

CHEMICAL HYGIENE PLAN

California Polytechnic State University San Luis Obispo

Introduction and Scope

The purpose of the Chemical Hygiene Plan (CHP) is to outline laboratory work practices and procedures which are necessary to ensure that members of the university community are protected from health hazards associated with chemicals with which they work.

This laboratory safety plan (CHP) is a resource for and appendix to the campus Injury and Illness Prevention Plan (IIPP). The IIPP is the comprehensive safety policy for the entire university (all locations, including laboratories). Authority for enforcement of adherence to standards set forth in this Chemical Hygiene Plan rests with the President of the University, as described in the IIPP.

This Chemical Hygiene Plan is required under Section 5191 of Title 8 of the California Code of Regulations (CCR 8:5191, the Lab Standard), and it is required to be:

(A) Capable of protecting laboratory workers from health hazards associated with hazardous chemicals in (all laboratories) and

(B) Capable of keeping exposures below the limits specified in subsection 5191(c) .

[This the list of airborne contaminants and the Permissible Exposure Limit (PEL) for each one, listed in Title 8, Article 107 of the California Code of Regulations.

Contents

Introduction and Scope

1. Definitions

2. Responsibilities

- 2.1 University
- 2.2 Chemical Hygiene Officer
- 2.3 Laboratory Supervisors
- 2.4 Laboratory Workers

3. Standard Operating Procedures

- 3.1 General Guidelines
- 3.2 Personal Laboratory Hygiene
- 3.3 Protective Clothing and Equipment
- 3.4 Housekeeping
- 3.5 Chemical Storage
- 3.6 Chemical Waste
- 3.7 Spill Response and Clean-up
- 3.8 Fire Emergency
- 3.9 Medical Emergency
(First Aid Supplies)

4. Medical Resources

- 4.1 Medical Evaluation of Students (employees and non-employees)
- 4.2 Medical Evaluation of non-student employees
- 4.3 Determination of Exposures

5. Designation of the Chemical Hygiene Officer

6. Laboratory Ventilation

- 6.1 Fume Hoods
- 6.2 Biosafety Cabinets

7. Provisions for work with Hazardous Materials

- 7.1 Definitions
- 7.2 General Procedures for Work with Hazardous Substances
- 7.3 Set of Criteria and Control Measures

Contents
(continued)

8. Information and Training for Laboratory Workers

- 8.1 Responsibility to Train
- 8.2 Training Contents
- 8.3 Documentation of Training

9. Prior Approval

- 9.1 Definition of Prior Approval
- 9.2 Circumstances Requiring Prior Approval

10. Use of Highly Hazardous Materials

- 10.1 Definitions
- 10.2 Procedures for Use

11. References

12. Appendices

1. DEFINITIONS

The definitions contained in CCR Title 8, Sec. 5191(b) are included in this Chemical Hygiene Plan by reference. Some of these and additional terms used in this CHP are listed below:

Action level- a concentration designated in Title 8, California Code of Regulations for a specific substance, calculated as an eight (8)-hour time weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Carcinogen (see “select carcinogen” below).

Chemical Hygiene Officer- 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 definition is not intended to place limitations on the position description or job classification that the designated individual shall hold within the employer's organizational structure.

Chemical Hygiene Plan- a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that

- (1) are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular work place and
- (2) meets the requirements of subsection 5191(e).

Chief- Chief of the Division of Occupational Safety and Health.

Designated area- an area which may be used for work with “select carcinogens,” reproductive toxins or substances which have a high degree of acute toxicity. A designated area may be the entire laboratory, an area of a laboratory or a device such as a laboratory hood.

Emergency- any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment which results in an uncontrolled release of a hazardous chemical into the workplace.

Employee- an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

Hazardous chemical- any chemical which is classified as health hazard or simple asphyxiant in accordance with the Hazard Communication Standard (Section 5194).

Health hazard- chemical that is classified as posing one of the following hazardous effects: Acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in Appendix A of the Hazard Communication Standard (Section 5194) and Section 5194(c) (definition of “simple asphyxiant”).

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

Laboratory scale- work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. “Laboratory scale” excludes those workplaces whose function is to produce commercial quantities of materials.

Laboratory-type hood- device located in a laboratory, enclosed on five sides with a movable sash or fixed partial enclosure on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms. Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow

CHEMICAL HYGIENE PLAN

and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.

Laboratory use of hazardous chemicals- handling or use of such chemicals in which all of the following conditions are met:

- (1) Chemical manipulations are carried out on a “laboratory scale”;
- (2) Multiple chemical procedures or chemicals are used;
- (3) The procedures involved are not part of a production process, nor in any way simulate a production process; and
- (4) “Protective laboratory practices and equipment” are available and in common use industry-wide to minimize the potential for employee exposure to hazardous chemicals.

Medical consultation- a consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

Mutagen- chemicals that cause permanent changes in the amount or structure of the genetic material in a cell. Chemicals classified as mutagens in accordance with the Hazard Communication Standard (Section 5194) shall be considered mutagens for purposes of this section.

Physical hazard- a chemical that is classified as posing one of the following hazardous effects: Explosive; flammable (gases, aerosols, liquids, or solids); combustible liquid; oxidizer (liquid, solid, or gas); self-reactive; pyrophoric (gas, liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; in contact with water emits flammable gas; water-reactive; or combustible dust. The criteria for determining whether a chemical is classified as a physical hazard are in Appendix B of the Hazard Communication Standard (Section 5194) and Section 5194(c) (definitions of “combustible dust,” “combustible liquid,” “water-reactive” and “pyrophoric gas”).

Protective laboratory practices and equipment- those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Reproductive toxins- chemicals which affect the reproductive capabilities including chromosomal damage (mutations), effects on fetuses (teratogenesis), adverse effects on sexual function and fertility in adult males and females, as well as adverse effects on the development of the offspring. Chemicals classified as reproductive toxins in accordance with the Hazard Communication Standard (Section 5194) shall be considered reproductive toxins for purposes of this section.

Responsible Person- the “Responsible Person” is accountable for the health and safety of a group of people in their working environment. In a research environment, this would be the Principal Investigator (PI). In a classroom laboratory, this would be the course coordinator or the faculty member that sets the curriculum in the laboratory

Select carcinogen- any substance which meets one of the following criteria:

- (1) It is regulated by Cal/OSHA as a carcinogen; or
- (2) It is listed under the category, “known to be carcinogens,” in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (1985 edition); or
- (3) It is listed under Group 1 (“carcinogenic to humans”) by the International Agency for Research on Cancer Monographs (IARC) (Volumes 1-48 and Supplements 1-8); or
- (4) It is listed in either Group 2A or 2B by IARC or under the category, “reasonably anticipated to be carcinogens” by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
 - (A) After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m³;
 - (B) After repeated skin application of less than 300 mg/kg of body weight per week; or
 - (C) After oral dosages of less than 50 mg/kg of body weight per day.

2. RESPONSIBILITIES

2.1 Responsibilities of California Polytechnic State University, San Luis Obispo (Responsibilities of the "University" - carried out by the appropriate department, college, or other administrative unit.

The Environmental Health & Safety is responsible for developing and implementing the campus Chemical Hygiene Plan. Deans, Department Chairs, Laboratory Supervisors, Faculty and Principal Investigators have the responsibility to implement and administer program elements within their respective areas as defined in Section 2.3.

