



Chemical Hygiene Plan

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CALIFORNIA STATE UNIVERSITY, SAN MARCOS

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1.0 AUTHORITY

California Code of Regulations (CCR), Title 8, Section 5191.
CSU Executive Order 1039

2.0 REGULATORY AGENCY

California Division of Occupational Safety and Health, Department of Industrial Relations (Cal-OSHA).

3.0 BACKGROUND

- 3.1 The California Code of Regulations, Title 8, Section 5191, "Occupational exposure of hazardous chemicals in laboratories," adopted April 26, 1991, requires employers to develop and implement a written Chemical Hygiene Plan (CHP). The plan should be capable of protecting employees from health hazards associated with hazardous chemicals in laboratory environments and keeping employee exposures below permissible limits.
- 3.2 The procedures and methods outlined in the CHP shall be regular, continuing efforts, not merely standby or short-term activities.
- 3.3 Colleges and universities have also had to assume the additional challenge of administering instructional laboratories, where relatively inexperienced students must be introduced to the safety precautions necessary to conduct various laboratory operations.
- 3.4 This plan fulfills the regulatory requirements as promulgated in the CCR, Title 8, Section 5191. It also includes input from the CSU Sample Chemical Hygiene Plan.

4.0 SCOPE

- 4.1 The provisions of this plan apply to all personnel who work in shop and laboratory-type environments that utilize hazardous materials, including but not limited to: faculty; principal investigators; laboratory and stockroom technicians and supervisors; student assistants and technical assistants; building service engineers; and building trades and maintenance staff.

5.0 POLICY

- 5.1 Under the University's Illness and Injury Prevention Program, and as outlined in this plan, it is the policy of the University to maintain, insofar as it is reasonably within its control to do so, campus laboratory environments

for faculty, staff, students and the public that will not adversely affect their health and safety nor subject them to avoidable risks of accidental injury or illness. No student or other worker shall be required to perform any task which is determined to be unsafe or unreasonably hazardous.

- 5.2 To accomplish this, departments shall provide facilities and equipment that meet all federal, state, and local (where applicable) safety laws and regulations, and shall promulgate appropriate policies, standards and procedures for governing campus health and safety programs.
- 5.3 While the overall responsibility for campus health and safety rests with the President, the immediate responsibility for laboratory or hazardous area workplace health and safety belongs to each campus employee who performs a supervisory role. In addition, individual employees are responsible for preventing laboratory accidents. Accordingly, all faculty and staff are to ensure that safe and healthful conditions and practices are provided and followed within the areas under their control, and all members of the campus community are to cooperate fully with all aspects of the various campus health and safety programs.

6.0 OBJECTIVES

- 6.1 The Chemical Hygiene Plan (CHP) is available to assist management, faculty, and supervisors to recognize hazards in the workplace, methods used to minimize potential exposure to hazardous chemicals and procedures for incidents involving hazardous materials.
- 6.2 Effective implementation of the Chemical Hygiene Plan is intended to achieve the following objectives:
 - a. Exposures to hazardous materials will be maintained below acceptable limits.
 - b. The CHP will be readily available to all employees, faculty, principal investigators, laboratory and stockroom technicians and supervisors, student assistants and technical assistants, building service engineers, and building trades and maintenance staff.
 - c. The CHP will be reviewed annually and updated as appropriate. Input on the CHP will be solicited from departments and personnel affected by it.
 - d. Laboratory equipment will be inspected regularly and maintained in safe working condition.

- e. The CHP provides for controls and protection for workers with particularly hazardous chemicals.
- g. The CHP provides for medical consultation and medical examinations.
- h. The CHP provides for worker information & training.

7.0 RESPONSIBILITIES

7.1 University Administration

- a. The University President has the ultimate responsibility for the safety of the personnel at CSUSM. The CHP is a part of the campus-wide IIPP, thus has the approval of the President. By Presidential delegation, the Director of Safety, Health & Sustainability (SH&S) is the administrator of environmental protection, occupational health and safety programs at CSUSM.
- b. It is recognized that certain responsibilities and expressed procedures in this program cannot be equally applied because of the wide diversity of operations within the University and the necessary differences in organizational structure within the various departments. There are, therefore, some details which might be impossible or impractical for one department chair or department head to implement as directed while another would have no difficulty in applying everyone. Departments will, therefore, have some latitude in formulating and implementing alternative methods when necessary as long as the total Chemical Hygiene Plan objectives are not compromised.

7.2 Chemical Hygiene Committee

The responsibilities of the Committee are as follows:

- a. Meet once a year or as needed.
- b. If requested, will review new project/process proposals for approval.
- c. If requested, will review proposals to change or modify existing projects/processes for approval.
- d. Discuss, explore, study and resolve problems that arise in the laboratories or other hazardous areas.

- e. Prepare written records of safety and health issues discussed, distribute records to affected employees and maintain records.
- f. Review investigations of laboratory or hazardous area accidents and causes of incidents.
- g. Submit recommendations to the Chemical Hygiene Officer on laboratory or hazardous area problems.

7.3 Safety, Health and Sustainability (SH&S)

It is the responsibility of SH&S, in coordination with the Chemical Hygiene Committee, to develop, implement and maintain a campus wide Chemical Hygiene Plan. Further responsibilities are outlined below:

- a. Provide consultation to Department Deans, Directors, Chairpersons and Coordinators regarding program compliance. Consult on issues of hazard identification and evaluation; procedures for correcting unsafe conditions; determining and implementing control measures; student and worker information and training programs; medical monitoring; and recordkeeping.
- b. Provide centralized monitoring of campus wide chemical hygiene activities on a consultative basis.
- c. Human Resources and SH&S will maintain centralized worker medical monitoring documents for 30 years after termination of employment (provide access as directed by law). Medical records will be maintained by the Occupational Medical Provider.
- d. Maintain environmental and personnel monitoring records in SH&S files for review by persons authorized under the law.

7.4 Chemical Hygiene Officer (CHO)

The Chemical Hygiene Officer is designated by the University to administer and oversee the institutional implementation of the CHP. Per the delegation of the President, the Director of SH&S which is authorized to administer the Occupational Health and Safety programs, retains the CHO position unless otherwise stated. This delegation of the CHO position can be provided by the President or by the SH&S Director.

It is the responsibility of the CHO, under the direction of the SH&S Office, to do the following:

- a. Work with administrators and others to develop and implement appropriate chemical hygiene policies and practices.
- b. Provide technical guidance as requested.
- c. Coordinate assessment of exposure to hazardous chemicals.
- d. Maintain legal requirements concerning regulated substances as current.
- e. Seek ways to improve the chemical hygiene program.
- f. Ensure that appropriate audits, certifications and inspections are conducted. Review and evaluate the effectiveness of the CHP at least annually and update if necessary.

7.5 Deans, Directors, Department Chairs, and Department Heads

To ensure employees are aware of and adhere to applicable EH&S requirements, **deans, and directors** are responsible for establishing, promoting, and maintaining a culture of safety within their respective colleges and departments/units, classrooms, laboratories and for maintaining and monitoring compliance with those EH&S requirements. Areas of responsibility include, but are not limited to, hazard assessment, training, maintenance and use of safety equipment, inspections, and hazardous materials management. They must attend/complete all required EH&S training and follow the procedures described in the training. If a CSU policy or program is in conflict with a Collective Bargaining Agreement (CBA), the CBA shall take precedence unless otherwise proscribed by law or regulation.*

To ensure employees are aware of and adhere to applicable EH&S requirements, **Department Chairs** are responsible for establishing, promoting, and maintaining a culture of safety within their respective departments/units, classrooms, laboratories and for maintaining and monitoring compliance with those EH&S requirements. Areas of responsibility include, but are not limited to, hazard assessment, training, maintenance and use of safety equipment, inspections, and hazardous materials management. They must attend/complete all required EH&S training and follow the procedures described in the training. If a CSU policy or program is in conflict with a Collective Bargaining Agreement (CBA), the CBA shall take precedence unless otherwise proscribed by law or regulation.*

It is the responsibility of Deans, Directors, Department Chairs, and Department Heads to develop departmental procedures to ensure effective compliance with the Chemical Hygiene Plan and other university health and safety policies as they relate to operations under their control. Specific areas include worker and student education and training, identification and correction of unsafe laboratory conditions and recordkeeping. Specifically, these individuals will:

- a. Identify all laboratories in the department.
- b. Identify Faculty and Principal Investigators (PIs) for each laboratory.
- c. Provide training to Faculty and PIs regarding requirements for compliance, elements of the program and specifics on what/how to train students and employees.
- d. Review departmental program routinely including:
 1. Checklists (inspections)
 2. Accident reports
 3. Certifications (hoods, showers)
 3. Maintenance reports
- e. Provide periodic training as necessary.
- f. Provide Safety Data Sheets (SDSs) to PIs when necessary.
- g. Assist Faculty and PIs in identifying laboratory hazards.

