

Section III: REGULATORY FRAMEWORK

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Sec. III is provided to the campus in an electronic version:

<http://web.chem.ucsb.edu/~moretto/Section III.2014.pdf>

*Per OSHA, this document needs to be reviewed and updated **annually** by EH&S. Therefore, we ask that this section NOT be printed out as a hard copy, as it becomes very difficult to locate hundreds of hard copies across the campus when the next update needs to occur.*

A. THE CAL-OSHA LABORATORY SAFETY STANDARD

1. Background

The Standard for *Occupational Exposure to Hazardous Chemicals in Laboratories* (commonly known as the “Laboratory Standard”, or “Chemical Hygiene Plan”) was adopted by the California Occupational Health & Safety Administration (Cal/OSHA) Standards Board on February 21, 1991. The Standard is summarized on the following page and the [complete text](#) is available online.

The intent of the Laboratory Standard is to protect laboratory employees from harm due to chemicals. The design of the Laboratory Standard is based on a recognition by OSHA that laboratory work is typically different in character from industrial operations in their use and handling of chemicals. In contrast to many industrial operations, laboratory chemical work often involves a relatively large number of chemicals in small scale procedures that can change significantly over time to reflect evolving research..

2. Applicability

Labs meeting the following four criteria are subject to the Laboratory Standard:

- Chemical manipulations are on a laboratory scale, i.e., easily and safely manipulated by one person
- Multiple chemical procedures are used
- The procedures involved are not part of a production process, nor simulate a production process
- Protective laboratory practices and equipment are available and commonly used

Clearly, most research and teaching laboratories at UCSB, meet these criteria. Students in teaching laboratories are not University employees and therefore do not fall under the provisions of the Standard. However, it is the judgment of the University, that it is obligated to develop policies and course materials which attempt to provide the same level of protection for students. It should be noted that teaching assistants, faculty and staff in instructional labs are covered by the Lab Standard and therefore need to be included in a Chemical Hygiene Plan.

3. Summary of the Laboratory Safety Standard

The [Laboratory Standard](#) contains the following elements.

- **Chemical Hygiene Plan (CHP)**— A written plan (this document) must be developed to control and minimize chemical exposure in laboratories. The CHP must be readily available to affected employees, who need to be oriented to its provisions and relevance to their health and safety. A CHP is required where hazardous chemicals, as defined by OSHA, are used in the workplace. The CHP must be:
 - (A) Capable of protecting employees from health hazards associated with hazardous chemicals...
 - (B) Capable of keeping exposures below OSHA Permissible Exposure Limits
- **Responsibilities**— Personnel responsible for implementation of the CHP must be designated, including the appointment of a Chemical Hygiene Officer. [Sec. III.B]
- **Employee Information and Training**— The employer shall provide employees with information and training to ensure that they are informed of the hazards in their work area and their avoidance. [Sec. III.C.1]
- **Standard Operating Procedures**— SOPs must be developed for incorporation into the CHP relevant to safety and health when lab work involves the use of hazardous chemicals. [Secs. I and III.C.2]
- **Particularly Hazardous Substances**— Provisions must be specified for additional employee protection for work with substances such as "select carcinogens", high acute toxicity substances and reproductive toxins. Provisions are generally incorporated into the SOPs [Secs. I and III.C.3]
- **Control Measures**— Criteria must be established that the employer will use to determine, implement and adequately maintain control measures to reduce employee exposures, including lab ventilation, personal protective equipment. Control measures generally incorporated into SOPs. [Sec. III.C.4]
- **Maintenance of Engineering Controls, Personal Protective Equipment and Emergency Equipment** – fume hoods must comply with Title 8 5154.1 and protective equipment function properly. [Sec. III.C.5]
- **Hazard Identification**— Safety Data Sheets (formerly known as MSDS) and other reference materials need to be available. Labeling of chemicals is strictly regulated. [Sec. III.C.6.]
- **Prior Approval**— Circumstances must be stipulated under which a particular laboratory operation requires prior approval from the lab supervisor. Generally incorporated into SOPs [Sec. III.C.7]
- **Employee Exposure Determination**— As appropriate, measurements must be taken to verify that exposure limits are not exceeded. [Sec. III.C.9]
- **Medical Consultation and Examinations**— Workers are entitled to medical attention when a significant chemical exposure is suspected. [Sec. III.C.8]

B. RESPONSIBILITIES

1. Introduction

The UCSB *Policy on Environmental Health and Safety* (Policy P-5400) states:

The University shall maintain as safe and healthy an environment as is reasonably feasible for its students, faculty, staff and visitors by:

- Conducting its operations and activities in a safe manner to minimize the risks of injury to people and minimize property damage at all locations where University operations and/or activities occur.
- Complying with applicable regulations, safety and health consensus standards, and practices generally accepted by experts in the field.