1. Keep records of laboratory worker exposures to hazardous chemicals including measurements made to monitor exposures, medical consultation and examinations, and written opinions;
2. Provide laboratory workers with general training and information regarding chemical and physical hazards;
3. Provide laboratory workers with access to medical consultation and examinations at no cost to the employee if a laboratory worker develops signs or symptoms of exposure, if an action level or PEL is routinely exceeded, or if there is a spill or leak, or explosion that makes laboratory exposure above a PEL likely.
4. Provide laboratory workers (employees) with personal protective equipment such as eye and face protection, gloves, lab coats, and aprons, etc. as needed. Provide laboratory workers with respiratory protection when necessary and within the guidelines of the campus Respiratory Protection Plan. Colleges/Departments/Grant-supported projects are responsible, as appropriate, for supplying personal protective equipment described in this section.

NOTE: Certification of medical fitness is required for individuals wearing respiratory protection. The Certification of medical fitness requires the signature of a medical doctor, and a doctor usually needs to do a "respirator physical" examination of the user before signing a certification. It is the responsibility of the university, through the appropriate College/Department/Grant-supported project, to provide for such "respirator physical" examinations.

5. Make Safety Data Sheets (SDS) accessible to laboratory workers;
6. Measure the airborne concentration of potential contaminants in the air if there is reason to believe that an action level or PEL has been exceeded for any chemical for which a substance-specific standard has been established, or for any other reason which indicates air sampling may be necessary or useful.
7. Notify all laboratory workers of the results of the measurements and implement procedures to lower the level below the PEL or action level, if the level measured is greater than the PEL or action level.
8. Monitor proper functioning of protective equipment and engineering controls (hoods) and arrange for prompt repairs as needed.

2.2 Responsibilities of the Chemical Hygiene Officer:

The Chemical Hygiene Officer (CHO), as defined in the Lab Standard, is one "who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan." Responsibilities of the Chemical Hygiene Officer are:

1. Develop and update the campus model Chemical Hygiene Plan and appropriate policies and practices;
2. Provide technical assistance to campus departments and individuals in complying with the Chemical Hygiene Plan, and answer safety questions for laboratory workers;
3. Work in conjunction with hazardous waste program manager on the monitoring collection and disposal of chemical wastes (hazardous waste)
4. Keep current on federal, state and local legislation and regulations concerning chemicals and worker safety issues;
5. Assist Principal Investigators (PI's) / Course Instructors in developing appropriate safety precautions for new projects and procedures;
6. Assist Principal Investigators/Laboratory Supervisors or Responsible Person in annual departmental chemical hygiene and lab safety inspections.
7. Assist PI's and departments in selecting appropriate personal protective equipment.
8. Assist departments and laboratory supervisors in making Material Safety Data Sheets (MSDS) available to laboratory workers as necessary;
9. Assist departments and laboratory supervisors in developing and implementing a labeling program for chemicals;
10. Assist departments and laboratory supervisors in determining when a complaint of possible over-exposure should be referred for medical consultation;
11. Assist in determining when an "Exposure Assessment" is appropriate;
12. Conduct or arrange for "Exposure Assessments" when necessary;
13. Review chemical inventory to determine the presence and location(s) of carcinogens;
14. Audit operations and compliance status of laboratories. Recommend corrective actions, if any, to the appropriate PI, laboratory supervisor, department, or other responsible individual(s).

2.3 Responsibilities of the Laboratory Supervisor / Principal Investigator

The laboratory supervisor is the person with overall authority for laboratory operations in a department or other instructional or administrative unit, such as the course or laboratory instructor and/or the department chairperson/head and/or the College Dean. The primary responsibility of the laboratory supervisors is to institute the Chemical Hygiene Plan and ensure compliance with its requirements within their respective laboratories. Each Laboratory Supervisor, as defined here, shall:

1. Become aware and keep current on the requirements of this Chemical Hygiene Plan;
2. Ensure that all laboratory work is performed in accordance with the Chemical Hygiene Plan;
3. Define the location of "controlled work areas", if any, within the laboratory where toxic substances and potential or known carcinogens will be used, and ensure that the inventory of these substances, if any, are properly maintained (See sec. 10.1 of this CHP for a list of carcinogens.);
4. Develop (or obtain), review, and approve Protocol-Specific Safety Procedures, detailing all aspects of proposed work involving hazardous agents;
5. With the assistance of the CHO, determine and periodically review hazardous operations, designate safe practices, and select protective procedures and equipment;
6. Ensure that laboratory workers receive and understand information and training in safe work practices, use of personal protective equipment, and in procedures for dealing with accidents involving hazardous chemicals;
7. Ensure that all laboratory workers who use **required respirators** receive the appropriate medical examinations ("respirator physicals" for certification of medical fitness to work while wearing a respirator) required for the use of respiratory protection equipment as specified in the Campus Respiratory Protection Program; (A copy of the Campus Respiratory Protection Program is located in the Appendix to this CHP.) See the definition of Required Respirator, Sec. 1.
8. Monitor the safety performance of laboratory workers to ensure the required safety practices, equipment (including personal protective equipment and engineering controls), and techniques are being appropriately employed;
9. Arrange, as necessary, with the Chemical Hygiene Officer for workplace (laboratory) air sampling or contamination surveys or other tests to determine the amount of airborne and/or surface contamination, inform laboratory workers of the results, and use data in the evaluation and maintenance of appropriate laboratory conditions;
10. Assist the Chemical Hygiene Officer, Radiation Officer, or other Environmental Health and Safety and Health personnel as necessary in evaluating conditions and procedures in the laboratory;
11. Conduct, within their respective areas of responsibility, formal laboratory inspections at least annually, to ensure compliance with existing laboratory S.O.P.'s;
12. Prepare written emergency procedures for dealing with accidents that may result in the unexpected exposure of personnel, or the environment, to a hazardous chemical;

2.3 Responsibilities of the Laboratory Supervisor / Principal Investigator (continued)

13. Investigate accidents and prepare and retain a written report (as specified in the campus IIPP under "Injury and (Occupational) Illness Investigation") and submit a copy of each report to the CHO and/or the Environmental Health and Safety Office;
14. Report to the CHO all incidents that:
 - (1) cause laboratory workers to be exposed to hazardous materials where symptoms of exposure are evident and/or medical treatment (including first aid) is rendered. Exposure means skin contact with (or skin penetration), eye contact with, ingestion of, or inhalation of a hazardous chemical; or
 - (2) constitute a danger of environmental contamination. "Danger of Environmental Contamination" means the spill or release of a hazardous chemical when the nature of the material or the circumstances of the spill are such that personnel in the immediate area **cannot** clean up the spill without further environmental contamination or increased exposure of personnel to the hazardous material.
15. Ensure that action is taken to correct work practices and conditions that may result in the release of toxic chemicals;
16. Ensure proper disposal of unwanted and/or hazardous chemicals and hazardous waste with the assistance of the CHO and/or the Environmental Health and Safety Office;
17. Make copies of the approved Chemical Hygiene Plan available to laboratory workers;
18. With the assistance of the CHO, develop and implement a labeling program within the laboratory/department.

