situation involving students; employees who do not supervise students in a classroom or laboratory do not have responsibility to respond to injury or spill incidents involving students.

Faculty, and any other University employee, graduate student or designee, who supervises students where chemicals are used or stored, or is conducting research in a University laboratory have the following responsibilities:

1. Understand and exercise the information in this section.
2. Using the chemical inventory, know exactly which chemicals are being used as teaching and research materials and stored where you work, where you do research, and for the classes you teach, and how to safely use those chemicals, use personal protective equipment (PPE) as necessary, know what to do in the event of a spill or accident, and know how to properly dispose of any chemical or hazardous waste generated by the instructional or research activity.
3. Be aware that to the best of your ability, you may need to distinguish between a basic first aid situation and one that requires medical attention beyond first aid.
4. Be aware that to the best of your ability, you may need to distinguish between a simple chemical spill and a complex chemical spill using the information in this section.

5. Know how to respond to a simple spill or a complex spill using the information in this section.
6. Know whom to call, what numbers to use, and where the campus emergency phones are.
7. Maintain familiarity with emergency procedures and locations of exits in the event the area needs to be evacuated.
8. Know the locations for closest eye wash fountains and emergency showers and know the procedures for when and how to use them.
9. Know when and how to contact the University's EH&S Department in advance of any incident to answer any questions about these responsibilities, or other questions related to chemical inventory, chemical use, chemical hazards, personal protective equipment (PPE), emergency response procedures, or hazardous waste.
10. Provide detailed information and training to all students for whom you have teaching responsibility about how to properly identify chemicals being used as teaching or research materials in each and every laboratory or classroom you teach, know and understand the hazards of those chemicals, the exact personal protective equipment that must be used when these chemicals are present, how to respond in the event of an injury, or either simple or complex accident spill, and how to properly dispose of used and unwanted hazardous chemicals as hazardous waste.
11. Before beginning any laboratory task where you teach students as faculty or instructor, or conduct research as investigator, know what to do in the event of an emergency, including the location of first aid kits, eye washes, emergency showers, fire extinguishers, fire alarm pull stations, and spill kits.
12. Follow instructions in section to ensure that in the event of a student injury or chemical exposure, appropriate medical attention is received.
13. Know how to report to EH&S injuries requiring medical treatment or complex chemical spills or chemical exposures to any employee or student as soon as possible.

University employees who work with chemicals that are stored, used, or disposed have the following responsibilities:

1. Understand and exercise the information in this section.
2. Using the chemical inventory, know exactly which chemicals are present and being used and stored where you work, and how to safely use hazardous chemicals, use PPE as necessary, know what to do in the event of a spill or accident, and know how to properly dispose of any chemical or hazardous waste generated by your work activity.
3. Be aware that to the best of your ability, you may need to distinguish between a basic first aid situation and one that requires medical attention beyond first aid for

all incidents that occur in your workplace, except for those that involve students who are already under direct supervision of faculty.

4. Be aware that to the best of your ability, you may need to distinguish between a simple chemical spill and a complex chemical spill using the information in this section for all incidents that occur in your workplace, except for those that involve students who are already under direct supervision of faculty.
5. Know how to respond to a simple spill or a complex spill using the information in this section.
6. Know who to call, what numbers to use, and where the campus emergency phones are.
7. Know the procedures and locations of exits in the event the area needs to be evacuated.
8. Know the locations for the closest eye wash fountains and emergency showers and know the procedures for when and how to use them.
9. Know when and how to contact the University's EH&S in advance of any incident to answer any questions about these responsibilities, or other questions related to chemical inventory, use, PPE, emergency response procedures, or hazardous waste.
10. Before beginning any work or task involving chemicals, know what to do in the event of an emergency, including the location of first aid kits, eye washes, emergency showers, fire extinguishers, fire alarm pull stations, and spill kits.
11. Follow instructions in section to ensure that in the event of any injury or chemical exposure, appropriate medical attention is received for incidents that involve persons who are not under the direct supervision of faculty.
12. Know how to report to EH&S and Workers Compensation any injuries requiring medical treatment or complex chemical spills or hazardous chemical exposures to any employees as soon as possible.