Therefore the intent of the University is to abide by the provisions of the Laboratory Standard to as great an extent as is reasonably feasible.

2. Responsibilities

a. Management

Department heads, deans, supervisors, vice-chancellors and the chancellor are responsible for ensuring that individuals under their management have the training and authority to implement appropriate health and safety policies and practices relative to the Laboratory Standard and per campus policy #5400.

b. Laboratory Supervisors/Principal Investigators

The term “supervisor” at UCSB refers to anyone having direct supervisory authority, and includes staff administrators, class instructors, research assistants, managers, and faculty. The supervisor is the key individual in a successful lab safety program. Supervisors are responsible for developing and implementing the CHP for their laboratories, particularly the development of appropriate SOPs for their lab-specific section. A [helpful guideline](#) to many common specific tasks of a lab supervisor can be found online. Supervisors can delegate specific tasks, but can not delegate their overall responsibility.

c. Environmental Health & Safety (EH&S)

Develop safety education and monitoring programs to help maintain a safe and healthy environment for faculty, staff, students and visitors in order to facilitate the research and teaching functions of the University. Support research and instructional activities by developing legally-mandated programs; provide technical guidance and consulting; and assist departments in program implementation. Make every effort to keep operations functioning smoothly in labs while meeting health, safety and environmental obligations.

d. Chemical Hygiene Officer

The Lab Standard specifically calls for the appointment of a *Chemical Hygiene Officer* by the employer: “*An employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan.*” This CHO role at UCSB is currently assigned as follows:

-UCSB Departments: Chemistry & Biochemistry; Materials; Chemical Engineering, Electrical and Computer Engineering: Alex Moretto, Chemical Laboratory Safety Officer, Physical Sciences Building North 2660, (805) 893-6630, moretto@chem.ucsb.edu

-All Other UCSB Laboratory Departments/Units: David Vandenberg, EH&S Laboratory Safety Program Manager, Bldg. 565, (805) 893-4899, David.Vandenberg@ehs.ucsb.edu

CHO Duties: develop and distribute the *UCSB Chemical Hygiene Plan* to laboratory supervisors. Assist and advise faculty and staff in the customization and implementation of their CHP as requested/needed. Describe the provisions of the CHP to those attending the *Fundamentals of Laboratory Safety* orientations. Monitor and evaluate the effectiveness of the CHP. As a member of the Laboratory Safety Committee, advise campus management on the effectiveness of CHP implementation and make recommendations for upgrades to the program. Serve as interface with Cal-OSHA regarding CHP issues.

e. Laboratory Safety Committee

The UCSB Chemical Safety Committee reviewed and approved earlier versions of the *UCSB Chemical Hygiene Plan* as drafted by EH&S. In 2010 the committee was superseded by the Laboratory Safety Committee (LSC) as co-Chaired by the Vice Chancellor of Research and the Associate Vice-Chancellor of Administrative Services. The LSC functions as a venue for EH&S/CHOs to receive input from the campus laboratory community on the content and effectiveness of the CHP and other lab safety issues.

f. Departments and Organized Research Units

- Under the campus *Injury and Illness Prevention Program* (Cal-OSHA requirement), and the associated [UCSB written program](#), the **department/unit Head or Chair is identified as the individual with the authority and responsibility to implement the IIPP**. The IIPP is the umbrella OSHA regulation, under which all worker safety program exist.
- To assist the Chair/Unit Head, each department has a *Department Safety Representative (DSR)* who coordinates health and safety program elements in the department and serves as a liaison with EH&S. The department may also have a Management Services Officer, or lab managers.
- General oversight of department operations and communicating with supervisors/personnel any relevant safety issues, problem solving, and preplanning for emergencies.
- Per UC policy, departments are responsible for ensuring that all new lab workers attend a *Fundamentals of Laboratory Safety* orientation before lab access is granted - see Sec. III.C.1.
- Ensure that all operations under departmental control develop and implement lab-specific CHPs. While individual lab supervisors have the primary responsibility, department administrations need to coordinate and support these efforts.

g. Laboratory Workers (non-supervisors: graduate students, undergraduates, postdoctoral staff; permanent staff, visiting researchers, etc.)

General responsibilities are below - a more [complete list](#) is online.