7.6 Principal Investigators (PIs), Faculty, Managers and Supervisors

Faculty shall identify and report hazards associated with their teaching and research activities. Faculty shall ensure students, employees, and official volunteers who are associated with their teaching and research activities, receive appropriate information, training, and safety equipment. Faculty shall comply with applicable laws, regulations, policies, and programs of which they are reasonably informed. Faculty should work with their department safety coordinator and/or EH&S department to implement applicable EH&S programs and document compliance with applicable EH&S requirements. They must attend/complete all required EH&S training and endeavor to follow the procedures described in the training. If a CSU policy or program is in conflict with a Collective Bargaining Agreement (CBA), the CBA shall take precedence unless otherwise proscribed by law or regulation.*

CSU managers and supervisors are responsible for identifying hazards associated with their duties/job functions, including any applicable reporting of identified hazards, learning and implementing EH&S requirements that are applicable to employees, areas and operations under their control. They must attend/complete all required EH&S training and follow the procedures described in the training. If a CSU policy or program is in conflict with a Collective Bargaining Agreement (CBA), the CBA shall take precedence unless otherwise proscribed by law or regulation.

Managers and supervisors should consult with employees under their supervision, in the development, planning, implementation, and corrective actions to improve EH&S function and compliance.*

- a. Identify potential laboratory hazards and report them to the Chemical Hygiene Committee or SH&S.
- b. Provide employee training at initial assignment and prior to new exposure situations.
- c. Identify materials considered particularly hazardous (carcinogens, highly toxics, reproductive toxins, etc.).
- d. Define special circumstances under which persons must request approval before engaging in a given work activity.
- e. Conduct routine inspections of the laboratory.

7.7 Laboratory Workers (Technicians, Student Assistants, Technical Assistants, Other Employees)

Staff, are responsible for reporting all identified hazards to their appropriate administrator. They must attend/complete all required EH&S training and follow the procedures described in the training. Training must be timely and in advance of the assignment of duties. Training information must be presented in a manner that employees receiving it are capable of understanding. Employee safety and environmental compliance are based on individual responsibility for safety and environmental stewardship. Staff support EH&S compliance by engaging in safe practices while performing activities at the University. Each individual is directly responsible for ensuring his or her own safety and for promoting a safe, healthy, and environmentally-sound workplace. An employee shall be responsible for other persons within a reasonable expectation of safety. Proper authority, training, appropriate equipment and span of control is necessary for staff to maintain a safe and healthy environment. If a CSU policy or program is in

conflict with a Collective Bargaining Agreement (CBA), the CBA shall take precedence unless otherwise proscribed by law or regulation.*

Student Workers and Official Volunteers are responsible for reporting all identified hazards to their appropriate administrator. They must attend/complete all required EH&S training and follow the procedures described in the training. Training must be timely and in advance of the assignment of duties. Training information must be presented in a manner that Student Workers and Official Volunteers receiving it are capable of understanding. Student Worker and Official volunteer safety and environmental compliance are based on individual responsibility for safety and environmental stewardship and they support EH&S compliance by engaging in safe practices while performing activities at the University. Each individual is directly responsible for ensuring his or her own safety and for promoting a safe, healthy, and environmentally-sound workplace. An employee shall be responsible for other persons within a reasonable expectation of safety. Proper authority, training, appropriate equipment and span of control is necessary to maintain a safe and healthy environment. If a CSU policy or program is in conflict with a Collective Bargaining Agreement (CBA), the CBA shall take precedence unless otherwise proscribed by law or regulation.*

Workers in laboratory environments are responsible for the following:

- a. Plan and conduct each operation in accordance with the institutional and chemical hygiene procedures.
- b. Use common sense and good judgment at all times.
- c. Understand and comply with all Procedures (see Attachment B). Report any significant problems arising from the implementation of the Procedures to the PI or Laboratory Instructor/Supervisor.
- d. Report to the PI, Faculty, Laboratory Instructor or Supervisor all facts pertaining to every accident/incident and any action or condition that may exist that could result in an accident.
- e. Attend established education and training sessions.
- f. Ask questions of supervisors when there is concern about an unknown or hazardous situation.
- g. Understand the function and proper use of all personal protective equipment (PPE). Wear appropriate PPE when required or necessary and enforce the wearing of appropriate PPE by students

and visitors to the laboratories.

- h. Contact the PI, Faculty, Laboratory Instructor, Supervisor, and/or the Chemical Hygiene Officer if any of the above procedures are not clearly understood.

7.8 Students

Students shall follow all established EH&S requirements for their campus. They must attend/complete all required EH&S training and follow the procedures described in the training. Students are responsible for ensuring their own safety and reporting identified hazards to their faculty, residential assistant, or campus EH&S departments.*

- a. Students are expected to always adhere to safe and healthful work practices defined by written and oral campus safety and health guidelines.
- b. Students are to report laboratory hazards that become known to them, to their instructors or other responsible parties. Failure to do so will result in the initiation of disciplinary measures as defined in the campus IIPP.
- c. Students will read the training and documents provided by their lab supervisor.
- d. The written CHP is accessible to students.

**Excerpt taken verbatim from CSU Executive Order 103*

8.0 ELEMENTS OF THE PLAN

The Chemical Hygiene Plan addresses the following eight elements:

- a. Procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals.
- b. Criteria to be used to determine and implement control measures in order to reduce worker exposure to particularly hazardous chemicals.
- c. A requirement that fume hoods comply with existing regulations, and that specific measures be taken to ensure proper and adequate performance of all protective equipment.
- d. Provisions for worker information and training (CHP Attachment I).

- e. The circumstances under which a laboratory, hazardous area, operation, procedure, or activity shall require prior approval from the employer (or the employer's designee) before implementation.
- f. Provisions for medical consultation and medical examinations based on specified criteria.
- g. Designation of personnel responsible for implementation of the CHP including the assignment of a Chemical Hygiene Officer and, if appropriate, establishment of a Chemical Hygiene Committee.
- h. Provisions for additional protection for work with particularly hazardous substances. These include carcinogens, reproductive toxins, and substances which are highly, extremely or acutely toxic (see Attachments B, C, D and E).

9.0 PROCEDURES

Procedures are written safety and health guidelines for laboratory or hazardous area work with hazardous materials. Procedures are required as a part of the Chemical Hygiene Plan (CHP). They are written for hazardous chemicals when their use poses a potential hazard to laboratory personnel. Departments shall develop laboratory or hazardous area specific procedures on a case by case basis for more hazardous materials. The following general procedures are included in Attachment B:

- a. Handling chemicals
- b. General safety guidelines
- c. General safety attitudes
- d. Personal hygiene
- e. Protective clothing and equipment
- f. Housekeeping
- g. Spills and accidents
- h. Hazardous Materials Management
- i. Waste minimization

10.0 CRITERIA USED TO DETERMINE AND IMPLEMENT CONTROL MEASURES

10.1 Recognition of Potential Hazards

Departments, PIs, Faculty, and Supervisors are responsible for recognizing potential hazards in the work areas under their supervision. This requires familiarity with the processes and work operations involved, maintenance of an inventory of the chemical and physical agents associated with those processes, and periodic review of the different job activities of a work area.

Departments shall also study the effectiveness of the existing control measures.

10.2 Hazard Identification

a. Labels

PIs, Faculty, or Supervisors shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.

b. Chemical Inventory and Safety Data Sheets (SDSs)

Each laboratory shall provide student and personnel access to SDSs for all laboratory chemicals.

c. Hazardous Chemicals Produced in the Laboratory

1. If the chemical composition is known and the chemical is produced exclusively for the laboratory of origin, the PI or Faculty shall determine if it is hazardous as defined in the Attachment A. If it is a hazardous chemical, the PI will provide and document training.
2. If the chemical produced is a by-product with an unknown composition, the PI or Faculty shall assume that the substance is a hazardous chemical and shall implement the CHP.
3. If the chemical substance produced is transferred to a user outside the lab, the PI or Faculty will comply with the University Hazard Communication Program, including labeling and preparation of the SDS. SH&S will assist with the preparation of a new SDS.
4. Laboratory prepared solutions of hazardous chemicals must be labeled with the identity of the chemical and an appropriate health and physical hazard warning. The identification used shall permit cross-referencing to the laboratory's SDSs collection.