CHEMICAL HYGIENE PLAN

2.4 Responsibilities of Laboratory Workers (including Technicians, Laboratory Assistants , Student Assistants, Teaching Assistants, and Students enrolled and working in laboratory classes)

1. Understand and comply with the procedures outlined in the Chemical Hygiene Plan;
2. Understand and comply with all Standard Operating Procedures which apply to laboratory procedures.
3. Understand and comply with all training received;
4. Understand the function and proper use of all personal protective equipment . Use (wear) personal protective equipment when mandated or necessary;
5. Report to the PI or laboratory supervisor any significant problems arising from the use of the Standard Operating Procedures;
6. Report-to the PI or laboratory supervisor all facts of which they are aware pertaining to accidents which occur in the laboratory, or conditions or actions which exist that could result in an accident;
7. Ask the PI or laboratory supervisor for clarification of any of the above responsibilities which they do not fully understand.
8. In the case of students (non-employees) enrolled in a laboratory course where hazardous chemicals are used: obtain/purchase (where not specified as "supplied by the university") and use minimum required protective equipment. Protective equipment includes (but is not limited to) ANSI Z87.1 rated safety glasses or goggles or other protective equipment such as gloves, or lab coat or apron, if required by this CHP.

Section 3. STANDARD OPERATING PROCEDURES FOR LABORATORY USE OF CHEMICALS

Note: Use of these guidelines will minimize exposure of laboratory workers to chemicals they work with. Numbers in parentheses [e.g. (82)] are page references in Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Research Council - Committee on Hazardous Substances in the Laboratory, 1995. This reference is available in hardback from many vendors. It can also be accessed online page-by-page at <http://books.nap.edu/openbook.php?isbn=0309052297&page=R1#pagetop>

The following guidelines are provided for the benefit of laboratory workers and supervisors and are therefore written as information for or instructions to those individuals.

General Safety Guidelines: You should follow these guidelines and instructions for all laboratory use of chemicals, whether or not you consider your materials to be hazardous. The concept of “dangerous chemicals” varies with individual attitudes and experience.

There are three important attitudes to assume while working with chemicals in the laboratory

BE AWARE - Know the hazards before you begin your experiment.

- At minimum, read the label and become familiar with information on Material Safety Data Sheets.
- Evaluate your lab facility and its equipment. Is it sufficient for the procedure you wish to perform? Should you move to a more adequate space or consider postponing or modifying your procedure?

BE PREPARED - Answer the following questions:

- What is the worst thing that can go wrong?
- What must I do to prepare for it?
- What must I do when it happens?

BE PROTECTED -

- What practices and equipment can minimize my exposure to the hazards of my work when things are happening **normally** – when work proceeds as “expected”?
- What practices and equipment can minimize my exposure to the hazards of my work when **unexpected** things happen? What should I be doing (or not doing) and what protections shall I use (plan to use) when things go terribly wrong?

3.1 General Safety Guidelines

- a) **Working alone (86, 90, 230)** while using hazardous chemicals always involves risk. Work with hazardous substances or processes must be done only when there is at least one other person present who is familiar with the work being done. A small accident has the potential of becoming a catastrophe if you are alone and isolated when things go wrong.

- b) **Eye and Face Protection (82)**: You must always wear appropriate eye protection whenever anyone (even someone else) is working with hazardous materials or processes in the laboratory. Appropriate eye protection worn when working with chemicals shall meet the requirements of the current American National Standards Institute (ANSI Standard Z87.1). Appropriate protective eyewear will be marked with “Z87.1” or “Z87+” as an indication of **impact resistance**, prescription eyewear will be marked with the suffix -2 (e.g. Z87-2+); sufficient protection against **liquid splash** is provided by ANSI Z87.1 (or Z87+) rated **goggles**, not safety glasses. Goggles that are vented must be indirectly vented to provide adequate splash protection.

Note: the ANSI Z87.1 standard does allow for the wearing of contact lenses if approved chemical splash **goggles** are worn over the eyes at the same time.

- c) When working with **Flammable Materials (95)**, 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 spill.

- d) Use **Shields (98)**, for protection whenever:
 - an explosion is possible (for example, when your work involves a potentially explosive or violently reactive material, or when your apparatus - especially if glass - is under pressure) or
 - implosion is possible (when your glass apparatus is under vacuum).

- e) Don't underestimate the risks of materials you use. The hazardous properties of each material / ingredient used in a procedure must be determined before the first time it is used. **Be aware of the chemical hazards (81)** as determined from the MSDS or other appropriate reference, and protect yourself more, rather than less. Assume a mixture to be more toxic than any of its components.

- f) Use proper **protective equipment (82-84)**, **every time** you use materials requiring it. Make sure the equipment is not damaged and that you know how to use it.

- g) Know the location and proper use of **emergency equipment (87-89)** and be familiar with emergency procedures (see [“Chemical Spill Procedures”](#) sec 3.7, [“Fire Emergency Procedures”](#) sec 3.8, and [“Medical Emergency Procedures”](#), sec. 3.9.)

- h) Don't use equipment or machinery (especially equipment powered by 115 volt AC power) unless you know how to use it properly, and use it only for its intended purpose. Repair of non-functioning electrical laboratory apparatus, should be performed only by someone qualified to do such work. **(109-112)**.

CHEMICAL HYGIENE PLAN

- i) **Minimize all chemical exposures.** Avoid all skin contact with chemicals. Wear gloves appropriate for the material. Consult the manufacturer glove guide for chemical resistance, permeation and degradation data.
- j) **Chemical Containers:** Keep chemicals in tightly closed containers with readable and accurate labels.
- k) **Fume Hood Use:** Use hazardous chemicals which may produce gases, fumes, or hazardous vapors in a **fume hood (13, 198-200)**, and know how to use the hood properly. Never use highly toxic agents, carcinogens, or reproductive toxins outside the hood. The room and hood should be labeled as a “Controlled Work Area” if these chemicals are in use.
- l) Dispose of cracked or **broken glassware** immediately into an appropriate container labeled for “Broken Glass Disposal”. Lubricate glassware with an appropriate lubricant such as water or glycerol when inserting glass tubing or glass thermometers through a tight fitting hole. Protect your hands with a cloth towel or leather gloves when inserting or attaching such glassware. Grasp the glass tube or thermometer near the tight fitting hole (**not** at the opposite, distant end) and push and twist the glass into the hole gradually.
- m) **Unattended Operations (27, 128):** An experiment is “unattended” if there is no one immediately present who fully understands the operation and shutdown procedure to be used in the event of an emergency. These circumstances require special precautions:
 - 1. Prominently label the apparatus with your name, start date and time, intended stop date and time, how to contact you (and your faculty advisor, if applicable) in case of emergency (e.g. names and telephone numbers).
 - 2. Unattended operations that could result in fire or explosion should be equipped with the necessary automatic shutdown controls. Examples of circumstances which can develop during unattended operations include loss of cooling water, overheating, flooding, power interrupt, loss of inert atmosphere, etc. (Ask yourself, “What is the worst thing that can go wrong?”)
 - 3. Post warning signs for radioactive, chemical, biological, flammable, reactive, explosive, or other hazard(s).
 - 4. Use necessary shields and barriers to contain splashes, explosions, or other releases.
 - 5. Be aware that the need for water campus wide decreases generally late in the day or at night. Increased water pressure may occur in the few areas that are using it. Poorly attached or unclamped cooling hoses may come loose with vibration, lubricating character of the water in the hose, and/or pressure changes in the hoses. (What will your apparatus do if cooling water is lost in the middle of the night?)

