

CHEMICAL HYGIENE PLAN

California Code of Regulations
Title 8, Chapter 4
Section 5191 et. Seq.

California State University, East Bay

July 20, 2004

REVISED: August 17, 2005

REVISED: July 31, 2006

REVISED: August 1, 2007

REVISED: August 3, 2010

College of Science

California State University, East Bay
25800 Carlos Bee Blvd.
Hayward, California 94542

CHEMICAL HYGIENE PLAN

CCR Title 8, Chapter 4,
Section 5191

August 3, 2010

<u>Donna Placzek</u>	/	<u>Dan Cerutti</u>
<u>Chris Baysdorfer</u>	/	<u>Rhea Williamson</u>
<u>Leanne Thompson</u>	/	<u>James Allen</u>
<u>Charlene Lebastchi</u>		

CHP Committee Members

FOREWORD

On 31 January, 1990 the Occupational Safety and Health Administration (OSHA) promulgated a final rule for occupational exposure to hazardous chemicals in laboratories. Included in the standard, which became effective on May 1, 1990 is a requirement for all employers covered by the standard to develop and carry out the provisions of a Chemical Hygiene Plan (CHP).

A CHP is defined as a written program which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace. Components of the CHP must include standard operating procedures for safety and health, criteria for the implementation of control measures, measures to ensure proper operation of engineering controls, provisions for training and information dissemination, permitting requirements, provisions for medical consultation, designation of responsible personnel, and identification of particularly hazardous substances.

This plan is the Chemical Hygiene Plan developed for the College of Science located at California State University, East Bay in Hayward, California. This CHP is maintained and is readily available to laboratory employees in the College of Science Office and in each department handling chemicals. All laboratory personnel must know and follow the procedures outlined in this plan. All operations performed in the laboratory must be planned and executed in accordance with the enclosed procedures. In addition, each employee is expected to develop safe personal chemical hygiene habits aimed at the reduction of chemical exposures to themselves and coworkers.

This document was developed to comply with CCR Title 8, Chapter 4, Section 5191. This CHP will be reviewed, evaluated and updated at least annually and is readily available to employees.

Michael Leung

Chief Hygiene Officer
Chief Executive Officer

3/25/05

DATE

TABLE OF CONTENTS

Section and Title	Page
FOREWORD	2
TABLE OF CONTENTS.	3
1.0 Standard Operating Procedures for Laboratory Chemicals	6
1.1 Chemical Procurement.	6
1.2 Chemical Storage.	6
1.3 Chemical Handling.	7
1.4 Laboratory Equipment and Glassware.	9
1.5 Personal Protective Equipment.	10
1.6 Personal Work Practices.	10
1.7 Labeling.	11
1.8 Waste Disposal	12
2.0 Criteria for Implementation of Control Measures.	12
2.1 Air Sampling.	12
2.2 Housekeeping.	13
2.3 Safety and Emergency Equipment.	13
3.0 Engineering Controls.	14
3.1 Local Ventilation.	14
3.2 Laboratory Hoods.	14
3.3 Glove Boxes and Isolation Rooms.	16
3.4 Refrigerators, Freezers, Cold Rooms And Warm Rooms	16
3.5 Storage Cabinets	16

TABLE OF CONTENTS (continued)

Section and Title	Page
4.0 Employee/Student Information and Training.	16
4.1 Hazard Information.	16
4.2 Training	16
4.3 Student Training.	17
5.0 Prior Approval for Laboratory Activities	18
5.1 Permit System.	18
6.0 Medical Consultations and Examinations.	19
7.0 Chemical Hygiene Responsibilities.	20
7.1 Chief Executive Officer.	20
7.2 Department Safety Committee.	20
7.3 Laboratory Workers.	21
8.0 Special Precautions.	22
8.1 Working with Allergens and Reproductive Toxins . . .	22
8.2 Working with Chemicals of Moderate Chronic or High Acute Toxicity.	22
8.3 Working with Chemicals of High Chronic Toxicity.	23
8.4 Working with Animals and Chemicals of High Chronic Toxicity.	23
9.0 Recordkeeping.	24
10.0 Chemical Spills, Releases and Accidents.	24
11.0 Reference and Recommended Reading	24

Appendices

- A. Safety Inspection Sheet
- B. Satellite Accumulation Site Weekly Inspection Log
- C. Resistance to Chemicals of Common Glove Materials
- D. Emergency Response Plan
- E. Fume Hoods Procedures
- F. Safety in the Laboratory
 - F1. Lab Instructor Orientation
 - F2. Student Safety in the Biology Laboratories
 - F3. Student Safety in the Chemistry and Biochemistry Laboratories
 - F4. Student Safety in the Chemistry and Biochemistry Laboratories
- G. Chemical Hygiene Permit
- H. CCR, Title 8, Chapter 4, 5191

1.0 Standard Operating Procedures for Laboratory Chemicals

1.1 Chemical Procurement

1.1.1 The decision to procure a chemical shall be a commitment to handle and use the chemical properly from initial receipt to ultimate disposal.