10.3 Evaluation of Potential Hazards

Departments and/or SH&S shall evaluate the degree of risk arising from exposure to chemical, physical, radiological and biological agents. Evaluation involves making a judgment based on observation and

measurement of the magnitude of these agents. Evaluation also involves determining:

- a. Toxicity and quantity of chemical agents;
- b. Routes of entry;
- c. Possibility of reaction with another agent (either chemical or physical);
- d. Duration of exposure;
- e. Levels of energy or air contaminants arising from a process or work operation (exposure determination); and
- f. Effectiveness of any control measures used.

10.4 Exposure Control

- a. Departments shall ensure that no one is exposed to levels of hazardous materials greater than or equal to the Action Levels (PEL). In the absence of Action Levels, exposure shall not exceed the Permissible Exposure Level (PEL) (see Attachment J for information on Federal and Cal-OSHA PELs).
- b. Departments shall take steps necessary to eliminate or reduce to the lowest practical level the exposure to airborne contaminants. This may be done by controlling the amount of the contaminant in the employee's breathing zone, by reducing the amount of time an employee spends in the exposure area, or by some other means.

10.5 Types of Control Measures

- a. Departments shall install control measures, the selection of which will depend on the nature of the harmful substance or agent and its routes of entry into the body.
- b. Control measures are divided into the following categories:
 1. Engineering Controls - Methods of controlling exposures by modifying the source or reducing the quantity of contaminants released into the environment (e.g., hoods, HVAC, glove boxes).
 2. Administrative Controls - Methods of controlling exposures to

contaminants by job rotation, work assignment or time periods away from the contaminant.

3. Personal Protective Equipment (PPE) - Personal protective equipment includes particle face masks, gloves, and other protective equipment/devices.

10.6 Selection

Departments shall always attempt to first design safety into a potentially hazardous process. Only when engineering controls are determined to be insufficient or unattainable, administrative controls, personal protective equipment and other measures shall be considered to achieve permissible levels of exposure.

10.7 Review and Updating

Because hazards may change over time, departments shall continually review and update health hazard control measures as necessary.

11.0 CONTROL MEASURES

11.1 General Laboratory Ventilation

- a. The University shall provide general laboratory ventilation systems that:
 1. Comply with the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook of Fundamental Guidelines; the State Building Standards Code, CCR Title 24, Parts 2 & 4; and CCR Title 8, Section 5142.
 2. Operate continuously;
 3. Provide a source of air for breathing and for input to local ventilation devices;
 4. Are not relied on for protection from toxic substances released into the laboratory;
 5. Continually replace air, preventing a build-up of toxic air concentrations during the work day;
 6. Direct air flow into the laboratory from non-laboratory areas and out to the exterior of the building; and
 7. Be inspected at least annually. Problems found during these

inspections shall be corrected within a reasonable time.

8. Fume hoods shall operate continuously;
 9. Scheduled shutdown of any fume hood requires a minimum 24-hour prior notification by Facilities to the Department affected to enable the Department to remove any chemicals from affected fume hood(s).
- b. General ventilation shall only be used when local exhaust systems are impractical.
 - c. General ventilation rates within a given workplace shall not only be calculated based on Threshold Limit Values (TLVs), but also on other factors, such as type and location of air diffusers, location of people in the room, and relative toxicity of the vapor.
 - d. The University shall alter the ventilation system only after thorough testing has indicated that worker protection from airborne toxic substances will continue to be inadequate.

11.2 Local Exhaust Ventilation

- a. The University shall only use local exhaust ventilation systems when every effort has been made to control the contaminant by isolation, a change in the process, or by substitution of a less harmful material.
- b. Local exhaust systems shall be the proper method of contaminant control if:
 1. Air samples show that the contaminant in the atmosphere constitutes a health, fire or explosion hazard;
 2. State or city codes require local exhaust ventilation at that particular process (i.e. at grinding or buffing wheels and metal-working machines);
 3. Maintenance of laboratory machinery would otherwise be difficult;
 4. Marked improvement in housekeeping or employee comfort will result;
 5. Emission sources are large, few and fixed and/or widely dispersed;
 6. Emission sources are near the employee breathing zone; and
 7. Emission rates vary widely by time.

11.3 Laboratory Fume Hood Certifications

The local exhaust hood is the point of air entry into the duct system and includes all suction openings regardless of their shape or mounting arrangement. Local exhaust systems can succeed only when the contaminant is drawn into the hood.

11.4 Flammable Solvent Hazard Control

- a. Departments shall provide for safe handling of flammable liquids, regardless of the quantities involved. Problems associated with each flammable liquid shall be analyzed to determine the extent of flammability and health hazards so that appropriate control measures can be taken.
- b. To control these hazards, departments shall consider the characteristics of the specific liquid, the amounts of vapor involved, potential ignition sources, the kinds of operations, unsafe temperature, ventilation and type of building construction.
- c. SH&S or a designated competent individual(s) shall determine the necessity of safeguarding electrical equipment; ventilation requirements; the need for eliminating sparks, open flames and other sources of ignition; safe material handling procedures; proper grounding procedures; and other factors promoting the maintenance of a safe environment (see CCR Title 8, Part 3, NEC).
- d. Departments shall obtain and use proper safety devices to protect workers from the hazards associated with flammable liquids.

11.5 Emergency Eyewashes and Safety Showers (see CCR Title 8, Section 5162)

- a. Location
 1. Emergency eyewash facilities and safety showers shall be installed in accessible locations that require no more than 10 seconds for the injured person to reach in accordance with ANSI Z358.1 - 2014 and CCR, Title 8, Section 5162.
 2. If both eyewash and shower are needed, they are conveniently located for simultaneous use.
 3. The area of the eyewash and shower equipment shall be maintained free of obstructions.

b. Performance Specifications (ANSI Z358.1-2014)

1. The control valve shall be designed so that the water flow remains on without requiring the use of the operator's hands, and so that the valve remains activated until intentionally shut off.
2. Plumbed eyewash/facewash units shall deliver potable water at the rate of 3.0 gal./minute for at least 15 minutes for eye/face wash units, and 0.4 gpm at 30 PSI for eyewash only.
3. Emergency shower units shall deliver water at the rate of 20 gal/minute for at least 15 minutes.
4. The ANSI standard states that all flushing equipment must be located in areas that are accessible within 10 seconds (roughly 55 feet).
5. Bottled Eyewash or other Personal Wash Units such as single head Drench Hoses are considered to be supplemental equipment only. These types of flushing units do not meet ANSI's requirements for Eyewash and/or Drench Shower stations and should not be used as an alternative to a 15-minute flushing station. The ANSI Z358.1-2014 standard states, *"A personal wash unit may be kept in the immediate vicinity of employees working in a potentially hazardous area. The main purpose of these units is to supply immediate flushing. With this accomplished, the injured individual should then proceed to a plumbed or self-contained Eyewash and flush the eyes for the required 15-minute period."*

SUMMARY/SPECIFICATIONS

Eye Wash Stations

- Minimum flow for plumbed and portable Eyewash units is .4 GPM at 30 PSI
- Units must be capable of delivering a minimum of 15 minutes of flushing fluid
- Eyewash units shall be capable of being activated in 1 second or less
- Stay open ball valves must be used to accommodate for hands-free rinsing
- Flushing fluid must be provided to both eyes simultaneously
- Dust caps or dust covers must be installed to protect the unit from contaminants
- Spray heads must be positioned between 33" and 45" from the floor
- Spray heads must be positioned at least 6" from the wall or nearest obstruction

Eye/Face Wash Stations

- Minimum flow for plumbed and portable Eyewash units is 3 GPM at 30 PSI
- Units must be capable of delivering a minimum of 15 minutes of flushing fluid
- Eyewash units shall be capable of being activated in 1 second or less
- Stay open ball valves must be used to accommodate for hands-free rinsing
- Flushing fluid must be provided to both eyes simultaneously
- Dust caps or dust covers must be installed to protect the unit from contaminants
- Spray heads must be positioned between 33" and 45" from the floor
- Spray heads must be positioned at least 6" from the wall or nearest obstruction

Drench Showers

- Minimum flow for Drench Showers is 20 GPM at 30 PSI
- Units must be capable of delivering a minimum of 15 minutes of flushing fluid
- Drench Showers shall be capable of being activated in 1 second or less
- Stay open ball valves must be used to accommodate for hands-free rinsing
- Drench Shower pull-rod must be installed no more than 69" from the floor
- Drench Shower spray head must be positioned between 82"-96" from the floor
- Spray-pattern must be 20" in diameter at 60" above the floor.
- Center of spray pattern must be at least 16" away from any obstruction

Combination Units must meet both criteria for drench showers and emergency eyewash stations.