3.2 Personal Hygiene

- Wash promptly whenever a chemical has contacted your skin.
- Avoid inhalation of chemicals; do not smell or taste chemicals, especially not for identification of an unknown material.
- Never mouth pipette anything or use mouth suction to start a siphon.
- Never bring food, cigarettes, chewing gum, beverages, or food containers into a laboratory.
- Never eat, drink, smoke, bite fingernails apply cosmetics or handle contact lenses while in laboratory.
- Always wash your hands with soap and water before leaving the laboratory and before eating, drinking, smoking, using the restroom, applying cosmetics, or handling contact lenses.
- Never store food in a refrigerator in a laboratory or in any refrigerator (inside a laboratory or not) which is used to store chemicals. Never put chemicals into a refrigerator which is used for food storage.
- Never use laboratory glassware for drinking vessel, whether inside or outside the laboratory.

3.3 Protective Clothing and Equipment

- a) Eye protection worn when working with chemicals shall meet the requirements of the current American National Standards Institute (ANSI Standard Z87.1). Appropriate protective eyewear will be marked with “Z87.1” or “Z87+” as an indication of impact resistance, prescription eyewear will be marked with the suffix -2 (eg Z87-2+). Sufficient protection against liquid splash is provided by ANSI Z87.1 (or Z87+), rated goggles, not safety glasses. Goggles that are vented must be indirectly vented to provide adequate splash protection.
- b) Eye protection should include a face shield when the chemical hazard warrants it. Goggles will protect your eyes but not the rest of your face and head.
- c) When working with hazardous chemicals, wear gloves made of a material that is resistant to permeation by that chemical. Such gloves are usually made of “plastic” or “rubber” (not leather).
- d) When working with hazardous chemicals (chemicals which will cause temporary or permanent skin damage on contact), wear an impervious lab coat or apron (such as a “rubberized” apron.) Examples of such chemicals are sulfuric acid and most of its solutions, and sodium hydroxide and most of its solutions (and there are many more).
- e) A lab coat or other appropriate protective garment must be worn at all times while you are working with hazardous chemicals in the laboratory. Your lab coat should be removed when you leave the laboratory at the end of your lab period or work day. If your lab coat becomes contaminated by a hazardous chemical, remove it immediately, and discard it or wash it thoroughly before using it again.

3.3 Protective Clothing and Equipment (continued)

- f) Protect your skin and feet with adequate clothing and footwear. Shorts or short skirts must not be worn in the laboratory without a lab coat. Open toed shoes or sandals, or shoes without firm footing (i.e. shoes with wheels on the bottom) must not be worn in the laboratory.
- g) Confine loose hair and clothing while working in a laboratory. Long, loose hair and long, flowing garments (especially sleeves) can easily be dragged over chemical apparatus or spills, and can be ignited if open flames are in use.
- h) Whenever exposure to a toxic material by inhalation is likely to exceed the Permissible Exposure Limit (as described in the MSDS or other information source), use a fume hood for work with that material. As a general rule, if the PEL for a material is less than 50 ppm, work with that material should be done in a fume hood or with the use of some other engineering control (197).
- i) Exposure to toxic air contaminants should always be controlled primarily by the use of a fume hood or other engineering control to prevent the release of vapors or fumes into the laboratory. You should use a respirator only if a hood or other engineering control is not feasible. (See [Respiratory Protection Plan](#).)

3.4 Housekeeping (24)

- a. Access to emergency equipment, eye washes, safety showers, fire extinguishers, circuit breakers, fire alarm pull boxes, emergency spill equipment, and exits must never be blocked by anything - not even a temporarily parked lab cart or bicycle.
- b. **Container labeling** is important to minimizing accidental contact (exposure) to hazardous materials and to prevent accidental mixing of the wrong ingredient(s). All chemical containers must be labeled with at least the identity of the contents and the hazards those contents present to users. Always use and store containers in a manner which preserves the labels in good condition, keeps labels attached to the container(s), and insures the label(s) will continue to be readable. Such containers must be stored in a dry location and out of direct sunlight whenever possible. A container **you** fill must always be labeled with all the information necessary for **someone else** to identify the contents.
- c. Keep all work areas, especially laboratory benches, clear of clutter.
- d. Keep all aisles, hallways, exits, and stairs clear of all chemicals.
- e. All chemicals should be placed in their assigned storage areas at the end of each workday.

3.4 Housekeeping (24) (continued)

CHEMICAL HYGIENE PLAN

- f. At the end of each workday, the contents of all unlabeled containers are to be considered hazardous waste if the contents are unknown. Containers with **known** contents should be **labeled** as you make them, to prevent them from becoming hazardous waste.
- g. Waste should be properly labeled and kept in proper containers. (See sec. 3.6 of this CHP.)
- h. Promptly clean up all spills; properly dispose of the spilled chemicals and clean up all surfaces and equipment.
- i. All working surfaces and floors should be cleaned regularly. Bench tops should be cleaned at the end of a particular operation or experiment or at the end of each workday.
- j. Extraneous material should not be stored in a fume hood because it can interfere with the air flow in the hood and jeopardize the safe operation of the hood.
- k. Chemicals should be stored in an earthquake safe manner - in closed cabinets or on shelves with adequate barriers to prevent objects (bottles) falling from the edge of the shelf.

3.5 Chemical Storage

- a. **Inventory-** The inventory of chemicals kept on hand should be not more than will be consumed by the department/laboratory in two (2) years. For some chemicals, a supply lasting only one (1) year is recommended. The expiration dates which appear on labels made by chemical manufacturers should be adhered to. Many chemicals lose their usefulness over time due to program changes or degradation with age (shelf life). Economies of scale - buying large or bulk amounts - are usually more than offset by the cost of disposing of old, unwanted chemicals as hazardous waste.
 1. A physical inventory of chemicals on hand should be conducted at least annually
 - to identify containers which are leaking,
 - to identify containers which are damaged (corroded, cracked, or dented) and may begin leaking;
 - to identify materials which are unknown (labels missing or illegible);
 - to identify chemicals which are no longer needed . The older the chemical is, the harder it is to find a potential alternate user.
 2. Chemicals in damaged or leaking containers should be re-packaged into new, sound containers and relabeled.
 3. Fading or damaged labels need to be re-attached or replaced before the material(s) become unknown. A list of un-wanted chemicals should be submitted to Environmental Health and Safety for pick up and possible distribution to other programs on campus.
- b. **Compatible Storage-** Chemicals should be stored according to their chemical compatibility (their ability to react with each other) rather than strictly by another organizational pattern, such as alphabetical. Chemicals which can react with each other and create a hazardous condition, such as fire or the generation of a toxic or flammable gas, should be stored apart from each other. The separation should be sufficient to prevent the accidental mixing of materials in case of catastrophic spill. A list and table of chemical compatibilities is located in the appendix to this CHP.