- Follow established work policies and procedures, including the UC Personal Protective Equipment policy; Laboratory Safety Training policy, CHP and authorizations from campus safety committees.
- Attend and actively participate in appropriate safety training.
- Notify the laboratory supervisor or EH&S of any unsafe or potentially unsafe condition.

Workers also have rights under the law - See also the *UCSB Injury & Illness Prevention Program*

- to be informed of the hazards in their workplace
- to be properly trained on safe work practices
- to be provided appropriate personal protective equipment needed for the job at no cost to them
- to file a complaint with Cal-OSHA if they feel they are being exposed to unsafe conditions and no reprisals can be taken against them. Workers are encouraged to report safety concerns to EH&S.

h. Facilities Management - see Section III.C.5

C. PROGRAM ELEMENTS OF THE CHEMICAL HYGIENE PLAN

1. *Employee Information and Training*

One of the major provisions of the Laboratory Standard and the OSHA *Injury and Illness Prevention Program* is a requirement for employee information and training. The employer must convey information to the employee regarding occupational hazards identified in the workplace. In general, training is required for:

- All new employees and employees given new job assignments involving exposure situations for which training has not previously been received
- Whenever the employer is made aware of a new or previously unrecognized hazard for which training has not previously been received

UC Laboratory Safety Training Policy

In October 2014, UC adopted a new policy entitled [UC Laboratory Safety Training Policy](#) to reinforce and support OSHA requirements and increase safety. Lab supervisors have the primary responsibilities for implementing the policy provisions, which include:

1. Ensure all “lab workers” complete an EH&S “*Fundamentals of Laboratory Safety*” training in order to be given access to their labs. Class enrollment directions (live, or online version) and class descriptions are in Sec. II. The training covers most of the issues specifically mandated in the Lab Standard (see box below).
2. However, the fundamentals course does *not* address lab-specific training issues and it is incumbent on the lab supervisor to do so. This is done via a **Training Needs Assessment** ([pdf](#); [Word](#)) to be performed for each lab worker as mandated in the UC policy. Copy of the TNA form and instructions begin on pg. II-21.

Safety Training Required by the Laboratory Safety Standard

(* = topic covered/documented in the EH&S *Fundamentals of Laboratory Safety* class as required per UC policy)

- *Employee rights and responsibilities under the *Laboratory Standard* and the *Injury & Illness Prevention Program*
- *Contents of the generic portions (Sec. II) of the *UCSB Chemical Hygiene Plan*
- *Concept of Permissible Exposure Limits for OSHA-regulated substances. Access to PELs noted in Sec. II.
- *Hazardous materials labeling, storage, and signage requirements
- *Relevance and access to SDSs (MSDS) and other informational references and resources pertinent to the lab
- *Spill response, waste disposal and emergency procedures
- Contents of the lab-specific *Chemical Hygiene Plan*, including any SOPs [*Lab supervisor responsibility*]
- The physical and health hazards of hazmat including signs and symptoms of overexposure, including Particularly Hazardous Substances - Sec. III.C.3. As appropriate, training can address entire classes of materials rather than individual substances. [*Major classes of chemical hazards are covered by EH&S*, but not lab-specific hazards*]
- Appropriate use of control measures including engineering controls, personal protective equipment, and work practices. [*Generic control measures covered by EH&S*. Lab-specific control measures should be addressed in the lab's SOPs.*]

2. *Standard Operating Procedures*

The OSHA Laboratory Safety Standard states that a laboratory's CHP include: *“Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals”*. A “hazardous chemical” is one for which:

“...there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees.”

Given the diverse nature of laboratory work at UCSB, it is incumbent on individual lab supervisors to develop lab-specific SOPs for operations which involve the use of a “hazardous chemical”, and

- SOPs should contain information about potential hazards and how these hazards will be mitigated
- Special focus should be on SOPs for “Particularly Hazardous Substances” (PHS) – human carcinogens and reproductive toxins, acutely toxic materials. (see C.6). In many cases chemicals with similar hazards and safety controls can be grouped together into a single SOP (“control banding”).
- SOPs should be written by lab personnel who are most knowledgeable of the experimental process and approved by the supervisor
- SOPs should be kept where workers can easily access them

Specific guidance on how to prepare SOPs are given in Section I. Some “UC communal SOPs” are available for sharing. This sharing process has already been completed for UC departments of Chemistry & Biochemistry. However, to adequately meet regulatory requirements, it is necessary that individual PIs/lab supervisors customize any communal SOP to meet their specific need.