Maintenance

1. Plumbed eyewash and shower equipment shall be activated monthly to flush the line and verify proper operation.
2. Other units shall be maintained in accordance with the manufacturer's instructions.

12.0 SPECIAL CONTROL MEASURES:

- SELECT CARCINOGENS (Attachment C);
- REPRODUCTIVE TOXINS (Attachment D);
- HIGHLY TOXIC CHEMICALS (Attachment E).

Departments shall follow special procedures when performing laboratory work with carcinogens, reproductive toxins, and highly toxic substances. Work with these particularly hazardous chemicals requires that the following provisions be considered and included where appropriate:

12.1 **Designated areas** should be posted and their boundaries clearly marked (see Attachment E sign).

- a. These areas must be a restricted access hood, glove box, or portion

of a lab designated for use of the particularly hazardous substances, for which all people with access are aware of the substances being used and necessary precautions.

- b. Only those persons with demonstrated knowledge and ability to work with particularly hazardous chemicals shall work with chemicals in the designated area.

12.2 **Containment devices**, such as fume hoods or glove boxes, shall be used when handling particularly hazardous chemicals when procedures involve manipulations that may result in the generation of an aerosol or airborne dust; and with any manipulation, handling, or reaction that may result in the uncontrollable release of the substance.

12.3 **Contaminated materials and wastes** are collected and removed by SH&S. Safe procedures shall be used.

12.4 **Decontamination procedures** are based on incident circumstances. Wash down with soap and water are usual.

13.0 ENVIRONMENTAL MONITORING AND EMPLOYEE EXPOSURE DETERMINATION

13.1 Environmental Monitoring

Regular monitoring of airborne concentrations is not usually justified or practical in laboratories but may be appropriate when testing or redesigning hoods or other ventilation devices or when a highly toxic or regulated substance is stored or used regularly (e.g., three times per week).

13.2 Employee Exposure Determination

a. Initial Monitoring

Initial monitoring and measurement shall be conducted if there is reason to believe that exposure levels for a substance exceed the Action Level (PEL/2).

b. Periodic Monitoring

Periodic monitoring shall be conducted in all areas where chemical exposure has been shown to exceed the Action Level. Monitoring will be performed in accordance with the applicable Cal-OSHA standards.

c. Termination of Monitoring

Monitoring may be terminated when exposures are reduced to an appropriate level in accordance with the applicable standards.

d. Exposure Determination

Monitoring needs will be identified during laboratory safety inspections. In addition, if there is a risk or concern of potential employee overexposure, SH&S will evaluate exposures on a case by case basis.

14.0 EMPLOYEE INFORMATION AND TRAINING

14.1 Frequency of Training

Employees shall be informed and trained on the hazards of chemicals present in the work area (see CHP Attachment I for specific training plan guidelines and the IIPP). Such information shall be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new hazardous chemical and/or new laboratory work procedures.

14.2 Employee Information

Employees shall be informed of the following:

- a. The content of the Chemical Hygiene Plan (CHP) and its attachments which shall be made available to employees and students.
- b. The location and availability of the CHP.
 1. The CHP will be located where the Instructional Support Technicians reside, the faculty office, and/or in the supervisor's office responsible for hazardous areas such as Facility Services. SH&S will also retain a copy available for review. The CHP can also be requested on the SH&S webpage through the Injury and Illness Prevention Program.
 2. The CHP will be available for review during normal work hours and additional copies may be distributed to employees, as appropriate.
- c. The exposure limits for Cal-OSHA regulated substances or recommended exposure limits for other hazardous chemicals where

there is no applicable Cal-OSHA regulation. The following guides can be used to obtain this information:

1. Safety Data Sheets;
 2. NIOSH Pocket Guide to Chemicals.
 3. ACGIH®, 2016 Threshold Limit Values® (TLV®).
- d. Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory. This information can be found in the SDSs for the chemical(s) in use.
- e. The location and availability of known reference materials on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, SDSs received from the suppliers.

14.3 Laboratory Training

Training shall be determined by the Faculty, PI, or Supervisor using the safety training matrix provided by SH&S in consult with applicable authorities found in Attachment I.

15.0 MEDICAL MONITORING

The University Medical Monitoring Program is designed to provide safe placement of employees, maintenance of employee health and to ascertain the effectiveness of hazard control methods. Certain laboratory or hazardous area workers who work with hazardous materials or certain hazardous operations shall be provided an opportunity to receive medical consultation and examination. Employees who meet specific criteria shall be provided appropriate medical consultation and exams at no cost to the employees, without loss of pay and at a reasonable time and place. Specific procedures relating to medical exams are contained in the Medical Surveillance & Physical Examination Program (IIPP))

16.0 RECORDKEEPING

16.1 Medical Surveillance & Physical Examination Program

Records relating to occupational injuries and illnesses, medical surveillance, exposure monitoring, inspections and other activities and incidents relevant to occupational safety and health shall be kept by SH&S, Human Resources, and designated PIs/Laboratory Supervisors or Department Heads. These records will be maintained by the appropriate department with respect to medical records and information laws.

16.2 Laboratory Inspections

Laboratory inspection results are maintained by SH&S. Forms and programs are described in Attachment H.

16.3 Fume Hood Certification

Fume hood certification results are maintained by SH&S.

16.4 Eyewash and Emergency Shower Tests

Eyewash and emergency shower test results are maintained by Facility Services. The program is described in the IIPP

16.5 Student Safety Training

Student safety training is conducted by the PIs/Faculty prior to laboratory coursework or research. The PIs/Faculty or their respective departments maintain these records. Refer to IIPP for General Hazard Communication and Worker Right-to-Know, and CHP Attachment I.

16.6 Other Training Programs

Records of training for employees and programs such as Back Safety, Laboratory Safety, CPR/First Aid, IIPP, and Respiratory Protection, etc. are located in the SH&S office and in the Employee Training Center Portal.

17.0 EMPLOYEE ACCESS TO EXPOSURE AND MEDICAL RECORDS

Employees retain the right of access to their occupational safety and health related medical records.

18.0 DOCUMENT REVIEW AND REVISION

18.1 Policy Governing Review and Revision

The Chemical Hygiene Plan will be reviewed annually by SH&S and the material or significant changes will be presented to the Chemical Hygiene Committee. It may be revised during the annual review, or ad hoc if required, to maintain current applicability.

18.2 Revision Date of this Edition

This First Edition was drafted in Spring/Summer, 1993. It was reviewed and

approved by the Chemical Hygiene Committee in August/September, 1993.
For other reviews please refer to the meeting minutes of the Chemical
Hygiene Committee located in the SH&S office.

ATTACHMENT A

GLOSSARY



Chemical Hygiene Plan

Implementation Date: 1998

Revision Date: June 2023

Revised By: VK

ATTACHMENT B

POLICY & PROCEDURE SUMMARY

Handling Chemicals

General Safety Guidelines

General Safety Attitudes

Personal Hygiene

Protective Clothing and Equipment

Housekeeping

Spills and Accidents

Waste Minimization

Protocol for Safety and Responsibility in the Chemistry
Teaching Laboratories

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY**HANDLING CHEMICALS**

- A. Safe Handling recommendations in compliance with CCR Title 8, Section 5191, paragraph (e)(3)(A).