3.5 Chemical Storage (continued)

- c. **Seismic Safety-** Chemicals should be stored on shelves or in cabinets which prevent the containers from falling in the event of earthquake.
 1. Cabinet doors should close and latch securely so as not to spring open during an earthquake nor be pushed open by objects moving inside.
 2. Shelves holding chemical containers should have a sturdy lip or rail at the front of each shelf which is capable of preventing the containers from being shaken off the shelves.
 3. Heavy items and containers of corrosive material (concentrated acid and alkali) should be stored on shelves near the floor.

- d. **Spill Response and Clean-up materials-** Every location where chemicals are stored should have available a supply of equipment and materials for use in the event of a chemical spill. A good rule of thumb is that the quantity of spill response material should be sufficient to handle a spill the size of two (2) of the largest container of material in storage.
 1. Spill response materials should include:
 - Absorbent (granular or “pillows”). (see Section 3.7, “Chemical Spills/Releases”, in this CHP);
 - Personal protective equipment (Minimum: rubber gloves and protective eyewear);
 - scoops and/or pans for picking up granular solids; plastic is recommended;
 - plastic bags to contain contaminated absorbent (use heavy bags, such as “trash compactor” bags, white or clear);
 - permanent marker to use for labeling the bag of contaminated clean-up material.

3.6 Guidelines for Chemical Waste

- a. Chemical Wastes (hazardous waste) must be kept in closed, appropriately labeled containers which are in good condition.

- b. A correct **hazardous waste label** must contain 6 pieces of information:
 1. The label must bear the words "HAZARDOUS WASTE"

 2. The label must contain A DESCRIPTION OF THE WASTE:
 - i.) the **chemical name or common name** of the waste material (EPA and Cal Poly’s Chemical Hygiene Officer is looking for recognized chemical or "material" names, not acronyms or abbreviations, and certainly **not** something like "RG-17 Waste" or "Fred's Waste" or merely the word "Waste".),

 - ii.) a statement of the **proportions of constituents**, if a mixture- percents, parts per million, molarity, etc.. An estimate of the proportions is OK, based on knowledge of the process that made the waste.

3.6 Guidelines for Chemical Waste (continued)

3. The label must contain a STATEMENT OF WHAT THE HAZARD IS. This means the label must say the word(s) "TOXIC", "CORROSIVE" (Please specify acid or alkaline), "REACTIVE", "FLAMMABLE", and/or "COMBUSTIBLE" These are the ones which usually apply. There are a few additional characteristics less often encountered, such as radioactive waste.
4. The label must SAY whether the waste in the container is SOLID, LIQUID, or GAS.
5. The label must contain the START DATE for that container of waste. That is the date when the first amount of the waste is added to the empty container. It is legal to specify the date when the empty waste container is put in place, even though the first drop of waste might not go in until a few days later.
6. The label must state the NAME AND ADDRESS OF THE GENERATOR. At Cal Poly this means: "CAL POLY STATE UNIVERSITY, SAN LUIS OBISPO, CA 93407". It is necessary for Cal Poly's record keeping functions to identify which department or program generated the waste in the container(s). It is also common for questions to arise about the nature of a specific hazardous waste, and the Environmental Health and Safety (Eh&S) Office needs to know who to ask.

NOTE: Campus departments need not wait for EH&S to arrive and make and attach such labels. These labels may be commercially printed labels or hand-made labels attached with tape or anything in between, and should be prepared and attached by the person who generated the waste. There are several examples of hazardous waste labeling in the Appendix to this CHP.

- c. A frequently cited detail of hazardous waste handling concerns the containers themselves. The regulations require that hazardous waste **containers**:
 - be of sound construction and in good condition (not leaking). This means **not** using the oldest, rustiest, most beat-up container available in which to keep hazardous waste.
 - be constructed of material compatible with the waste being stored. It is **NOT** O.K. to store something in a drum which will eventually eat a hole in the drum.
 - be kept **CLOSED AT ALL TIMES** except when material is being added or removed. This means with an appropriate screw cap or bung screwed on tight enough not to leak if the container is inverted. A waste drum or bottle which is left open is a citable EPA violation.
 - be kept in a secondary containment - a tray or outer container which will prevent leaking or spilled waste material from escaping (to land or water) or from coming into contact with nearby incompatible material.

3.6 Guidelines for Chemical Waste (continued)

- d. **Chemical Waste (Hazardous Waste) Removal Procedure-** If your department has no location specified for the accumulation of hazardous waste, such material can be picked up by an employee of the Environmental Health and Safety Office upon sufficient notification. The procedure for having hazardous waste picked up requires the disposing department/individual do at least **one (A or B)** of the following:

- A. Place a telephone call to the Environmental Health and Safety Office (extension 6661 or 6662) and be prepared to provide the following information:
- the trade name and manufacturer (if known) of the material
 - the chemical constituents of the material (if not discernible from the trade name)
 - the size(s) of the container(s)
 - the number of containers

or

- B. Send to the Environmental Health and Safety Office a filled out form (“Hazardous Waste Pick-up/Disposal Request) detailing the nature and quantity of the waste. A sample of this form is included in the appendix of this CHP.

A request to pick up hazardous waste may also be made electronically by accessing the form found on the internet at <http://www.afd.calpoly.edu/ehs/hazwastepickup.asp>

NOTE: All containers of hazardous waste must be kept in closed, non-leaking containers to comply with hazardous waste management regulations and to allow for the safe transport of containers without having waste material leak into the vehicle or onto the roadway.

3.7 Chemical (Hazardous Material) Spills/Releases Cleanup Procedures

Notes and Precautions: The range and quantity of chemicals in the laboratory requires pre-emergency planning to respond safely to chemical spills. The cleanup of a chemical spill should be done only by workers who are familiar with the material and its hazards. Chemical spill cleanup guidance and instructions are available from the Environmental Health and Safety Office, extension 6661 or 6662. In this section, the terms “chemical “and “hazardous material” are synonymous.

Emergency assistance, if you need it, can be reached by calling 911 on any campus telephone.

- a. A **MINOR CHEMICAL SPILL** is a spill or release of hazardous material that **laboratory personnel are capable of handling safely** without the assistance of safety or emergency personnel. Usually, this is less than 1 liter, however if the material is toxic, produces a toxic or corrosive vapor, or circumstances change so that laboratory personal can no longer safely handle the situation (i.e. flammable material spill ignites). it becomes a **MAJOR CHEMICAL SPILL**. Responding to a **MINOR SPILL**:
1. Alert people in the immediate area of the spill.
 2. If the spilled material is flammable, turn off all sources of ignition which may cause the spilled material to ignite.
 3. Wear protective equipment appropriate for the spilled material and /or the location of the spill. Protective equipment includes, but is not limited to; eye/face protection, gloves (rubber and/or leather, as appropriate) and a lab coat, apron, or other “coverall” garment, boots or other impermeable shoe covers.