1.1.2 Before a chemical is ordered which has significant hazardous properties and is new to the work place, then Environmental, Health and Safety is to be notified, given the name of the chemical, the manufacturer, MSDS or SDS, and intended use.

1.1.3 All departmental chemicals shall be received in each individual department stockroom. Personnel who receive chemical shipments shall be knowledgeable of the proper procedures for receipt. Chemical containers shall not be accepted without accompanying labels and packaging in accordance with all appropriate regulations. All chemical shipments should be dated on each container when received.

1.1.4 Provide EHS a copy of the MSDS (or SDS) if it is not already available on the campus electronic MSDS system found on the EHS website.

1.2 Chemical Receipt and Storage

1.2.1 Received chemicals shall be immediately moved to the designated storage area. Glass containers of liquids 500 mls or larger shall be placed in carrying containers or shipping containers during transportation through areas of public access.

1.2.2 The storage area shall be well illuminated, with all storage maintained below eye level. Liquids shall be placed in secondary containers.

1.2.3 Chemicals shall be segregated by hazard classification and compatibility in a well-identified area, with local exhaust ventilation for volatile chemicals. See Appendix I Chemical Storage Compatibility Table

1.2.4 Mineral acids (inorganic acids) shall be separated from flammable and combustible materials.

1.2.5 Acid-resistant trays shall be placed under bottles of mineral acids.

1.2.6 Acid-sensitive materials such as cyanides and

sulfides shall be separated from acids and protected from contact with acids.

1.2.7 The storage area shall not be used as a preparation or repacking area.

1.2.8 The storage area shall be accessible only during normal working hours while it is under the control of Stockroom Personnel.

1.2.9 Storage of chemicals at the teaching lab bench or other work areas shall be limited to those amounts necessary for one operation or shift. The container size shall be the minimum convenient. The amounts of chemicals at the lab bench shall be as small as practical. Chemicals in the workplace shall not be exposed to sunlight or heat. In research labs, relevant chemicals must remain present and accessible for the duration of the research project.

1.2.10 Stored chemicals shall be examined at least annually by a department representative for replacement, deterioration, and container integrity. The inspection should determine whether any corrosion, deterioration, or damage has occurred to the container or the storage facility as a result of leaking chemicals.

1.2.11 Periodic inventories of chemicals in work and research areas shall be conducted by designated staff. Unneeded items shall be properly discarded or returned to the storage area.

1.2.12 Write the receipt date on all chemical containers. Chemicals with degradation properties, e.g. peroxide formers, shall be also be labeled with an expiration or disposal date.

1.3 Chemical Handling

Each laboratory employee with the training, education and resources provided by supervision, shall develop and implement work habits consistent with this CHP to minimize exposure of self, others, and the environment to the chemicals in the laboratory. Based on the realization that all chemicals inherently present hazards in certain conditions, exposure to all chemicals shall be minimized.

General precautions that shall be followed for the handling and use of all chemicals are:

1.3.1 Skin contact with all chemicals shall be avoided. It is important to have gloves on during chemical transfers and procedures in which hazardous

chemical are being used. To select the correct chemical compatible glove see Appendix C Chemical Compatible Gloves and verify with the vendor's Chemical Compatibility Chart. Contact EHS for additional guidance.

1.3.2 All employees shall wash all areas of skin at risk for chemical exposure, prior to leaving the laboratory. Wash hands after removing gloves.

1.3.3 Mouth suction for pipeting or starting a siphon is prohibited.

1.3.4 Eating, drinking, smoking, chewing gum or application of cosmetics in areas where laboratory chemicals are present shall be avoided. These areas have been clearly identified. Hands shall be thoroughly washed prior to performing these activities.

1.3.5 Storage, handling and consumption of food or beverages shall not occur in locations where chemicals are present or stored, including refrigerators. Glassware or utensils used for laboratory operations should never be used to handle food.

1.3.6 Risk determinations shall be conservative in nature.

1.3.7 Any chemical mixture shall be assumed to be as toxic as its most toxic component.

1.3.8 Substances of unknown toxicity shall be assumed to be toxic.

1.3.9 Laboratory employees are encouraged to be familiar with the symptoms of exposure for the chemicals with which they work and the precautions necessary to prevent exposure.