Students who are in classrooms, laboratories, or other campus facilities where chemicals are used have the following responsibilities:

1. Understand and exercise the information in this section.
2. Using the chemical inventory and information provided by your faculty instructor, graduate assistant, or room supervisor, know exactly which chemicals you are using, know how to safely handle those chemicals, how to use personal protective equipment as necessary, and know what to do in the event of a spill or accident.
3. Know and understand the specific chemical safety and emergency response information and training provided by your faculty or other university instructor or supervisor.
4. Know how to report any incident that requires first aid or medical treatment to your faculty or other university instructor or supervisor.

5. Know how to report any chemical spill using the information in this section to your faculty or other university instructor or supervisor.

Accidents – Sharps Injury Involving Non-infectious Materials

Injuries from needles, scalpel blades and glass pipette injuries pose a potential threat to an individual's health due to the potential nature of materials being worked with. For sharps related injury involving infectious materials, consult the Bloodborne Pathogen Exposure Control Manual for guidance.

In the event you sustain a sharps injury in a University facility where chemicals are present or being used but the incident does not involve using biohazardous materials:

1. Notify the person supervising the location immediately, if possible. If the injured person is the location supervisor, the Department leadership must be notified. In the event the injured person cannot initiate the notification, another person close to the situation must make that immediate notification.
2. To the best of the ability of the injured person and the location's faculty or supervisor, determine if the situation requires basic first aid or will require medical treatment. If a determination cannot be immediately made, the immediate response is to assume the situation requires medical treatment.
3. **For all cases that require medical treatment, the faculty or supervisor or other witness must immediately call 911** from a campus phone, if available, and indicate an event has occurred that requires immediate medical attention.
4. If a **cell phone** is used, call Cal Poly Humboldt Police Dispatch at **(707) 826-5555**. The caller must provide exact location information (Building-Floor-Room) and indicate that there is a need for immediate emergency medical response.
5. Faculty or supervisors are to assist the injured as possible and remain with the injured person until campus police and professional emergency medical technicians (EMTs) arrive.
6. Witnesses should remain at a safe distance until University Police has released them.
7. For simple first aid cases, the faculty or location supervisor may choose to assist the injured person with first aid, using materials found in the first aid kit.
8. In the event a student believes additional medical observation and advice is needed after simple first aid is rendered, they may choose to visit Student Health Services.
9. If the student decides to visit Student Health Services, the faculty or supervisor may choose to accompany the student to the building, depending on the circumstances. However, faculty/staff should not transport students to the Student Health Services

themselves or any medical facility for treatment. If the student is not ambulatory, emergency medical may be needed to ambulate for medical care.

10. Immediately after calling for medical assistance or providing first aid, the Department Chair must be notified.
11. If any person receives medical attention beyond basic first aid or is transferred off campus for medical treatment, whether or not it involves chemical exposure, **EH&S must be notified as soon as possible but not more than 8 hours after the incident at risk-management@humboldt.edu. EH&S will report the event to Cal-OSHA if necessary.**
12. For medical treatment cases involving employees (faculty, staff, student assistants), **Workers' Compensation** must be contacted as soon as possible and a Worker's Compensation case initiated.
13. Complete the Injury Log and return to EH&S.

Accidents – No Chemicals Involved

In the event you sustain an injury or illness in a University facility where chemicals are present or being used, but the incident does not involve a chemical spill or any chemical exposure:

1. Notify the person supervising the location immediately, if possible. If the injured person is the location supervisor, the Department leadership must be notified. In the event the injured person cannot initiate this notification, another person close to the situation must make that immediate notification.
2. To the best of the ability of the injured person and the location's faculty or supervisor, determine if the situation requires basic first aid or will require medical treatment. If a determination cannot be immediately made, the immediate response is to assume the situation requires medical treatment.
3. **For all cases that require medical treatment, the faculty or supervisor or other witness must immediately call 911** from a campus phone, if available, and indicate an event has occurred that requires immediate medical attention.
4. If a **cell phone** is used, call Cal Poly Humboldt Police Dispatch directly at **(707) 826-5555**. The caller must provide exact location information (Building-Floor-Room) and indicate that there is a need for immediate emergency medical response.
5. Faculty or supervisors are to assist the injured as possible and remain with the injured person until campus police and professional emergency medical technicians (EMTs) arrive.
6. Witnesses should remain at a safe distance until University Police has released them.
7. For simple first aid cases, the faculty or location supervisor may choose to assist the injured person with first aid, using materials found in the first aid kit.