Before beginning to use any chemical, each user must be familiar with the characteristics associated with the particular chemical, including:

1. Quantity of chemical which is toxic or hazardous:
 - a. the amount of exposure considered to be safe;
 - b. the lethal dose of any toxic chemical.
2. Route of entry the chemical may enter the body through:
 - a. absorption;
 - b. ingestion;
 - c. inhalation;
 - d. injection.
3. Types of Hazards (many chemicals are dangerous in more than one way):
 - a. corrosive;
 - b. explosive;
 - d. extreme (acute or high) toxin;
 - c. flammable;
 - e. irritant;
 - f. radioactive;
 - g. reactive;
 - h. reproductive toxin (mutagen or teratogen);
 - i. sensitizer;
 - j. toxin.
4. Modes of action:
 - a. acute toxicity (symptoms and damage occur soon after single exposure: see CHP Attachment E);
 - b. chronic toxicity (symptoms and damage occur after numerous exposures over time: see CHP Attachment E);
 - c. carcinogens and possible carcinogens (see CHP Attachment C);
 - d. radioactive materials (see IIPP & Radiation Safety Manual);

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

- e. reproductive toxins (see CHP Attachment D).
5. Symptoms and target organs of overexposure:
- A chemical or group of chemicals may cause organ-specific symptoms which can be associated with overexposure to that chemical.
6. Physical characteristics of the chemical:
- a. aerosol (airborne dusts or mists);
 - b. cryogen;
 - c. dusts or particulates (may become airborne and inhaled);
 - d. flammability;
 - e. gas;
 - f. liquid;
 - g. solid;
 - h. vapor density (heavy vapors will fall to the floor and may stay in pockets);
 - i. volatility (fast evaporation may increase exposure).
7. Chemical compatibility:
- a. The mixing of some chemicals may cause an explosion, may release toxic gases, or may cause a fire (see CHP Attachment F: Incompatible Chemicals and Storage).
 - b. Store certain hazardous chemicals (including acids, bases and other corrosives) in the cabinets under the fume hoods. Separate acids, bases and other corrosives by providing spill pans under each hazardous chemical's container and/or placing containers in separate cabinets (acids separate from bases).
 - c. Contact SH&S at X4502 for assistance in finding the best storage situation for your chemicals and available space.
8. Safety Data Sheets (SDSs) are good sources of information. SDSs are made available to each user. The lab or department supervisor can assist with locating the SDSs for your chemicals. Other sources of chemical information include package labels, reference books and SH&S (see IIPP Section Hazard Communication Program, for details).

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

9. Employee and student training on the hazards and proper use of each hazardous chemical is provided to each user. Documentation of the training is maintained by the Principal Investigator/Faculty or supervisor (see CHP Attachment I: Training Program and Records, for details).

10. Recommended/Required work practices:
 - a. restrict the amount of chemicals ordered, kept on hand and used;
 - b. substitute less hazardous chemicals whenever possible;
 - c. use a fume hood where applicable;
 - d. do not work alone when handling hazardous materials;
 - e. keep work area clean;
 - f. wear eye protection;
 - g. it is recommended to wear a clean lab coat at all times when in the lab and required when in process;
 - h. wear proper type of gloves as necessary;
 - i. wash hands frequently and before eating, drinking, and/or applying cosmetics;
 - j. label all containers;
 - k. keep containers closed except when in use;
 - l. segregate chemicals in storage to keep incompatibles separated;
 - m. dedicate and label storage and use areas of particularly hazardous chemicals (see Attachment G);
 - n. do not taste chemicals;
 - o. do not mouth pipette;
 - p. avoid smelling chemicals;
 - q. know the locations of fire extinguishers, eyewashes and safety showers;
 - r. **do not smoke, eat, drink or apply cosmetics while using hazardous materials; maintain a separate "clean area" for eating and drinking. Food and drinks are not allowed in the laboratory areas (unless it is an authorized "CLEAN AREA") where hazardous materials are present. This was determined by the Chemical Hygiene Committee and implemented by this Chemical Hygiene plan. Contact SH&S for "Clean Area" Information and designation.**

B. Chemical Classes

1. Flammable Liquids

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- a. A flammable liquid is any liquid having a flash point below 100° F (37.8° C). If stored or used improperly, flammable liquids can be a fire hazard (e.g., benzene, acetone, alcohols, and ethers).
 - b. Segregate flammable liquids from oxidizing acids and oxidizers.
 - c. Keep flammable liquids away from ignition sources.
 - d. Static-generated sparks can be sudden ignition sources. When transferring flammable liquids in metal equipment, take care that metal lines and vessels are bonded together and grounded to a common ground.
2. Water-reactive chemicals
- a. Water reactive materials react with water, moisture or water solutions to produce heat or flammable gases (e.g., aluminum bromide, cyanogen bromide, elemental potassium, phosphorous pentachloride, phosphorus pentoxide, and elemental sodium,).
 - b. Store water-reactive chemicals away from any sources of water or moisture.
 - c. The storage area of any water-reactive chemicals is indicated with a warning sign.
3. Oxidizers
- a. Oxidizers react vigorously with reducing materials. The reaction can lead to fires or explosions (e.g., hydrogen peroxide, potassium permanganate, and perchloric acid).
 - b. Keep strong oxidizers away from flammables, combustibles and other reducing agents.
 - c. The storage area of any strong oxidizers is indicated with a warning sign.
4. Reducing Materials
- a. Reducing materials react vigorously with oxidizers. The reaction can

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

lead to fires or explosion (e.g., ammonia, phosphorus, metals, and carbon).

- b. Store reducing materials away from strong oxidizers.

5. Acids

- a. Acids require special storage because they are corrosive and some are oxidizers. There are two main groups of acids: organic acids and mineral acids. Some mineral acids are oxidizers and will react with organics. Therefore, as a rule of thumb, mineral acids should be stored separately from organic acids.

- i. Examples of mineral acids:

Oxidizers

- *perchloric acid
- nitric acid
- chromic acid
- sulfuric acid

Non-oxidizers

- hydrochloric acid
- hydrofluoric acid
- phosphoric acid

- ii. Examples of organic acids:

- acetic acid
- propionic acid
- formic acid
- *picric acid

* Perchloric acid and picric acid require special handling. Picric acid is reactive with metals or metal salts and explosive when dry. Picric acid must contain at least 10% water to inhibit explosion. Perchloric acid is also potentially explosive, should be stored by itself and tested annually for peroxides.

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- b. Segregate acids from bases and active metals such as potassium and magnesium.
 - c. Segregate acids from chemicals that could generate toxic gases upon contact such as sodium cyanide, iron sulfide, etc.
 - d. All acids should be stored in an appropriate cabinet under the fume hood in individual trays which are large enough to contain spills. Do not store acids with bases in the same cabinet.
 - e. Segregate oxidizing mineral acids from organic acids, flammable and combustible materials. Most mineral acids can be stored together with the exception of perchloric acid.
6. Bases
- a. Bases are corrosive and react violently with acids. Examples of bases include: ammonium hydroxide, sodium hydroxide, bicarbonates and organic amines.
 - b. Segregate bases from acids.
 - c. All bases should be stored in an appropriate cabinet in individual trays which are large enough to contain spills. Do not store bases with acids in the same cabinet.
7. Corrosives
- a. Corrosive chemicals include strong acids and bases, as well as oxidizing and dehydrating agents.
 - b. Liquid Corrosives
 - i. Toxicity

A liquid corrosive will act on the skin either rapidly or slowly depending on concentration and length of contact. These chemicals react directly with the skin - dissolving or abstracting from it some essential components, denaturing the proteins of the skin, or disrupting the skin cells. Mineral acids, organic acids, and bases are among typical liquid

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corrosives.

ii. Handling

Always avoid contact with liquid corrosives when handling liquid corrosives. Wear goggles, rubber or suitable gloves, and a face shield. A rubber or synthetic apron and rubber boots may also be necessary. Procedures using these materials should be performed in a fume hood.

c. Solid Corrosives

i. Toxicity

Solid corrosives interact with the skin when dissolved by surface moisture. Damage then occurs both from the corrosive action and from the heat of solution. Because they are solid, these chemicals are relatively easy to remove; but because they may not react immediately and may not be painful at first (as with the caustic alkalis), they may cause substantial damage before being detected.

ii. Handling

Solid corrosives are most dangerous in a finely divided state. Dust control and good exhaust ventilation are essential. The use of goggles, gloves, and other protective clothing is critical. In case of chemical contact, care must be taken during the emergency shower irrigation to remove all particles of solid matter that might be lodged in the eye, skin or clothes.

d. Store corrosives in an appropriate cabinet and in individual trays sufficient to contain any spilled or leaked liquid.