1.3.10 In all cases of chemical exposure, neither the Permissible Exposure Limits (PELs) of OSHA or the Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH) shall be exceeded.

1.3.11 The engineering controls and safety equipment in the laboratory shall be utilized and inspected in accordance with **Appendix A - Laboratory Safety Inspection Sheet**.

1.3.12 Special precautions based on the toxicological characteristics of individual chemicals shall

be implemented as deemed necessary by a department representative (see 7.2). These special precautions are listed in Section 8.0.

1.4 Laboratory Equipment and Glassware

Each employee shall keep the work area clean and uncluttered. All chemicals and equipment shall be properly labeled in accordance with Section 1.7. At the completion of each workday or operation, the work area shall be thoroughly cleaned and all equipment properly cleaned and stored.

In addition, the following procedures shall apply to the use of laboratory equipment:

- 1.4.1 All laboratory equipment shall be used only for its intended purpose.
- 1.4.2 All glassware will be handled and stored with care to minimize breakage; all cracked or broken glassware will be immediately disposed of in the broken glass container.
- 1.4.3 When practical, all evacuated glass apparatuses shall be shielded to contain chemicals and glass fragments should implosion occur.
- 1.4.4 Labels shall be attached to all chemical containers, identifying the contents and related health and physical hazards.
- 1.4.5 Waste receptacles shall be identified and dated in accordance with **Appendix B - Standard Operating Procedures For Waste Collection and Disposal.**
- 1.4.6 Laboratory equipment shall be inspected on a periodic basis as specified in **Appendix A Laboratory Safety Inspection Sheet** and replaced or repaired as necessary.

1.5 Personal Protective Equipment

1.5.1 Safety glasses meeting ANSI Z87.1 are required for employees, students and visitors to the laboratory and will be worn at all times when in the laboratory handling hazardous chemicals. Contact lenses may be worn if recommendations in the NIOSH Current Intelligence Bulletin #59 are followed. Currently, OSHA recommends against contact lens use when working with acrylonitrile, methylene chloride, 1,2 dibromo-3-

chloropropane, ethylene oxide, and methylene dianiline. These recommendations are presumably based on best professional judgment, as no specific bases are provided in the preambles to these standards.

1.5.2 Chemical goggles and/or a full-face shield shall be worn during chemical transfer and handling operations as prudence or procedures dictate.

1.5.3 When hazardous materials are being handled, sandals or perforated shoes are discouraged. Bare feet are prohibited. Safety shoes, per ANSI Z41.1 are required where employees lift or handle heavy objects.

1.5.4 Lab coats are provided for employees and their use is recommended. Lab coats should be laundered on a periodic basis. Lab coats shall be removed immediately upon discovery of significant contamination. If there is potential for significant contamination of the lab coat use a disposable Tyvek lab coat or Tyvek sleeves and apron.

1.5.5 Students and Staff should be encouraged to wear appropriate chemical-resistant gloves based on the table in **Appendix C** Chemical Compatible Gloves. Gloves shall be worn at all times when there may be skin contact with hazardous chemicals. Replace damaged or deteriorated gloves immediately. Remove gloves prior to exiting the lab to avoid contaminating common door knobs and faucets. Always wash hands after gloves are removed.

In special cases, specific gloves can be washed and reused, check with Faculty or Staff. Wash prior to removal from the hands.

1.5.6 Thermal-resistant gloves shall be worn for operations involving the handling of heated or cryogenic materials. Thermal-resistant gloves shall be non-asbestos and shall be replaced when damaged or deteriorated.

1.5.7 Respirator usage shall comply with the CalOSHA Respiratory Protection Standard, Title 8 CCR 5144 and the CSUEB Respiratory Protection Program. For information about this program contact Environmental Health and Safety. This program requires a workplace evaluation, training, a medical exam, and respirator fitting prior to use and annually thereafter.

1.6 Personal Work Practices

1.6.1 Laboratory supervision must ensure that each

employee knows and follows the rules and procedures established in this plan.

1.6.2 All employees shall remain vigilant to unsafe practices and conditions in the laboratory and shall immediately report such practices and/or conditions to the laboratory supervisor. The supervisor must correct unsafe practices and or conditions promptly.

1.6.3 Long hair and loose-fitting clothing shall be confined close to the body to avoid catching fire or being caught in moving machine/equipment parts.

1.6.4 Utilize laboratory fume hoods to avoid contamination of laboratory atmosphere.

1.6.5 Avoid unnecessary exposure to all chemicals by any route.

1.6.6 Do not smell or taste any chemicals.

1.6.7 Encourage safe work practices in coworkers by setting the proper example. Horseplay is strictly forbidden.

1.6.8 Seek information and advice from knowledgeable persons, standards and codes about the hazards present in the laboratory. Plan operations, equipment use, and protective measures accordingly.