8. In the event a student believes additional medical observation and advice is needed after the simple first aid is rendered, they may choose to visit the Student Health Services.
9. If a student decides to visit the Student Health Services, the faculty or supervisor may choose to accompany the student to the building, depending on the circumstances. However, faculty/staff should not transport students to Student Health Services or any medical facility for treatment. If the student is not ambulatory, emergency medical may be needed to ambulate for medical care.
10. Immediately after calling for medical assistance or providing first aid, the Department Chair is to be notified.
11. If any person receives medical attention beyond basic first aid or is transferred off campus for medical treatment, whether or not it involves chemical exposure, **EH&S must be notified as soon as possible but not more than 8 hours after the incident at risk-management@humboldt.edu. EH&S will report the event to Cal-OSHA if necessary.**
12. For medical treatment cases involving employees (faculty, staff, student assistants), **Worker's Compensation** must be contacted as soon as possible and a Worker's Compensation case initiated.

Accidents – Chemical Spill

In the event there is a chemical spill, or you sustain an injury or illness or chemical exposure in a University facility where chemicals are present or being used:

1. Notify the person supervising the location immediately, if possible.
2. If the injured or chemically exposed person is the location supervisor, the Department leadership must be notified.
3. In the event the injured or chemically exposed person cannot initiate this notification, another person close to the situation must make that immediate notification.
4. To the best ability of the location's faculty or supervisor, use the information in this section to determine if the situation is a simple chemical spill or a complex chemical spill. If a determination cannot be immediately made, the immediate response is to assume the situation is a complex chemical spill. There is more information regarding on how to respond to both types of spills below.
5. For cases where a hazardous chemical exposure has occurred that requires medical treatment, the faculty or supervisor or other witness must immediately **call 911 on the campus emergency phone** and indicate a chemical exposure event has occurred that requires immediate medical attention.

6. If a **cell phone** is used, call Cal Poly Humboldt Police Dispatch at **(707) 826-5555**. The caller must provide exact location information (Building-Floor-Room) and indicate that there is a need for immediate emergency medical response.
7. Faculty or supervisors are to assist the injured person if possible and remain with the injured person until campus police arrives. Faculty or supervisors as well as witnesses should remain at the scene and at a safe distance until being released by University Police and EH&S.
8. Faculty, instructors, or other University personnel with supervisory responsibility for the location where the incident has occurred to make the determination whether to use the showers or eye washes.
9. For hazardous chemical exposures, this assistance may involve immediately using the eyewash or emergency shower.
10. Eyewash fountains and showers are to be used for 15 minutes. Contaminated clothing and lab coats must be removed to the extent possible.
11. Washing off a minor exposure to a non-hazardous chemical or using only the eyewash fountain is first aid, not medical treatment, and may not require calling 911.
12. Assisting personnel are advised to limit contamination of the building with a hazardous chemical by **NOT** taking the exposed person outside the lab and into hallways and bathrooms, unless immediate evacuation from the location is warranted, based on significant hazards of the spilled or released chemical.
13. Faculty, staff, and supervisors, and any other assisting personnel, must use appropriate PPE to limit their own exposure while assisting the person exposed to a hazardous chemical, so that only those with proper PPE may assist.
14. For first aid cases and simple spills only, the faculty or location supervisor may assist the injured person by providing first aid, or for minor or non-hazardous chemical exposure, in ensuring that the person can appropriately remove contaminated clothing or PPE and ensuring the chemically exposed body parts are washed.
15. For students who have a minor or non-hazardous exposure, after washing or first aid as appropriate, the student may choose to have additional medical observation and advice. In these cases, they may choose to visit the Student Health Services.
16. If the student decides to visit Student Health Services, the faculty or supervisor may accompany the student to the building, depending on the circumstances. Faculty/staff must not transport the student to Student Health Services or other medical facilities. If the student is not ambulatory, emergency medical may be needed to ambulate for medical care.
17. Immediately after medical assistance has been called or first aid rendered, the Department Chair is to be notified.
18. If any person receives medical attention beyond basic first aid or is transferred off campus for medical treatment, whether or not it involves chemical exposure, **EH&S**

must be notified as soon as possible but not more than 8 hours after the incident at risk-management@humboldt.edu. EH&S will report the event to Cal-OSHA if necessary.

19. For medical treatment cases involving employees (faculty, staff, student assistants), **Worker's Compensation** must be contacted as soon as possible and a Worker's Compensation case initiated.