8. Infectious Waste

a. All infectious waste will be stored, handled and disposed of in accordance with the Biohazard Control Program (see applicable IIPP Section)

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

- b. Infectious waste is laboratory waste including: specimen cultures from medical and pathological laboratories, cultures and stocks of infectious agents, discarded live and attenuated vaccines, human blood and tissues, and sharps (pipettes, hypodermic needles, slides, etc).
 - c. Biohazards will be segregated from other waste at the point of origin and contained in appropriately labeled, double bags (red in color). Unless waste is determined to be part of the Emerald Energy program.
 - d. Sharps will be disposed of in containers which are leak proof, rigid, puncture-resistant and made so that they cannot be reopened without great difficulty.
 - e. All infectious waste bags and sharps containers will be placed in appropriately labeled, secondary containers such as pails, cartons or drums which are leak proof and have tight-fitting covers.
 - f. Appropriate personal protective equipment (e.g., gloves, goggles) will be worn when handling or transporting infectious waste.
9. Other Particularly Hazardous Chemicals to comply with paragraph (e)(3)(H).
- a. Handling

Attachments C, D and E chemicals are most dangerous as finely divided solids (powders). Dust control and good exhaust ventilation are essential. These chemicals must be used only in the fume hood. The use of goggles, gloves, and other protective clothing to reduce exposure is required. In case of contact, exercise care during the emergency eyewash or shower irrigation to remove all particles of solid matter that might be lodged in the eye, skin, hair or clothes.
 - b. Storage

Attachments C, D and E chemicals are stored on dedicated, labeled shelves or in other designated areas in the stockrooms, shops and laboratories. Minimum inventories are maintained to reduce potential exposure due to spillage or container breakage.

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY**GENERAL SAFETY GUIDELINES**

1. Working alone is fundamentally unsafe. If the "buddy system" is not possible then someone should be aware of the solitary worker and check on him/her at regular intervals.
2. When working with flammable chemicals, be certain that there are no sources of ignition near enough to cause a fire or explosion in the event of a vapor release or liquid spill.
3. Use appropriate shields (Plexiglas or fume hood sash) for protection from an explosion, implosion or radiation hazard.
4. Don't underestimate the risks of hazardous materials, especially of chronic, long-term low-level exposures. Be aware of the chemical hazards, as determined from the SDS and other appropriate references.
5. Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation.
6. Always use proper protective equipment when using hazardous materials. Ensure that protective equipment is not damaged and that affected personnel have been trained on the proper use of the equipment.
7. Know the location, and proper use of emergency equipment, and be familiar with procedures. Spill containment equipment is stored at the emergency shower stations in each lab. Clean up spills immediately. Emergency evacuation routes and telephone numbers are posted in the hallways.
8. Don't use equipment unless you know how to use it properly, and use it only for its intended purpose.
9. Minimize all chemical exposures. Avoid all skin contact with chemicals.
10. Assume a mixture (or substance of unknown toxicity) is more hazardous than its components.
11. Keep chemicals in properly labeled containers.
12. Use chemicals in a chemical fume hood, and know how to use the hood properly.

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Never use particularly hazardous chemicals outside the hood (see CHP Attachments C, D and E for details and identification of these chemicals). The hood [and/or other area(s)] is labeled as an "EXTREMELY HAZARDOUS SUBSTANCE DESIGNATED USE AREA" if such chemicals are in routine use (routine is defined as 3 times/week or more often, for these purposes).

13. Horseplay, pranks, or other acts of mischief are especially dangerous and are prohibited.
14. Keep the doors and windows to labs closed to increase the efficiency of the ventilation system for the room. In the event of a large hazardous material spill, fire or other emergency evacuation, close all windows and doors if possible prior to evacuation, to inhibit the spread of fire or toxic fumes.
15. Dispose of cracked or broken glassware in the provided sharps containers immediately. Protect your hands when inserting or attaching glassware. Use equipment only for its designated purpose.
16. Use only those chemicals for which the quality of the available ventilation system is appropriate.
17. Do not allow release of toxic substances in cold rooms and warm rooms, since these have contained recirculated atmospheres.
18. Unattended Operations
 - i. An experiment is unattended if there is no one immediately present who fully understands the operation and shutdown procedure to be taken in the event of an emergency. These circumstances require special precautions.
 - ii. Unattended procedures that could result in fire or explosion should be equipped with the necessary automatic shutdown control. Examples include loss of cooling water, overheating, flooding, etc.
 - iii. Post warning signs for biological, chemical, explosive, flammable, infectious (biohazard), radioactive, reactive, strong oxidizer, water-reactive and any other hazards, if appropriate. Call SH&S at X4502 if assistance is required.
 - iv. Use necessary shields and barriers to contain radiation, splashes, explosions, or other releases.

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- v. Leave lights on and doors and windows closed and locked at all times while the operator is absent.
- vi. Be aware that as the need for water for cooling decreases late in the day or at night, water pressure surges may result because of excess water pressure in the few areas that are using it.

GENERAL SAFETY ATTITUDES

BE AWARE- Know the hazards before beginning the experiment. At a minimum, read the container label and the chemical's Safety Data Sheet.

BE PREPARED - Answer the following questions:

"What's the worst thing that can go wrong?"

"What should I do to be prepared for it?"

BE PROTECTED - Know what practices and equipment (hoods, PPE, etc.) can minimize exposure to hazards in the workplace.

PERSONAL HYGIENE

- a. Wash promptly whenever a chemical has contacted the skin.
- b. After removing gloves and discarding them appropriately, wash hands and face before leaving the area.
- c. Avoid inhalation of chemicals; do not smell or taste chemicals for identification.
- d. NEVER mouth pipet anything; NEVER use mouth suction to start a siphon.
- e. Avoid eating, drinking, smoking, gum chewing, application of cosmetics or inserting contact lenses in areas where laboratory chemicals are present. Wash hands before conducting these activities.
- f. Avoid storage, handling, or consumption of food or beverages in lab areas unless specifically set aside for food consumption. Use refrigerators, glassware, utensils and microwave ovens for food which are dedicated for food handling or

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

preparation only.

PROTECTIVE CLOTHING AND EQUIPMENT

For more information refer to the Personal Protective Equipment policy and procedure.

- a) All personal protective equipment should be:
 - i) Carefully selected;
 - ii) Inspected regularly and before each use;
 - iii) Cleaned properly, if necessary;
 - iv) Stored properly; and
 - v) Replaced/discarded if not working properly or defective.
- b) Eye and Face Protection
 - i) Wear appropriate eye and face protection at all times.
 - ii) Wear only eye and face protection that meets the requirements of the American National Standard for Occupational and Educational Eye and Face Protection (ANSI Z 87.1).
 - iii) If your vision requires the use of corrective lenses in glasses and you are required to wear eye protection, either: (1) wear corrective glasses that meet the requirements of ANSI, or (2) wear approved goggles over regular corrective glasses.
 - iv) It is recommended to refrain from wearing contact lenses when working with chemicals. In the event of an eye exposure, contact lenses may absorb and/or trap chemicals against the eyes. Always wear safety glasses instead of contact lenses.
 - v) Wear a face shield over your regular eye protection when the chemical hazard warrants.

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c) Skin, Body and Foot Protection

- i) Avoid all skin contact with chemicals. Wear gloves appropriate for the material.
- ii) When working with a hazardous substance (especially an allergen, skin irritant or sensitizer), wear gloves made of material known to be or tested and found to be resistant to permeation by the substance. Permeation information can be found in manufacturer's glove charts or on the SDS.
- iii) Test chemical protective gloves, if appropriate to the hazardous operation intended, by air inflation (do not inflate by mouth) for the absence of pin-hole leaks.
- iv) When working with corrosive chemicals, wear a rubberized laboratory apron and gloves.
- v) Wear and keep your lab coat buttoned at all times while in the laboratory. Remove your lab coat when you leave the laboratory or if it becomes contaminated. Laundry services are provided for employee lab coats.
- vi) Protect your skin and feet with adequate clothing and footwear. Do not wear shorts, open-toed shoes, sandals, or shoes without firm footing.

d) Respirators/Ventilation

- i) **IMPORTANT:** Wear a particle face mask when working with any chemical listed in CHP Attachments C, D and E. These chemicals can cause serious damage or death with one-time and/or long-term, low-level chronic exposure. Contact SH&S prior to any operations where a particle mask is used.
- ii) **IMPORTANT:** Use a fume hood when working with any chemical listed in CHP Attachments C, D and E. These chemicals can cause serious damage or death with one-time and/or long-term, low-level chronic exposures. Work in a fume hood.
- iii) Wear a respirator or particle face mask that is appropriate for any hazardous exposure. Do not use a respirator unless you have been trained in accordance with the Personal Protective Equipment Procedures (see IIPP Section for more information).