1.6.9 Use engineering controls in accordance with Section 3.0.

1.6.10 Chemical workers should be encouraged to wear appropriate protective equipment as procedures dictate and when necessary to avoid exposure. Inspect personal protective equipment prior to use.

1.7 Labeling

1.7.1 All containers in the laboratory shall be labeled. This includes chemical containers and waste containers. Manufacturer's labels shall include contents, hazardous characteristics, and source. Lab-generated labels shall include identifying name or code (for student unknowns) and physical and chemical hazards. It is good practice to date chemicals when they arrive, and when they are opened.

1.7.2 Exemptions for labeling requirements shall be made for chemical transfers from a labeled container into a container that is intended only for the immediate

use of the employee who performed the transfer.

1.7.3 The chemical inventory shall be periodically inspected by a department representative to ensure that labels have not been defaced or removed.

1.7.4 All chemicals left in a container at the end of a work shift must be labeled. No unlabeled containers will be allowed. At a minimum the label must have complete chemical name, primary health and physical hazards, date it was prepared, and the full name of the owner.

1.8 Waste Collection and Disposal

Please refer to **Appendix B Laboratory Waste Collection and Disposal Practices and Appendix B1 Satellite Accumulation Site Weekly Inspection.**

2.0 Criteria for Implementation of Control Measures

2.1 Air Sampling

2.1.1 Air sampling for evaluating employee exposure to chemical substances shall be conducted when determined advisable by the Department of Environmental Health and Safety, or as specified by codes or regulations.

2.1.2 Upon addition of new chemicals or changes in control procedures, additional air sampling will be considered to determine the exposures. Conduct air sampling if there is reason to believe that exposure levels for regulated substances may exceed the action level, or in the absence of an action level, the PEL.

2.1.3 Air sampling study results are maintained by EHS.

2.2 Housekeeping

2.2.1 Each laboratory worker is directly responsible for the cleanliness of his or her workspace, and jointly responsible for common areas of the laboratory. Laboratory management shall insist on the maintenance of housekeeping standards.

2.2.2 The following procedures apply to the housekeeping standards of the laboratory:

2.2.2.1 All spills on lab benches or floors shall

be immediately cleaned and properly disposed of. Large spills will necessitate the implementation of **Appendix D - Laboratory Emergency Response Procedures.**

2.2.2.2 The teaching lab benches shall be kept clear of equipment and chemicals except those necessary for the work currently being performed.

2.2.2.3 The work area shall be cleaned at the end of each operation. The entire work area shall be left clean and hazard free at the end of the working day. Lights, hot plates, other utilities, and other equipment should be turned off at the end of the day.

2.2.2.4 All apparatuses shall be thoroughly cleaned and returned to storage upon completion of usage.

2.2.2.5 All floors, aisles, exits, fire-extinguishing equipment, eyewashes, showers, electrical disconnects and other emergency equipment shall remain unobstructed.

2.2.2.6 All labels shall face front.

2.2.2.7 Chemical containers shall be clean, properly labeled, and liquids will be stored in secondary containers. Chemicals will be returned to storage upon completion of usage.

2.2.2.8 All chemical wastes will be disposed of in accordance with **Appendix B Procedures for Waste Collection and Disposal.**

2.3 Safety and Emergency Equipment

2.3.1 Emergency telephone numbers, i.e. 9-1-1 have been posted.

2.3.2 Fire extinguishers are available throughout the Science Building. All laboratory personnel should be trained in the proper use of fire extinguishers. Prior to the procurement of new chemicals, a department representative shall verify that existing extinguishers and other emergency equipment are appropriate for such chemicals. Fire extinguishers must be inspected monthly. EHS inspects all fire extinguishers in hallways. Fire extinguishers in classrooms, laboratories, and offices are the department's responsibility. Contact EHS if you need training on how to properly inspect a fire extinguisher.

2.3.3 All employees who might be exposed to chemical splashes shall be instructed in the location and proper usage of emergency showers and eyewashes. The eyewash and emergency shower shall be inspected monthly. These inspections shall be performed by the Department of Facilities Management. Records shall be maintained by the Department of Facilities Management.

2.3.4 Location signs for safety and emergency equipment have been posted.

3.0 Engineering Controls

The engineering controls installed in the laboratory are intended to minimize employee exposure to chemical and physical hazards in the workplace. These controls must be maintained in proper working order for this goal to be realized. No modification of engineering controls will occur unless testing indicates that worker protection will continue to be adequate. Improper function of engineering controls must be reported to a department's Safety Committee member immediately. The system shall be taken out of service until proper repairs have been executed.