Determining a Simple Chemical Spill

All the following criteria must be met to define a simple chemical spill:

1. The material released must be known to the faculty, employee, graduate student, or supervisory designee in charge of the location where the release occurs.
2. This knowledge of the chemical teaching/research material enables the faculty, employee, graduate student, or supervisory designee to immediately determine if the volume, toxicity, flammability, or environmental effects of the material can be safely managed and cleaned up using the standard PPE already being worn in the location.
3. Standard PPE (fresh gloves, lab coat, goggles/glasses) are used to safely work with the chemical.
4. A fume hood is NOT needed to work with the material (see Fume Hood Spill below).
5. The spill has NOT occurred in a public space (ex. Hallway, elevator, etc.)

Additional Simple Spill Definitions

1. Low volume incidental release, splash, or drip of chemical teaching/research materials which are known to the faculty, staff, and graduate students responsible for the specific classroom, laboratories, countertops, measuring/weighing locations and fume hoods is not a spill, if it can be managed safely with standard PPE.
2. Safe housekeeping of these incidental releases while wearing standard PPE is not a spill clean-up.
3. Spills in a functioning fume hood that are in secondary containment may be defined as a simple spill by the faculty or supervisor in that location, based on exact knowledge of the spilled chemical and the certainty that it presents no hazard to the location in which the fume hood is located.
4. Solid chemical spills are generally a simple spill. Unless the faculty, employee, graduate student, or supervisory designee in charge of the location has determined that the substance cannot be managed with

standard PPE in use, use damp paper towels to transfer it into plastic bags to prevent causing an airborne hazard by dry sweeping.

Simple Chemical Spill Response

1. Determine that all criteria are met for a Simple Spill.
2. Immediately notify the faculty or supervisor where the spill occurred.
3. Since it is a simple spill, the people cleaning the spill are knowledgeable about the spilled material, are current on all required EH&S training, and are approved to do so by the faculty, employee, graduate student, or supervisory designee.
4. Ensure all personnel or students who are non-essential for the clean-up process are not in the immediate area of the spill.
5. Limit contamination of other areas by anyone from walking through the spill.
6. Use appropriate cleanup techniques and the local spill response kit if needed. Contact EH&S at risk-management@humboldt.edu for guidance if necessary.
7. If a person is involved in a simple spill incident where the chemical has contacted skin, eye, or mouth despite wearing PPE, that person must wash off the material as soon as possible.
8. Faculty or supervisors may assist those who need to have the chemical washed off by directing them to the appropriate location to do so. Simple spills are low volume, low hazard chemicals and a sink, rest room, or eye wash fountain may be all that is required to provide the individual with the ability to wash the chemical off. The full body emergency shower is likely not necessary for a simple spill.
9. Work with another person to clean up the spill. **Do not clean up a simple spill alone.**
10. Use an appropriate chemical spill kit to neutralize and absorb the chemical with sorbent pads, paper towels, vermiculite, dry sand, or diatomaceous earth.
11. For other chemicals, use the appropriate spill kit or absorb the chemical with sorbent pads, paper towels, vermiculite, dry sand, or diatomaceous earth.
12. Collect the clean-up materials and residue and place it in a clear plastic bag. Double bag the waste and label the bag with properly completed Hazardous Waste label.

Complex Chemical Spills

1. Any spill that is NOT a simple spill is a complex chemical spill.
2. There are spills of larger quantities than 500 ml, known toxic substances for which standard PPE may not be sufficient, a spill of an unknown chemical, a spill of a toxic substance in a public area where people are not wearing PPE, or spills into or adjacent to drains.
3. Uncontrolled leaks from compressed gas cylinders can be considered a complex spill requiring an emergency response depending on the hazard of the gas.

Chemical Spill Response

1. Complex spills require an emergency response from the EH&S Department.
2. Faculty, staff, and students **DO NOT** respond directly to a complex chemical spill.
3. Unless you have been contaminated by the spill material, when the faculty or location supervisor has declared a spill emergency, evacuate from the immediate area and leave the room where it occurred.
4. **Call 911 on a campus phone** and indicate the room location where a chemical spill has occurred that requires EH&S response.
5. **If a cell phone is used, call Cal Poly Humboldt Police Dispatch at (707) 826-5555.** The caller must provide the exact location information (Building – Floor – Room) and indicate that there is a need for immediate EH&S response.
6. If the spill presents a situation that is immediately dangerous to life, activate the fire alarm and clear the entire building.
7. Anyone who has been directly exposed to a significantly hazardous chemical should not evacuate the building unless the situation is immediately dangerous to life and health and prioritize immediately washing the contamination off.
8. Faculty, instructors, or other University personnel with supervisory responsibility for students at the location where the incident has occurred make the determination whether to use the showers, eye washes, or restrooms for decontamination, not the students of supervised staff.
9. Faculty or supervisors are to assist those who have been exposed to a significantly hazardous chemical by directing them to the nearest location outside the immediate spill area that has appropriate means to

wash off the chemical, such as eye wash fountains, emergency showers, or rest rooms if appropriate.