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY**HOUSEKEEPING**

1. Always maintain clear access to emergency equipment, eyewashes, safety showers, fire extinguishers, circuit breakers, fire pull boxes, and emergency spill equipment. Never obstruct access to these emergency items, even temporarily.
2. Keep all aisles, hallways, exits and stairs unobstructed at all times.
3. Label all chemical containers with the identity of the contents, date labeled and the health and physical hazards of the chemical.
4. Keep all work areas, especially laboratory benches, clear of clutter.
5. Place all chemicals in their assigned storage areas at the end of each workday.
6. At the end of each workday, consider the contents of all unlabeled containers to be wastes.
7. Properly label all waste and keep it in proper containers with waste labels (call SH&S at X4502 for assistance or labels). Do not mix dissimilar wastes, if possible.
8. Promptly clean up all spills; properly dispose of the spilled chemicals and clean up all materials. Spill clean-up materials are stored in each lab at near the emergency shower station.
9. Clean all working surfaces and floors regularly. Clean off bench tops at the end of a particular operation or experiment or at the end of each workday.
10. Never store chemicals in aisles, hallways, stairwells, desks or on laboratory benches or floors.
11. Do not store extraneous materials in a fume hood. These materials will interfere with the air flow and jeopardize the safe operation of the hood. Cabinets under the hoods are provided for storage of chemicals.
12. Store all chemicals in a seismically safe manner. Closed cabinets and lipped or retaining wired shelves are two methods used for seismic bracing.
13. Do not block or impede halls or exits in any way with furniture, lab equipment or

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

instruments. Hallways and exits are to be completely unobstructed.

14. All containers must be labeled at all times. Containers or experiments left on benchtops overnight must be labeled with chemical identity(s), date, and your name.

SPILLS AND ACCIDENTS

1. Spills of toxic substances or accidents involving any hazardous chemical will be managed in accordance with the Hazardous Materials Management Program (see Attachment G).
2. Spill Notification
 - a. In the event of a chemical spill or accident, the worker will immediately notify the Principal Investigator, Lab Manager or Supervisor and the appropriate emergency responders (UPD) at 760-750-4567 and/or SH&S.
 - b. All appropriate personnel will be familiar with emergency notification procedures and the location of emergency equipment.
 - c. Accidents (or potentially unsafe conditions) should be reported to the P.I./Faculty, Lab Manager, Supervisor, or Department Chair, and SH&S.
3. Spill Evaluation and Identification
 - a. If possible, the P.I./Faculty/Lab Manager or Supervisor will determine the name, quantity and nature of the material that spilled or was involved in an accident. If the chemical spilled is an unknown or extremely hazardous, evacuate and close doors and windows to the lab immediately and wait for emergency personnel. If the identity of the chemical is known, a hazard evaluation will be made in accordance with the information provided in the SDS and the Hazardous Materials Management Program (Attachment G) procedures.
 - b. The person that makes the hazard evaluation will have appropriate training in accordance with information and training section of the Hazardous Materials Management Program (Attachment G). Documents that will aid in the evaluation of the hazard of the spilled material include some of the following:

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

- Current chemical exposure limit information;
- SDSs; and
- Hazardous material references (NIOSH Pocket Guide, etc.).

4. Hazardous and Non-hazardous Material Spill Clean Up

- a. Hazardous materials: Only persons that have been properly trained in accordance with the information and training section of the Hazardous Materials Management Program (Attachment G) are authorized to contain and clean up spills involving hazardous materials.
- b. Non-hazardous materials: Chemicals which are clearly non-hazardous (i.e., NaCl, sodium and potassium phosphates and other buffers and salts, pH-meter calibrating solutions, etc.) should be swept up (or, if liquid, absorbed with paper towel or clay absorbent) and discarded in the trash can.

5. Emergency Procedures

The following emergency procedures are recommended in the event of fire, explosion, or other laboratory spill/accident. These procedures are intended to limit injuries and minimize damage if an accident should occur.

- a. Render assistance to persons involved and if determined necessary, remove them from exposure to further injury.
- b. Warn personnel in adjacent areas of any potential threat to their safety.
- c. Render immediate first aid. Appropriate measures include washing under a safety shower, artificial resuscitation if breathing has stopped and special first aid measures if the responder is appropriately trained.
- d. For all circumstances that involve fires or any other emergencies please contact University Police (at X911, X4567, or 760-750-4567). Pull the fire alarm and evacuate the building. If appropriately trained extinguish small fires by using a portable extinguisher. Turn off nearby sources of ignition and remove combustible materials from the area.
- e. In case of a medical emergency:
 - i. Summon medical help immediately by contacting University Police (at

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X911, X4567, or 760-750-4567);

- ii. Do not move an injured person unless he/she is in danger of further harm;
- iii. Keep an injured person warm. If feasible, designate one person to remain with the injured person;
- iv. If clothing is on fire, knock the person to the floor and roll him/her around to smother the flames or, if a safety shower is immediately available, douse the person with water;
- v. If chemicals have been spilled on the body, flood the exposed area with sufficient running water from the safety shower and immediately remove any contaminated clothing; and
- vi. If a chemical has entered the eye, immediately wash the eyeball and the inner surface of the eyelid with plenty of water for at least 15-20 minutes. An emergency eyewash station should be used if available. Forcibly hold the eye open to wash thoroughly behind eyelids.

6. Preparing for Emergencies

- a. Emergency plans for each laboratory include evacuation routes and shelter areas, medical facilities, and procedures for reporting all accidents and emergencies and will be reinforced by frequent drills and simulated emergencies conducted by University Police.
- b. All emergency equipment will be regularly inspected and maintained in good working order.
- c. Employees will become familiar with the location of the emergency eyewash station and shower before starting work in the lab.
- d. Laboratories and Hazardous Areas should be prepared for hazards resulting from loss of any utility service or severe weather. Loss of the water supply, for example, can render safety showers, eyewash fountains, and sprinkler systems inoperative. In such a case, all hazardous operations or laboratory work will cease until service is restored.

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

7. Recordkeeping

- a. Spills and accidents are recorded by SH&S in accordance with the California State University Injury and Illness Prevention Program "Accident, Injury and Occupational Illness Investigation Form".
- b. Safety and other training is recorded using IIPP forms for Group or Individual Training.
- c. Records are maintained using the records retention program provided by the Chancellors office. Records may be stored for longer periods of time depending upon the needs of the SH&S or HR department.

WASTE MINIMIZATION

1. Plan a procedure for waste disposal before you start on a project. Label waste properly. Contact SH&S at X4502 for labels or information.
2. Order only the amount of hazardous materials needed for the project or experiment. Even if the manufacturer provides twice as much for the same amount of money, the cost of excess chemical disposal far exceeds any money saved by buying in bulk quantities.
3. Avoid long term (>1 year) storage of excess chemicals, if they are particularly hazardous (Attachments C, D, and E), or explosive.
4. Use only the amount of chemicals that are needed for conclusive results.
5. Before disposing of unwanted, unopened, or uncontaminated chemicals, check with others in your department who may be able to use them, or contact SH&S (X4502) for assistance with finding another user.
6. Label all unused excess chemicals that are kept following the termination of a research project or completion of a thesis.
7. Make sure all samples and products scheduled for disposal are properly identified, containerized and labeled. Affix a hazardous waste label to the container which indicates the start date of waste accumulation and the identity of the contents. Do not mix dissimilar wastes. Do not leave wastes for others to

CHEMICAL HYGIENE PLAN – POLICY AND PROCEDURE SUMMARY

clean up after you.

8. Inform SH&S (X4502) of wastes which you are accumulating and storing within 90 days of initial accumulation date. SH&S will provide pickup service and coordinate the disposal of your hazardous wastes.
9. Refer to CHP Hazardous Materials Management (Attachment G) for further details regarding materials handling and waste disposal.

IIPP

ATTACHMENT C

CHEMICAL HYGIENE PLAN – SELECT CARCINOGENS

ATTACHMENT C

SELECT CARCINOGENS

Chemical Hygiene Plan
Attachment K – REGULATIONS AND STANDARDS

ATTACHMENT D

REPRODUCTIVE HAZARDS

Chemical Hygiene Plan Attachment D - Reproductive Hazards

Little is known about the ability of chemicals to affect reproduction. Therefore, it is difficult to determine whether or not a particular exposure or chemical can cause reproductive harm. To decrease the chances of reproductive harm, it is prudent to minimize exposures to hazardous chemicals. This may be accomplished by substitution of a less hazardous chemical, the use of engineering controls, or the use of personal protective equipment.

The following agents are toxic to the human reproductive system. This is not a complete list of reproductive hazards. An adverse reproductive effect will not necessarily occur in response to exposure to these chemicals. Response depends on a number of factors, including dose and the point in the reproductive process at which exposure occurs.