3.1 Local Ventilation

Each laboratory has air supply vents and exhausts, driven by fans. In many labs the fume hoods supply much or all of the exhaust function. Each laboratory has been balanced to maintain a slight negative pressure relative to the hallway to protect that vital area from contamination in a room. Laboratory workers shall become familiar with the normal operating conditions in a lab such that they may note and report possible changes in balance. Indications of imbalance include unusual whistling sounds, doors slamming or not closing due to air flow, and air flow indicators.

3.2 Laboratory Hoods

The laboratory hoods shall be utilized for all chemical procedures that might result in release of hazardous chemical vapors or dust.

The following work practices shall apply to the use of hoods: For details see **Appendices E1 Laboratory Fume Hood User Procedures; Appendix E2 Laboratory Fume Hood Decreased Speed After Hours; E3 Laboratory Fume Hood Failure Response Procedures.**

3.2.1 Confirm adequate hood ventilation performance prior to opening chemical containers inside the hood. An inward flow of air can be confirmed by holding a piece of tissue paper at the face of the hood (or low flow indicator) and observing the movement of the paper. Immediately report suspected hood fan failures to Facilities and write a Work Request (confirmed by an indication of static or outward flowing air by the plastic ribbon in each hood or the paper test). Reporting procedures are on a large yellow label on each fume hood.

3.2.2 Do not use a hood with a fan failure. If safe to do so, close all chemical containers in the lab hood and room. This is especially important with flammable and combustible liquids to prevent an LEL condition from developing. All persons should leave the room where a failed hood is discovered until an evaluation of and response to the situation is made by a qualified person.

3.2.3 The insufficient flow alarms on each hood give both false positives and false negatives. Therefore always confirm adequate flow with ribbon or tissue. A sounding alarm in a working hood can usually be silenced by partially closing the sash thereby increasing the face velocity. Sashes should not be opened more than 18" to maintain adequate face velocity.

3.2.4 Storage of chemicals and equipment inside the hood shall be kept to a minimum.

3.2.5 Minimize interference with the inward flow of air into the hood.

3.2.6 The fume hood/exhaust system shall be inspected as follows and a record of each inspection shall be maintained by the Department of Facilities Management:

3.2.6.1 Daily inspection by the Building Engineer of four hood fan function indicator light panels on the roof.

3.2.6.2 Every three months inspection PM of belts, fans and motors.

3.2.6.3 Annual replacement of fan belts.

3.2.6.4 Annually the hood face velocity shall be inspected to ensure that the velocity is between 75 and 125 linear feet per minute when the sash is 18" open.

3.2.7 The hood shall not be used as a means of

disposal for volatile chemicals.

3.2.8 Prior to the introduction of new chemicals of extreme hazard classes such as carcinogens, biohazards, or radioisotopes, the adequacy of hood ventilation systems shall be determined by a department representative in consultation with the Department of Environmental Health & Safety.

3.2.9 See **Appendix E - Fume Hood Failure Response Procedures**

3.3 Glove Boxes and Isolation Rooms

The need for a glove box or isolation room will be evaluated and determined when the Chemical Hygiene Permit is completed and evaluated.

3.4 Refrigerators, Freezers, Cold Rooms and Warm Rooms

Each refrigerator, freezer, coldroom in a department that deals with chemicals shall be posted "In the event of failure, notify the department stockroom immediately." Any user must not store any material which poses risk of fire or explosion upon system failure. Flammables must be stored in a laboratory safe refrigerator.

Freezers or refrigerators utilized in laboratories where chemicals are used or stored must be prominently labeled to indicate whether they are or are not suitable for storing flammable liquids. Class I flammable liquids are defined as "any liquid having a flash point below 100 degrees F and having a vapor pressure not exceeding 40 PSI absolute at 100 degrees F". Class One liquids are subdivided as follows:

- Class IA Those liquids having a flash point below 73 degrees F and a boiling point at or below 100 degrees F.
- Class IB Those liquids having a flash point below 73 degrees F and a boiling point above 100 degrees F.
- Class IC Those liquids having a flash point at or above 73 degrees F and below 100 degrees F.