3.7 Chemical (Hazardous Material) Spills/Releases Cleanup Procedures (continued)

4. Avoid breathing any vapors, fumes, or dust from the spilled material.
5. Confine the spill to as small an area as possible.
6. If the spill is a **liquid**:
 - i. Use appropriate absorbent material (sponge, spill pillow, spill pad or socks, disposable rags or towels, or granular absorbent) to absorb and/or pick up the spill. A list of common spill clean-up absorbents and their appropriate use follows this section.
 - ii. Begin at the outer edges of the spill area, surround the spilled material and work toward the center.
 - iii. Allow the liquid to be completely absorbed into the pick up material (absorbent).
 - iv. Absorb (and neutralize, if appropriate and safe to do) the spilled chemical with **effective** and **compatible** spill cleanup materials.
7. Spills of **solid** material can usually be picked up without the aid of an absorbent.
8. Collect the residue, used absorbent (if any), rinse water (if any), and any contaminated gloves, suits, etc. which are to be discarded.
9. Place all the spill clean-up material in a container(s) for disposal as hazardous waste. As a minimum, the container may be (temporarily) a heavy plastic bag, 4 mil thickness or more. "Trash Compactor Bags" are adequate and readily available.
10. Do not place hazardous chemicals or spill cleanup material from such a spill into the normal trash nor flush down the drain.
11. Notify the Environmental Health and Safety Office of the spill cleanup and arrange for pick-up of the used absorbent and collected residues. See also Hazardous Waste Procedures, Sec. 3.7 for Hazardous Waste Removal Procedures.

3.7 Chemical (Hazardous Material) Spills/Releases Cleanup Procedures (continued)

Some Common Absorbents for Hazardous Material Spill Clean-up

~~Strikethrough~~ type is used here only to emphasize spilled chemicals not to be absorbed into the indicated absorbent.

ABSORBENT MATERIAL:	USES:	LIMITATIONS:
common sand or soil	Works for organic and aqueous (water born) liquids. Moderate capacity. Usually inexpensive and available in large quantities.	NOT RECOMMENDED FOR: nitric, hydrochloric, sulfuric, or hydrofluoric acids. Heavy material - affects disposal cost and handling in large amounts
diatomaceous earth, "Superfine", kitty litter, etc.	Works for organic (oil) and aqueous (water born) liquids. Good capacity. Moderate weight	NOT RECOMMENDED FOR: hydrofluoric acid, hydrogen peroxide
sawdust, sweeping compound, "Sphagsorb", etc.	Works for Oil and Organic Liquids Light Weight	NOT RECOMMENDED FOR: aqueous (water born) liquids, acids, oxidizing materials
paper towels, sponges	Works for SMALL SPILLS of organic (oil) or aqueous (water born) liquids. Wear rubber gloves when using for Hazardous Material clean-up. May require disposing of used sponge as Hazardous Waste.	NOT RECOMMENDED FOR: concentrated acids (sulfuric, nitric, hydrochloric), oxidizing materials, spills containing sharps (broken glass)
Spill-Specific Absorbent Pillows, Socks, Granular Material (Many types are available.)	Follow Manufacturer's Instructions.	Designed for cleaning up spills of a <u>specific</u> chemical.

- b. **A MAJOR CHEMICAL SPILL-** is spill or release of hazardous material that **cannot be safely handled by laboratory personnel**. The steps below are best carried out by more than one person and should be done as quickly and safely as possible:
1. Attend to injured or contaminated persons, if any, and remove them from exposure if you can do so safely without endangering yourself.
 2. Alert people in the laboratory to evacuate. Notify your supervisor/lab instructor immediately or as soon as safely possible. If necessary, initiate evacuation of the building (send someone door to door or pull fire alarm box).
 3. If the spilled material is flammable, turn off ignition and heat sources if you can do so safely without endangering yourself or others.
 4. From a **safe** but nearby location, call the Cal Poly emergency number 911, and tell the dispatcher who answers that you have a chemical emergency (and/or medical emergency, if any). The dispatcher will ask you for more information. Stay on the telephone until you are asked to hang up.

3.7 Chemical (Hazardous Material) Spills/Releases Cleanup Procedures (continued)

5. Close doors to the affected area. Until emergency help arrives, have someone stay nearby but in a safe location to warn away others who may wish to enter the area.
6. Have a person knowledgeable of the incident and the laboratory stand by to assist by providing information to emergency personnel when they arrive.

c. **BIOLOGICAL SPILL**- see campus [Biosafety Program](#), Appendix C.1

d. **RADIOLOGICAL SPILL**

1. In the case of a spill of radioactive material, immediately contact Environmental Health and Safety at extension 5555, 6661 or 6662, or the Emergency dispatcher at extension 911.
2. Then, follow the procedures for spill cleanup outlined in your protocol as described in the radioactive materials in the [Campus Radiation Safety Manual](#).
3. Notify the Radiation Safety Officer in the Environmental Health and Safety as soon as possible at extension 6628.

3.8 Fire Emergency Procedure

- a. If there is a fire in your lab, immediately notify those nearby, e.g. YELL FIRE!
- b. **Immediately evacuate the room (all occupants).**
- c. Close the door(s).
- d. Pull the nearest fire alarm box on your way out of the building.
- e. If there is no fire alarm pull box in the area, call **911** from a telephone at a nearby but safe location to report the fire. The dispatcher will ask you for more information. Stay on the telephone until you are asked to hang up.
- f. If you do use a fire extinguisher, call the Environmental Health and Safety at extension 6661 or 6662, soon afterwards to report the fire, even if the extinguisher's contents were only partially expended. This will allow a replacement extinguisher to be delivered as soon as possible. The rule of thumb is: A used extinguisher is the same as an empty extinguisher."

3.9 Medical Emergency Procedure

- a. If someone in your area is injured or becomes ill, and it appears that **treatment or intervention by a medical professional (doctor, nurse, etc.) is required, call 911, the Cal Poly Emergency number**, and tell the dispatcher who answers that you have a medical emergency. The dispatcher will ask you for more information. Stay on the telephone until you are asked to hang up.
- b. If the injury is the result of contact with chemical(s), very hot or very cold liquid, or burning (flaming) material, **immediately flush the affected area with WATER ONLY -- faucet, eyewash, or shower as necessary, depending on location and area of injury --, and keep flushing for 15 minutes.**

3.9 Medical Emergency Procedure (continued)

CHEMICAL HYGIENE PLAN

- c. Further medical treatment (other than any first aid given immediately) or transport to the hospital, if needed, will be arranged by the police officer who will respond and/or the ambulance personnel if an ambulance is summoned.

- d. Laboratories and departments which use materials or processes which have the potential to cause serious physical harm such as, the potential for involvement in incidents requiring **treatment or intervention by a medical professional**, (doctor, nurse, etc.) should maintain a basic first aid equipment and materials, (see List of Basic First Aid Equipment and Materials below).

List of Basic First Aid Equipment and Materials:

At a minimum, a Lab First Aid kit should contain:

- Sterile compresses or pads (commonly called 4 x 4 's) to stop bleeding (10 each)
- Band-aids – 1 inch wide (10 each). 1-inch band-aids are more universal than ¾-inch size.
INVENTORY THE FIRST AID KIT OFTEN. BANDAIDS WILL BE THE FIRST TO DISAPPEAR.
- Rubber gloves (medical latex gloves) to be worn as needed by the care giver.

Note: Burn medication, ointment, spray, etc. is not included:

BURN MEDICATION – SPRAY OR OINTMENT – IS NOT RECOMMENDED IF THE VICTIM WILL BE GETTING FURTHER TREATMENT. Medical personnel – ambulance EMT and/or ER doctors - will treat a burn patient by first removing (scrubbing off) all First Aid burn medications that have been applied by first aid givers.