10. For significantly hazardous chemicals, washing off the chemical must be immediate and continue for 15 minutes, unless trained EMTs and Hazmat responders arrive on the scene and require other procedures. Contaminated clothing and lab coats must be removed to the extent possible before washing and appropriately bagged and labeled as hazardous waste.
11. Faculty, staff and supervisors, and any other assisting personnel must use appropriate PPE to limit their own exposure to a hazardous chemical while assisting the person exposed, so that only those with proper PPE may assist.
12. Assisting personnel are advised to limit contamination of the building with a significantly hazardous chemical by NOT taking the exposed person into hallways, stairways, and elevators, unless immediate evacuation from the location is warranted, based on significant hazards of the spilled or released chemical.
13. Be sure to notify EH&S at risk-management@humboldt.edu as soon as possible after calling the police/dispatch of any complex chemical spills. EH&S will handle further notifications to regulatory authorities as needed. EH&S will report the event to Cal-OSHA if necessary and investigate further.
14. For medical treatment cases involving employees (faculty, staff, student assistants), **Worker's Compensation** must be contacted as soon as possible and a Workers Compensation case initiated.
15. **No re-entry of any evacuated space where a complex emergency chemical spill has occurred is permitted until approval is provided by the Office of Environmental Health and Safety.**

Highly Toxic Chemical Spills

Do not clean up by yourself. All spills of these chemicals require emergency response:

- Aromatic amines
- Hydrazine
- Bromines
- Nitriles
- Carbon disulfide
- Nitro-compounds
- Cyanides

- Organic halides
1. Notify EH&S at risk-management@humboldt.edu as soon as possible **after calling the police/dispatch** of any toxic chemical spills.
 2. For medical treatment cases involving employees (faculty, staff, student assistants), **Worker's Compensation** must be contacted as soon as possible and a Workers Compensation case initiated.
 3. **No re-entry of any evacuated space where a toxic emergency chemical spill has occurred is not permitted until approval is provided by the Office of Environmental Health and Safety.**

Accidents – Fire

1. If a fire or smoke is detected in a laboratory or other University facility, the faculty or supervisor of that location must be alerted immediately.
2. Faculty, staff, or supervisors in a location are not required to extinguish fires that occur in their work areas and should not attempt to do so unless:
 - a. It is a small fire (i.e., small trash can size fire);
 - b. Appropriate fire extinguisher training has been received; and
 - c. The person wishes to do so and is capable.
3. The immediate location must be evacuated, and a fire alarm pulled.
4. If the clothing of an individual catches on fire, the most immediate location where drenching water can be applied must be used.
5. Any time a fire occurs, a fire extinguisher is used, no matter for how brief a period, the incident must be reported to Cal Poly Humboldt Police Dispatch at **(707) 826-5555** and afterwards to EH&S at risk-management@humboldt.edu.

Section 13. Recordkeeping Requirements

Accurate recordkeeping demonstrates a commitment to safety and health of the Cal Poly Humboldt community, integrity of research, and protection of the environment. EH&S is responsible for maintaining records of inspections, accident investigations, equipment calibration, and training conducted by EH&S staff. Documentation of training conducted by EH&S staff can be accessed via the Learning Management System (LMS). Per OSHA regulations, departments or laboratories must document health and safety training, including safety meetings, one-on-one training, and classroom and online training. Additionally, the following records must be retained in accordance with the requirements of state and federal regulations:

- Accident records – 5 years
- Measurements taken to monitor employee exposure – 30 years

- Chemical Hygiene Plan records should document that the facilities and precautions were compatible with current knowledge and regulations
- Inventory and usage records for high-risk substances should be kept
- Any medical consultation and examinations, including tests or written opinions required by Title 8 CCR §5191 – duration of employment plus 30 years
- Medical records must be retained in accordance with the requirements of state and federal regulations – duration of employment plus 30 years

Section 14. Document Revision History

Revision Date	Summary of Changes	Updated By