Standard refrigerators have electrical fans and motors that make them potential ignition sources for flammable vapors. Do not store flammable liquids in a refrigerator unless it is approved for such storage. Flammable liquid-approved refrigerators are designed with spark-reducing parts on the inside and/or outside to avoid accidental ignition. Lab Safe or explosion proof refrigerators will be labeled by the manufacturer that it is approved for the storage of flammable materials. "No food or drinks may be

stored in this refrigerator" should be placed on the refrigerator if not provided by the manufacturer. Household refrigerators will require a red and white label on the refrigerator door which stating: "WARNING This refrigerator is not approved for the storage of flammable materials. No food or drinks may be stored in this refrigerator."

3.5 Storage Cabinets

Storage cabinets for flammable and hazardous chemicals will and labeled as required. Hazardous material cabinets and their locations must be approved by EHS.

4.0 **Employee/Student Assistant Information and Training**

4.1 Hazard Information

All employees will be informed of the hazards presented by the chemicals in use in the laboratory. Each employee shall receive training at the time of initial assignment to the laboratory, prior to assignments involving new hazards, and at a regular frequency as determined by CHP Committee members.

4.2 Training - Faculty and Staff

Training shall include measures that employees can take to protect themselves from chemical, physical and health hazards in the lab. The training shall present the details of the Chemical Hygiene Plan, and shall include;

4.2.1 The contents of the CalOSHA Laboratory Standard, and its appendices;

4.2.2 The location and availability of the Chemical Hygiene Plan;

4.2.3 The location of on-line and hard copy resources which report the permissible exposure limits for CalOSHA regulated substances or recommended exposure values for other hazardous chemicals not regulated by CalOSHA which are present in the laboratory;

4.2.4 Signs and symptoms associated with exposure to the chemicals present in the laboratory;

4.2.5 Location and availability of reference material on chemical hygiene;

4.2.6 Training shall be conducted and documented by appropriate personnel including supervisors,

CHP Committee members, and staff from Environmental Health and Safety. While verbal training is useful, the use of materials that become part of the training record is encouraged, including written, audio-visual and web-based materials. See **Appendices F1. Lab Instructor Orientation and F3 New Employee Safety Training.**

4.3 Student Training

4.3.1 At the beginning of each quarter, faculty shall familiarize students with common laboratory safety standards **Appendix F2 - Student Safety in the Laboratory in conjunction with the specific school of science safety procedures:**

Appendix F4 - Safety in the Biology Laboratory
Appendix F5 - Safety in the Chemistry and Biochemistry Laboratory
Appendix F6- Safety Precautions for the Engineering Labs

4.3.2 At the beginning of each laboratory period, the lab instructor shall review safety concerns pertinent to the experiment to be performed that day. Information shall include:

- i. hazardous properties of materials to be employed
- ii. personal protective measures to be utilized with specific activities
- iii. emergency procedures relevant to potential mishap with materials and equipment in use
- iv. proper waste disposal and cleaning at the conclusion of the experiment
- v. an overall goal is to train students in the process of mental rehearsal of procedures, developing an ability to spot hazards and pitfalls, and to plan for their mitigation in advance
- vi. to emphasize safe thinking, faculty are encouraged to introduce safety questions into test materials

5.0 Prior Approval of Laboratory Activities

5.1 Permit System

A permit form shall be completed for non-classroom

laboratory work including grant work and student laboratory activities that include hazardous operations, working alone, working outside lab hours or carrying out unattended procedures. **Appendix G - Chemical Hygiene Permit** shall be executed prior to the performance of these activities.

5.1.0 Definition

Hazardous materials - Any material that can cause harm to people, the environment or property.

Hazardous operations - Any operation using hazardous materials or any other operation with significant potential for causing harm to people, the environment, or property.

5.1.1 Types of Work Procedures requiring a permit - **Appendix G - Chemical Hygiene Permit:**

5.1.1.1 Hazardous Operations are not allowed while working alone.

All hazardous operations are to be performed during a time when at least two personnel are present in the laboratory. At no time shall a student or employee, while working alone in the laboratory, perform hazardous operations. The determination of hazardous operations shall be made by the laboratory supervisor.

Under unusual conditions, crosschecks, periodic security guard checks, or other measures may be taken when permitted.

5.1.1.2 Working After Hours

Laboratory personnel are not allowed to work alone with hazardous materials/operations after hours in the lab. The definition of lab hours will be determined by the laboratory supervisor. To conduct hazardous operations after hours, at least two workers approved by the laboratory supervisor must be present.

5.1.1.3 Unattended Operations

When laboratory operations are performed which will be unattended by laboratory personnel (continuous operations, overnight reactions, etc.), the following procedures will be employed:

5.1.1.3.1 The permit system shall be utilized.

5.1.1.3.2 The laboratory supervisor will review work procedures to ensure for the safe completion of the operation.

5.1.1.3.3 If prudent and appropriate, a sign will be posted at the entrances to the laboratory.

5.1.1.3.4 Precautions shall be made for the interruption of utility service during the unattended operation (loss of water pressure, electricity, etc.).