If the burn victim will be getting further medical treatment for the burn, recommended first aid for thermal burns (and completely decontaminated chemical burns) is

- sterile gauze or 4x4 pad (or other clean fabric)
- soaked in clean, room temperature water
- applied to the burn area.
- Seek medical attention promptly.

A minor burn (heat burn) can be treated by running cold water over the burned area. The use of ice is not recommended as this can cause frostbite. Time recommended for cold applications (cold water straight from the tap) varies from 10 to 30 minutes or until the pain does not recur after the cold water is stopped.

Section 4. MEDICAL RESOURCES

(Non - emergency medical monitoring and response)

NOTE:

Incidents in which any laboratory worker(s) are injured or exposed to a hazardous material such that **immediate treatment or intervention by a medical professional** (doctor, nurse, etc.) is necessary should be addressed as a **Medical Emergency and call 911**.

- a. Staff, faculty, and student employees who have been injured or have been exposed, or are suspected to have been exposed to a hazardous chemical(s) but are not showing symptoms; i.e. they are **not apparently in need of immediate treatment or intervention by a medical professional (doctor, nurse, etc.)**, can obtain a medical evaluation from the Emergency Room at Sierra Vista Hospital.
- b. Medical examinations and consultations shall be provided at no cost to the employee, without loss of pay.
- c. Students who are injured or have been exposed (or are suspected to have been exposed) to a hazardous chemical(s) but are not showing symptoms; i.e. they are **not apparently in need of immediate treatment or intervention by a medical professional (doctor, nurse), etc.**, may obtain a medical evaluation for this exposure (or suspected exposure) at the University Health Center during business hours. After hours, medical evaluations can be obtained at Sierra Vista Hospital.
- d. Determination of whether an exposure requiring treatment has occurred can be made with the assistance of the Chemical Hygiene Officer. This determination may involve the completion of an exposure assessment (see definitions) by the Chemical Hygiene Officer.

Section 5. DESIGNATION OF THE CHEMICAL HYGIENE OFFICER

An individual is to be assigned by the University Environmental Health and Safety Manager (or his designee) to be the Chemical Hygiene Officer.

Responsibilities of the Chemical Hygiene Officer are described in section 2.2 of this Chemical Hygiene Plan.

Current Chemical Hygiene Officer Designation:

Individual Currently Designated as Chemical Hygiene Officer: Christina Juarez (temporary)

University Title and Department of the Current CHO: Chemical Hygiene Officer, Environmental Health and Safety Office.

Section 6. FUME HOODS

6.1 Laboratory Fume Hood Inventory and Inspection

- a. An inventory of laboratory fume hoods and their locations on the campus will be maintained by the Environmental Health and Safety Office. This inventory will be comprised of all campus laboratory -type fume hoods which are described/defined in CCR Title 8, sec. 5154.1, Ventilation Requirements for Laboratory-Type Hood Operations.
- b. Each campus laboratory-type fume hood shall be tested annually by the Environmental Health and Safety Office to verify and document adequate airflow. Records of this annual testing are kept at the Environmental Health and Safety Office.
- c. A copy of the current protocol used for the air flow testing of laboratory-type fume hoods can be requested from the Environmental Health & Safety office.
- d. In this CHP, when the single word “hood” is used to describe a device used for exposure control in a laboratory, this means a laboratory-type fume hood (described/defined in CCR Title 8, sec. 5154.1), which is **operating correctly** and is **on and running** during the time the experiment / material is open and in the hood.
- e. A correctly operating hood has an average airflow of **100 linear feet per minute (LFM)** into the hood through the front opening with a minimum of 70 LFM at any point on the face of the opening. Many hoods have a feature whereby the area of the hood face opening can be varied, by adjusting a vertically moving sash. The airflow of 70 to 100 LFM should be achieved by adjusting the size (height) of the face opening. At airflows much in excess of 100 LFM, eddy currents can form which will cause airborne contaminants inside the hood to be swept outward and into the breathing zone of a person standing in front of the hood.
- f. A correctly operating fume hood must also have a visible flow sensing device that indicates the hood fan is running and air flow is adequate. The visible indicator may be as simple as a light weight ribbon hanging into the hood face opening from the lower edge of the hood sash.

6.2 Biosafety Cabinets

- a. An inventory and locations of Biosafety Cabinets will also be maintained by the Environmental Health and Safety Office as are laboratory fume hoods. Biosafety Cabinets are similar to laboratory fume hoods in appearance and function and are defined in CCR Title 8, sec. 5154.2.
- b. Each Biosafety Cabinet shall be tested annually by a Certified BSC Testing Consultant to verify and document adequate operation. Use and testing of Biosafety Cabinets shall be in accordance with (1) HHS Publication No. (CDC) 93-8395, Biosafety in Microbiological and Biomedical Laboratories and (2) Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets.

Section 7. PROVISIONS FOR WORK WITH HAZARDOUS SUBSTANCES

7.1 Definitions

- a. **Control(s)** means any equipment, wearing apparel, or prescribed procedures which, when in good working order and properly used, will prevent lab workers from being exposed to hazardous materials.
- b. Controls which may be used (as appropriate) include, but are not limited to:
 - eye and face protection (safety glasses, goggles, face shield),
 - head protection (hard hat),
 - gloves (rubber or leather, as appropriate),
 - lab coat, apron, or coveralls,
 - boots (rubber or “steel toe” type, as appropriate)
 - use of a fume hood,
 - use of shielding,
 - limiting the amounts of materials in use,
 - limiting access to specified areas,
 - use of container types (e.g. metal safety solvent can),
 - use of prescribed or “alternate” procedure (e.g. use of electric or steam heat in place of open flame), etc.
 - any other technique, strategy, or equipment which serves to prevent exposure of the user(s) to hazardous materials (solid, liquid, or gas) or exposure to hazardous energy (heat, cold, electricity, laser, ionizing and non-ionizing radiation, etc.).
- c. **Exposure:** physical contact of a person with any material (solid, liquid, or gas) or any form of energy (temperature extreme, electricity, laser, ionizing or non-ionizing radiation, etc.).
- d. **Hazardous Chemical/Hazardous Substance/Hazardous Energy:** a substance or form of energy for which there is statistically significant evidence, based on at least one scientific study, showing that acute or chronic harm may result from exposure to that substance or energy. This definition includes substances which present physical **hazards**. A substance is a physical hazard if there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric (ignites spontaneously in air), unstable (reactive) or water-reactive. A physical hazard also exists for a substance, form of energy, or process if there is the potential for skin or eye contact with hot or cold material (or surface) source of energy (e.g. laser) or moving parts (e.g., gears, drive belts, etc.) sufficient to cause tissue damage or loss of eyesight.

7.2 General Procedures for Work with Hazardous Substances

Several groups of substances fall under specific categories--either by hazardous effects to humans, i.e. carcinogens or reproductive toxins, or by hazardous properties, such as corrosive or explosion hazards. More stringent work practices and specific precautions are appropriate when working with these types of chemicals. In general, when working with these particularly hazardous chemicals, you must:

- a. Before beginning work, consult the manufacturer’s safety data sheet (SDS) for exposure and emergency information. SDS can be found online in Risk & Safety Solutions (RSS). Log in using Cal Poly single sign on.
- b. Work in a fume hood and/or controlled work area
- c. Label ALL containers with contents, date, and hazardous properties

CHEMICAL HYGIENE PLAN

- d. Wear appropriate protective equipment, including gloves, lab coat or other skin protective covering, eye/face protection.
- e. Follow other control criteria as listed below in Section 7.3 for specific hazards.