3. *Particularly Hazardous Substances (PHS)*

The Laboratory Standard states that: *“The Chemical Hygiene Plan shall include... provisions for additional employee protection for work with hazardous substances, including “select carcinogens,” reproductive toxins and substances which have a high degree of acute toxicity*

SELECT CARCINOGENS— Includes carcinogens as listed by the following organizations: OSHA; the National Toxicology Program; the International Agency for Research on Cancer. See also Sec. II.

REPRODUCTIVE TOXINS— A chemical which affects human reproductive capabilities, including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

HIGH ACUTE TOXICITY SUBSTANCES— Substances such as hydrogen cyanide or hydrogen sulfide which may be fatal or cause damage to target organs as a result of a single exposure or exposures of short duration.

It is the responsibility of individual lab supervisors to institute SOPs for using a specific Particularly Hazardous Substance in their laboratories. See Section I for template forms and instructions.

The PHS section of the Lab Standard goes on to say: *“ Specific consideration should be given to the following provisions which shall be incorporated where appropriate:*

1. *“Establishment of a designated area”*
2. *“Use of containment devices such as fume hoods or glove boxes”*
3. *“Procedures for safe removal of contaminated waste”*
4. *“Decontamination procedures”*

Again, directions/prompts for addressing these issues is provided in the SOP development section (Sec. I).

4. *Criteria for Determination and Implementation of Control Measures*

The Laboratory Standard states that the CHP “... *shall include criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals*”

Hazard controls are generally classified into three broad groups: engineering controls, administrative procedures and personal protective equipment. Guidance on control measures are delineated here.

A. General

- Lab supervisors shall determine and implement appropriate control measures and preferably incorporate them into their lab’s individual SOPs
- Environmental Health & Safety shall be responsible for assisting the above in determining these control measures upon request. EH&S may do periodic evaluations of control measures on campus as deemed necessary and notify lab supervisors of their results and recommendations.

B. Engineering Controls—Criteria for Implementation (see Sec. II-15)

C. Administrative Controls—Criteria for Implementation

The variety of possible administrative controls to reduce hazard levels in laboratories is large, e.g., training, signage, labeling, SOPs, etc. The controls instituted by a given laboratory shall be determined by the lab supervisor in consultation with EH&S, as needed. In general, measures shall be implemented:

- As indicated in Standard Operating Procedures
- As mandated by health and safety regulations, or as called for by accepted good practice

D. Personal Protective Equipment—Criteria for Implementation

Appropriate personal protective equipment (PPE) practices are stipulated in the UC policy titled: [Personal Protective Equipment](#) (March 2014). The key provisions of the policy are summarized in Sec. II, pgs. 6 to 10 of this manual, including:

- how to determine the appropriate PPE for the hazards present in a particular laboratory (via “LHAT”)
- how to obtain free PPE on campus;
- when and where to don PPE;
- how to launder dirty laboratory coats

5. *Maintenance of Engineering Controls, Personal Protective Equipment and Emergency Equipment*

Per the Laboratory Standard: “.....*a requirement that fume hoods comply with section 5154.1 (Title 8, CCR), and that all protective equipment shall function properly and that specific measures shall be taken to ensure proper and adequate performance of such equipment....*”

General Responsibilities:

FACILITIES MANAGEMENT (FM): Responsible for routine maintenance, replacement and installation of University-owned building emergency systems and environmental controls. Must inform affected departments and/or individuals in a timely way when building systems are, or will be, non-functional.

ENVIRONMENTAL HEALTH & SAFETY: Responsible for evaluating effectiveness of engineering control measures and emergency equipment used on campus. Will make recommendations to FM and users on implementation of appropriate equipment and control measures as needed.

LAB SUPERVISOR/LAB PERSONNEL: Responsible for monitoring status and effectiveness of equipment and control measures. Responsible for reporting to appropriate campus entity if equipment is not functioning properly or are inadequate.

Specific Responsibilities:**FUME HOODS/GAS CABINETS (per CCR, Title 8, 5154.1)**

Maintenance: Facilities Management
 Annual certification: EH&S

BIOSAFETY CABINETS (per CCR, Title 8, 5154.2)

Maintenance: Owner (generally lab supervisors)
 Annual certification: Generally, owner covers cost of outside vendor certification. Biosafety Committee typically requires cabinet use as part of their authorization

OTHER LOCAL EXHAUST VENTILATION

Maintenance: Facilities Management

EMERGENCY SHOWERS AND EYEWASHES (per CCR, Title 8, 5162)

Maintenance & testing Facilities shall check on a regular basis by running water through them until the water runs clear and repair as needed and keep records.