5.1.1.3.5 The person responsible for the operation will return to the laboratory at the conclusion of the operation to assist in the dismantling and cleanup of the apparatuses.

6.0 Medical Consultations and Examinations

6.1 An opportunity to receive medical attention is available to all employees and students who work with hazardous chemicals in the laboratory. The opportunity for medical attention will be made available to employees/students under the following circumstances:

6.1.1 Whenever an employee or student develops signs or symptoms associated with a hazardous chemical to which the employee or student may have been exposed in the laboratory,

6.1.1.1 Employees should report to the Worker's Compensation Coordinator (WCC) immediately for medical attention if they think they are experiencing signs and symptoms of a chemical exposure. Bring a copy(s) of the chemical(s) MSDS(s). The Supervisor should notify the Director of EHS immediately upon learning about the potential exposure. Student Assistants are considered University Employees.

6.1.1.2 Students should report to the Student Health Center for medical attention if they think they are experiencing signs and symptoms of chemical exposure. Bring a copy(s) of the chemical(s) MSDS(s). The responsible Faculty should notify the Director of EHS immediately upon learning about the

potential exposure. Student Interns should report to SHS for medical follow-up.

6.1.2 Medical surveillance programs will be established where exposure monitoring reveals an exposure level above the action level for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, and/or,

6.1.3 Whenever an event takes place in the laboratory such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the employee/student will be provided an opportunity for medical consultation for the purpose of determining the need for medical examination.

6.2 These medical consultations and examinations shall be provided without cost to the employees/students at a reasonable time and place. In the case of an employee, it is without loss of pay. In the case of a student, it is without any penalty in the course.

6.3 These medical consultations and examinations shall be administered by or under the direct supervision of a licensed physician. Requests for examinations may be submitted to the Department of Environmental Health and Safety.

7.0 Chemical Hygiene Responsibilities

7.1 Chief Executive Officer

The Dean of the College of Science has the ultimate responsibility for chemical hygiene throughout all laboratories under his direction in the College of Science and with assistance of other program administrators, will provide continued support for chemical hygiene.

7.2 Department Chair Responsibilities

7.2.1 Each Department Chair in the College of Science is responsible for implementing the Chemical Hygiene Plan in their departments. This pertains to those Departments using hazardous materials in the laboratories. All departments are required to comply with the Hazardous Communications Program.

7.2.2 The Department Chair will ensure that at least

once a year their Department meets to review changes to the CHP and focus on safety issues that pertain to that department.

7.2.3 The Department Chair or their designee will participate on the CHP Committee. The Committee will be comprised of departments using hazardous materials in laboratories and EHS. This Committee will meet at least annually to:

- review and improve the CHP;
- maintain the regulatory required status of the program with the **California Code of Regulation, Title 8, Chapter 4, Section 5191**;
- review Laboratory Work Permits;
- request the assistance of EHS to implement the CHP as needed;
- review all lab related injuries and illnesses and communicate to their departments finding and actions of applicable investigations

7.3 Designated department faculty and staff shall:

7.3.1 work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices,

7.3.2 perform regular, formal chemical hygiene and housekeeping inspections including inspections of emergency equipment,

7.2.3 help project directors develop precautions and adequate facilities,

7.3.4 maintain current knowledge concerning the legal requirements of regulated substances in the laboratory,

7.3.6 maintain overall responsibility for the laboratory operation,

7.3.7 ensure that workers know and follow the chemical hygiene rules,

7.3.8 determine the proper level of personal protective equipment, ensure that such protective equipment is available and in working order,

7.3.9 ensure that appropriate training has been provided to employees,

7.3.10 monitor the waste disposal program.

7.4 Laboratory Workers

The laboratory workers are individually responsible for;

7.4.1 planning and conducting each laboratory operation in accordance with the Chemical Hygiene Plan,

7.4.2 developing good personal chemical hygiene habits.

7.5 Environmental Health and Safety

7.5.1 EHS will review the implementation of the CHP and verify compliance.

7.5.2 EHS will participate on the CHP Committee and provide it with regulatory updates applicable to work in laboratories.