A. Agents Toxic to the Human Male Reproductive System:

1. Physical agents
 - a. Microwaves
 - b. High-altitude exposure to ionizing radiation (14,000 feet or more)
 - c. X-Irradiation
 - d. High temperatures
2. Social habits
 - a. Alcohol ingestion
 - b. Cigarette smoking
 - c. Marijuana smoking
3. Metals
 - a. Lead
 - b. Cadmium
4. Chemicals
 - a. Alkylating agents
 - b. Anesthetic gases
 - c. Carbon disulfide
 - d. Chloroprene
 - e. Vinyl chloride
5. Pesticides

Chemical Hygiene Plan
Attachment D - Reproductive Hazards

- a. Dibromochloropropane
 - b. Kepone
 - c. DDT
6. Therapeutic agents
- a. Female oral contraceptives
 - b. Chemotherapeutic cancer agents
 - c. Narcotics

B. Agents Toxic to the Human Female Reproductive System:

1. Physical agents
- a. X-Irradiation
2. Social and Personal habits
- a. Alcohol Ingestion
 - b. Cigarette smoking
 - c. Vitamin deficiency
 - d. Mineral deficiency
 - e. Hallucinogens
3. Metals
- a. Tellurium
 - b. Lead
4. Therapeutic agents
- a. Chemotherapeutic cancer agents
 - b. Large doses of steroid hormones
 - c. Streptomycin
 - d. Tetracyclines
 - e. Sulfonamides
 - f. Novobiocin
 - g. Chloramphenicol
 - h. Erythromycin

Chemical Hygiene Plan
Attachment D - Reproductive Hazards

- i. Aminopterin
 - j. Anticoagulants
 - k. Antidiabetics
 - l. Thiazide diuretics
 - m. Quinine
 - n. Prednisolone
 - o. Antihistamine antiemetics
 - p. Narcotics
 - q. Thalidomide
 - r. Excess vitamin K
 - s. Chloroquine
5. Other
- a. Acute hypoxia
6. Chemicals
- a. Alkylating agents
 - b. Anesthetic gases
 - c. Methyl mercury
7. Biological agents
- a. Rubella virus
 - b. Toxoplasmosis
 - c. Syphilis
8. Pesticides
- a. Organophosphates
 - b. Carbamates
9. CSUSM Chemical Inventory
- 2,4-dinitrophenylhydrazine (pos. mutagen)
 - 2,4-pentanedione (teratogen, pos. mutagen)
 - Aniline
 - Benzaldehyde (mutagen)
 - Benzene (mutagen)
 - Biphenyl (pos. mutagen)

**Chemical Hygiene Plan
Attachment D - Reproductive Hazards**

Dibutyl phthalate (pos. teratogen)
Dimethyl sulfate (mutagen)
Carbon disulfide (pos. mutagen/teratogen)
Chloroform-D (mutagen)
Lead nitrate (teratogen)
Mercury (II) chloride (pos. mutagen)
Pyridine (pos. mutagen)
Pyridine-D5 (pos. mutagen)
Salicylic acid (pos. mutagen)
Silver nitrate (pos. mutagen)
Sudan II (pos. mutagen)

***Mutagen - May cause heritable genetic defects.**

***Teratogen - May cause embryonic and fetal abnormalities during gestation.**

ATTACHMENT E

HIGHLY TOXIC CHEMICALS

EXTREMELY HAZARDOUS SUBSTANCES

DESIGNATED USE AREA "FORM"

CHEMICAL HYGIENE PLAN

ATTACHMENT E

**HIGHLY TOXIC CHEMICALS
EXTREMELY HAZARDOUS
SUBSTANCES**

DESIGNATED USE AREA

CHEMICALS IN USE:

ATTACHMENT F

INCOMPATIBLE CHEMICALS

AND STORAGE

IIPP

ATTACHMENT G

**CHEMICAL HYGIENE PLAN – HAZARDOUS MATERIALS MANAGEMENT
PROGRAM**

ATTACHMENT G

HAZARDOUS MATERIALS MANAGEMENT PROGRAM

HAZARDOUS MATERIALS MANAGEMENT

1. Deposit chemical waste into appropriately labeled containers. Include identity, quantity, your name and start date of waste generation on your label. Containers for hazardous wastes may be obtained from your departmental stockroom. SH&S also stocks some waste containers for your use.
2. Do not discharge to sewer any hazardous materials, which includes concentrated acids or bases, highly toxic, malodorous or lachrymatory substances, radioactive liquids or solids, or substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow.
3. Significant amounts of particularly hazardous substances (carcinogens, reproductive toxins and highly toxic chemicals) are used only in dedicated areas. These areas are to be signified with an appropriate warning sign (see Attachment E sign).
4. Radioactive wastes must be handled in accordance with the Ionizing Radiation (Radioactive Materials) Management Program, refer to IIPP program documents. Further details are described in the Radiation Safety Manual.
5. Biohazardous (or biomedical) wastes must be handled in accordance with the Biohazard or Exposure Control Program.
6. Store hazardous wastes in appropriate areas prior to SH&S pickup for disposal. Consult SH&S regarding recommended storage for particular waste streams. You may store your waste chemicals under the hoods in the cabinets or in other appropriate areas. The stored waste must not react with the container materials.
7. Do not mix dissimilar wastes. Segregate waste chemicals unless they were mixed prior to disposal. Secondary containers are a safe and convenient method of segregation.
8. Inform SH&S (X4502) of wastes which you are accumulating and storing within 90 days of initial accumulation date. There are regulations that prohibit storage after 180 days for certain quantities of waste materials.
9. SH&S cannot provide storage service but can coordinate the disposal of your hazardous wastes as needed. Contact SH&S at X4502 if you want your waste accumulation evaluated for disposal for either time, space or safety reasons.
10. A component of the campus Waste Minimization Program is the sharing of chemical inventories. Please call SH&S to assist in locating current inventory of any chemical or hazardous materials for your use prior to ordering additional amounts. SH&S manages an on-line database for your consultation regarding available surplus chemicals. The Biology and Chemistry Instructional Support Technicians will have access to this database.

ATTACHMENT H

LABORATORY INSPECTIONS

IIPP	ATTACHMENT I
CHEMICAL HYGIENE PLAN – TRAINING PROGRAM AND RECORDS	

ATTACHMENT I

TRAINING PROGRAM and RECORDS

CHEMICAL HYGIENE PLAN – TRAINING PROGRAM AND RECORDS

The following safety training guides are provided upon request:

- I. Chemical Safety and Hazard Communication;
- II. Radioactive Materials Safety;
- III. LASER Safety;
- IV. Bloodborne Pathogen Safety.

Training records are maintained in the SH&S files for employees and within the departments for students. Training is recorded through the Learning Management System for Employees and Student Researchers.

ATTACHMENT J

PERMISSIBLE EXPOSURE LEVELS

IIPP	ATTACHMENT J
CHEMICAL HYGIENE PLAN – PERMISSIBLE EXPOSURE LEVELS	

Permissible Exposure Levels

OSHA sets enforceable permissible exposure limits (PELs) to protect workers against the health effects of exposure to hazardous substances. PELs are regulatory limits on the amount or concentration of a substance in the air. They may also contain a skin designation.

OSHA PELs are based on an 8-hour time weighted average (TWA) exposure.

Federal OSHA Standards

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9992

CALIFORNIA OSHA Standards

TABLE AC-1 ([printable .pdf file 128K](#))

PERMISSIBLE EXPOSURE LIMITS FOR CHEMICAL CONTAMINANTS

http://www.dir.ca.gov/Title8/5155table_ac1.html

ATTACHMENT K

REGULATIONS AND STANDARDS

Chemical Hygiene Plan

Attachment K – REGULATIONS AND STANDARDS

Various regulations and standards which mandate the Chemical Hygiene Plan, support it and further define it are included in Attachment K. This list is by no means either complete or necessarily permanent. The list and enclosures will be updated and revised for current applicability annually along with the entire California State University San Marcos Chemical Hygiene Plan.

- I. Occupational Exposure to Hazardous Chemicals in Laboratories, California Code of Regulations, Title 8, Section 5191. This regulation established the provisions of the Chemical Hygiene Plan.
 - a. <http://www.dir.ca.gov/Title8/5191.html>

- II. Hazard Communication Standard, California Code of Regulations, Title 8, Section 5194. This regulation applies to any hazardous substance which is known to be present in the work place in such a manner that employees may be exposed under normal conditions of use or in a reasonably foreseeable emergency resulting from work place operations.
 - a. <http://www.dir.ca.gov/title8/5194.html>