RESPIRATORS (per CCR, Title 8, 5144)

Administration: EH&S has sole responsibility for approval, fit-testing and issuance. Lab supervisors are responsible for identifying and directing individuals to EH&S who may require respirators in their work.
 Maintenance: Lab supervisor or designee

OTHER PERSONAL PROTECTIVE EQUIPMENT (per CCR, Title 8, 3380-3387)

Maintenance: Generally provided by UCSB, or the lab supervisor – maintenance & replacement are the responsibility of the supervisor and lab personnel. See Sec. II-6 to -10.

FIRE EXTINGUISHERS, DETECTORS, ALARMS, SUPPRESSION SYSTEMS (per CA Fire Code and Building Code)

Administration: The campus Fire Marshal's office is responsible for evaluation and approval of these systems
 Maintenance: Facilities Management

GAS DETECTION/ALARM SYSTEMS (per CA Fire Code and Building Code)

Administration: EH&S has responsibility for evaluation and approval of code-required gas detection/alarm systems
 Maintenance: Facilities Management, or Cleanroom staff

EMERGENCY PHONES

Maintenance: Communications Services

HAZARDOUS MATERIALS SPILL RESPONSE EQUIPMENT (per CCR, Title 8, 5192)

Maintenance: EH&S is responsible for equipping, maintaining and using the primary hazmat response equipment stores for the campus. Individual labs or departments may have local supplies which they maintain.

6. Hazard Identification

Policies and regulations on hazard identification with respect to labeling and Safety Data Sheets are:

- Labels on incoming containers of hazardous chemicals are not to be removed or defaced.
- The primary campus access to Safety Data Sheets is through the internet, particularly the UC SDS search engine. See Sec. II-13. Individual labs are encouraged to maintain their own hardcopy files as well.
- For chemical substances developed in University laboratories, the provisions for hazard determination, training and labeling shall be those stated in the Laboratory Standard.

7. *Prior Approval*

Another provision of the Laboratory Standard is for incorporating policies into the CHP on: ***“The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from the employer or the employer’s designee before implementation.”***

Given the diversity of chemical work done in campus laboratories, it is impossible to specify the operations which would require prior approval. **It is therefore the responsibility of individual lab supervisors to establish these criteria, if any, for their operations. Establishment of prior approval criteria is solely the prerogative of the lab supervisor.** These criteria should be incorporated into the lab’s SOPs.

8. *Medical Consultation and Examination*

The Laboratory Standard states that: ***“The employer shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances”:***

- **When an employee develops signs or symptoms associated with a hazardous chemical to which that employee may have been exposed**
- **Where exposure monitoring reveals an exposure level routinely above the action level or PEL for an OSHA-regulated substance**
- **Whenever an event takes place in the work area such as a spill, leak, or explosion resulting in the likelihood of a hazardous exposure”**

The University has established the following procedures, when it is known or suspected that an employee or student has been exposed to a hazardous chemical(s) or is otherwise injured on campus.

- All employees suffering from chemical exposure or other work-related injury incurred at UCSB shall be [evaluated/examined](#) at University expense. Students are covered by their required medical insurance.
- If the injured/exposed person is safe to transport, escort them to either Student Health Services (undergraduate students), Goleta Valley Community Hospital, or their primary physician for evaluation. Contact EH&S at x3194, or x4440 immediately to initiate medical coverage procedures.
- In some cases a work-related chemical exposure may be suspected but not certain. For example, some low-level but chronic exposures may be difficult to identify or relate to specific symptoms. In these instances, contact the Chemical Hygiene Officer at x4899 to arrange a review of the suspected exposure.
- The Laboratory Standard includes specific provisions regarding the employer’s exchange of information with the examining physician. The provisions of the Standard will be followed as stipulated therein.

9. *Criteria for Establishing Exposure Monitoring*

The legal limits for occupational exposure to ~500 chemicals which are toxic by inhalation, or skin contact, are codified by OSHA in so-called [Permissible Exposure Limit \(PEL\)](#) values. Values are generally expressed in parts per million (or mg/m³) and can relate to short-term (15 min.), long-term (8 hour), or ceiling level exposures. PEL values for [50 common lab chemicals](#) is also provided.

Exposure monitoring for any substance regulated by an OSHA standard will be performed if there is reason to believe that exposure levels exceed the action level, or Permissible Exposure Limit. The tasks of determining if exposure monitoring is required and performing or supervising exposure monitoring shall be the sole responsibility of EH&S. For “regulated carcinogens” (See Sec. II-11) EH&S does periodic reviews of usage practices and exposure monitoring to establish if there is reason to suspect there are exposures.