7.5.3 EHS will participate in incident investigations involving

8.0 Special Precautions

When laboratory procedures require the use of hazardous materials with extreme health and/or physical hazards additional precautions shall be implemented as deemed necessary. The risk assessment of the procedure shall be documented using the permit system (**Appendix G Chemical Hygiene Permit**) and will include evaluation and recommendation for control methods (work procedures, engineering, administrative, and personal protective equipment) to be used. Health hazards may include work with chemical sensitizers, mutagens, carcinogens, reproductive toxins (male or female), and teratogens. Extreme physical hazards may include reactivity, explosivity, and/or water reactivity. All questions regarding the use of the permit system should be addressed to the Department Chair or their designee. Contact EHS if additional assistance is required.

8.1 Work procedures and special considerations

8.1.1 Use of chemical compatible gloves to prevent hand contact shall be worn when exposed to allergens or substances of unknown allergen activity.

8.1.2 Chemicals that are reproductive hazards (male or female and/or teratogenic will be handled in an appropriate containment device with confirmed

satisfactory performance and with use protective equipment to prevent skin contact as prescribed by the supervisor and Chemical Hygiene Officer.

8.1.3 Store in adequately ventilated areas in unbreakable secondary containers.

8.1.4 The supervisor, Chemical Hygiene Officer, and EHS will be notified of spills and other exposure incidents. A physician will be consulted when appropriate.

8.2 Working with Chemicals of Moderate Chronic or High Acute Toxicity (Special Precautions)

8.2.1 Areas where these chemicals are stored and used are of restricted access and have special warning signs.

8.2.2 Gloves and long sleeves will be used. Hands and arms will be washed immediately after working with these chemicals.

8.2.3 Two people will always be present during work with these chemicals.

8.3 Working with Chemicals of High Chronic Toxicity (Special Precautions)

8.3.1 All transfer and work with these substances shall be in a designated area: a restricted access hood, glove box or portion of lab.

8.3.2 Approval of the supervisor will be obtained before use.

8.3.3 Vacuum pumps must have scrubbers or high efficiency particulate absolute (HEPA) filters.

8.3.4 Any contaminated equipment or glassware will be decontaminated in the hood before removing them from the designated area.

8.3.5 For small quantity powders, use wet methods for cleanup. If larger quantities need to be cleaned up use vacuum with a HEPA filter.

8.3.6 The designated area will be marked with warning and restricted access signs.

8.3.7 Containers will be stored in a ventilated, limited access area in labeled, unbreakable, chemically resistant, secondary containers.

8.4 Working with animals while using Chemicals of High Chronic Toxicity or biohazardous organisms. (Special Precautions)

8.4.1 For large-scale studies, special facilities with restricted access will be provided.

8.4.2 The substance will be administered by injection or gavage when possible, rather than by diet. When diet is used, a caging system under negative pressure or under laminar airflow directed toward HEPA filters will be used.

8.4.3 Procedures will be used to minimize contaminated aerosol from food, urine and feces:

- HEPA filtered vacuum equipment for cleaning.
- Moistened contaminated bedding before removal from cage.
- Mix diets in closed containers in hood.

8.4.4 Plastic or rubber gloves and fully buttoned lab coats will be worn in the animal room.

9.0 Record keeping

9.1 Accident investigations will be conducted by the immediate supervisor with assistance from other personnel as deemed necessary. EHS will be notified as soon as possible.

9.2 Accident reports will be written and retained for 3 years up to 30 years by EHS

9.3 Exposure records (workplace monitoring) for hazardous chemicals and harmful physical agents will be maintained for 30 years by EHS.

9.4 Medical records for employees exposed to hazardous chemicals and harmful physical agents will be maintained for the duration of employment plus 30 years by Risk Management.

9.5 Records of inspections of equipment will be maintained for 3 years by the departments. These will be made available for review by EHS upon request.

9.6 Records of employee training will be maintained for 3 years by the department and EHS.

10.0 Chemical Spills, Releases and Accidents

In the event of a chemical spill, release or other accident, the University will adhere to the procedures outlined in **Appendix D Emergency Response Plan** as required by OSHA.

11.0 References and Recommended Reading

California Code of Regulations Title 8

National Research Council, Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, Washington, D.C. 1981.

National Research Council, Prudent Practices for Disposal of Chemicals from Laboratories, National Academy Press, Washington, D.C., 1983.

Freeman, N.T., Introduction to Safety in the Chemical Laboratory, Academy Press, 1982.

Manufacturing Chemists' Association, Inc., Guide For Safety In The Chemical Laboratory, D. Van Nostrand Company, Inc., 1954.

Green, Michael E., Safety In Working With Chemicals, MacMillan Publishing Co., Inc. 1978.

Pipitone, David A., Safe Storage of Laboratory Chemicals, Wiley & Sons, Inc. 1984.

Code of Federal Regulations, 29 CFR part 1910 subpart Z section 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories, 1990.

NIOSH Current Information Bulletin 59