7.3 Set of Criteria and Controls

This section contains lists of materials requiring the use of exposure prevention controls.

- a. **The following requirements apply to materials used in any laboratory at California Polytechnic State University, San Luis Obispo, California.**

This section consists of Control strategies for use of materials having these hazards:

- 1. TOXIC MATERIALS**
- 2. FIRE HAZARDS**
- 3. REACTIVE HAZARDS (runaway heating, violent reactions – especially with water, explosive reactions)**
- 4. CORROSIVE HAZARDS (Strong Acids and Alkali [Base])**

<p>1. Criteria for TOXIC MATERIALS:</p> <p><u>Definition:</u> For the purposes of this CHP, <u>Toxic Materials</u> are those materials which have an OSHA PEL below 50 ppm or an inhalation LC50 below 200 ppm or 2000 mg/m³, or a vapor pressure above 200 torr at room temperature.</p> <p>(Note: There is a further definition of “Particularly Hazardous” Materials, and additional controls for materials which meet that definition in Section 10 of this CHP.)</p>	<p>Controls for TOXIC MATERIALS:</p> <ul style="list-style-type: none">• <u>Toxic materials</u> (as defined) shall be used in a laboratory fume hood or handled so that laboratory workers are not exposed to toxic fumes from these materials.• Additionally, laboratory employees shall use appropriate personal protective equipment (garments) to prevent accidental skin or eye contact with toxic material. Such protective equipment includes a lab coat or apron, chemical splash goggles or face shield, and rubber gloves. (See appendix for information on selection of glove material.)• Limiting the amount of material to be used and/or present in the laboratory (viz. scale-down of the procedure) shall be considered as a Control strategy whenever experiments are being planned or performed.• Disposal of waste material which is toxic shall be managed in accordance with section 3.5 and 3.6 of this CHP.
---	--

Examples of TOXIC MATERIALS are (but are not limited to):

Acrylamide, Ammonia, Bromine, Carbon tetrachloride, Chlorine, Chloroform, Crotonaldehyde, Cyclohexanone, Diethylenetriamine, Ethylamine, Formaldehyde, Hydrogen bromide, Maleic Anhydride, Methyl Amine, Methyl Hydrazine, Nitric Acid (concentrated), Ozone, Phosphorus Pentachloride, Silane, Sodium Azide, Sulfur Monochloride, Tetranitromethane, Toluidine, Vinyl Bromide, Vinyl Chloride, and many others.

<p>2. Criteria for FIRE HAZARDS</p> <p><u>Definition:</u> For the purposes of this CHP, <u>Fire Hazards</u> are those materials which have a flashpoint below 200 deg. F (93.3 deg. C.)</p> <p><u>Definition:</u> For the purposes of this CHP, <u>A well ventilated area</u> is an area where the ambient conditions of use include sufficient ventilation to prevent a flammable or combustible vapor/air mixture reaching the lower flammable limit (LFL). The interior of a correctly operating fume hood is included in this definition.</p> <p><u>Definition:</u> For the purposes of this CHP, <u>Lower flammable limit, LFL</u> (same as lower explosive limit, LEL) means the minimum concentration (percent by volume) of vapor in air below which the mixture cannot be ignited (viz. fuel/air mixture is too lean.).</p>	<p>Controls for FIRE HAZARDS:</p> <ul style="list-style-type: none"> • Materials which are fire hazards shall be stored in flammable storage areas or flammable storage cabinets which meet standards contained in NFPA (National Fire Prevention Association) Code 30 and UFC 79 (Uniform Fire Code) . • Materials which are fire hazards shall be used away from ignition sources and in a well ventilated area. • OSHA and NFPA guidelines for the storage and use of flammable and combustible materials shall be followed in university laboratories. • Limiting the amount of material to be used and/or present in the laboratory (viz. scale-down of the procedure) shall be considered as a Control strategy whenever experiments are being planned or performed. • Disposal of waste material which is a Fire Hazard shall be managed in accordance with section 3.5 and 3.6 of this CHP. <p>A summary of applicable NFPA, UFC, and Cal-OSHA specifications for the storage (container types, storage options, and amounts) and use of flammable materials can be found in Appendix of this CHP.</p>
---	--

Examples of materials which are FIRE HAZARDS are (but are not limited to):
 Acetaldehyde, Acetone, Acetylene, Alcohol (Ethyl Alcohol or Isopropyl Alcohol) Carbon disulfide, Diethyl Ether (“ether”), Gasoline, Hexane, Ligroine, Methanol (“methyl alcohol”), Petroleum Ether, explosive dusts (cellulose dust, lycopodium powder, any finely divided and dispersed powder of combustible material), many more ...

<p>3. Criteria for REACTIVE HAZARDS</p> <p><u>Definition:</u> For the purposes of this CHP, <u>Reactive hazards</u> are those materials which:</p> <ul style="list-style-type: none"> • are oxidizers (can initiate or support combustion), • are organic peroxides, • are explosive, • can react with other materials, including water, to release a hazardous gas (flammable or toxic gas) or can react violently or with the generation of large amounts of heat. • can polymerize violently with the release of large amounts of heat. 	<p>Controls for REACTIVE HAZARDS:</p> <ul style="list-style-type: none"> • Materials which are reactive hazards shall be stored in such a way as to prevent their mixture with incompatible materials. • Reactive materials shall be mixed only in small quantities so that reactions are small and controlled. • Mixtures which include reactive materials shall be made only when appropriate personal protective devices and precautions are in place and the generation of hazardous reaction products do not present an exposure hazard to individuals in or near the laboratory. • Processes involving reactive mixtures which can react violently shall be performed behind a sufficient barrier (shielding) or at a sufficient distance to prevent any violent reaction from affecting laboratory workers. • The area/room where a reactive process is performed shall have a clear exit route (escape route) which cannot be compromised by violent or “run-away” reactions in the process. (Never place the reactive mixture between you and the last door out of the room.) • Limiting the amount of material to be used and/or present in the laboratory (viz. scale-down of the procedure) shall be considered as a Control strategy whenever experiments are being planned or performed. • Disposal of waste material which is a Reactive Hazard shall be managed in accordance with section 3.5 and 3.6 of this CHP.
--	---

Examples of materials which can be REACTIVE HAZARDS are (but are not limited to): Calcium Carbide, Sodium and Potassium metal, thionyl chloride, anhydrous Aluminum Chloride, Hydrogen Peroxide (approx. 10% or greater), Perchloric Acid, Perchlorate Salts, Chlorate Salts, Nitrate Salts, Potassium Permanganate crystals, Chromate and Dichromate Salts, Picric Acid, Tetranitromethane, Acrylic Acid monomer and monomeric Acrylate Esters (ie. Methyl Methacrylate monomer), etc.

+++++

<p>4. Criteria for CORROSIVE HAZARDS: <u>Definition:</u> For the purposes of this CHP, <u>Corrosive Hazards</u> are materials which can cause tissue damage to human skin or eyes upon immediate contact or upon contact over a period of time. Aqueous solutions which exhibit a pH of less than 2 or greater than 12.5 are CORROSIVE liquids</p>	<p>Controls for CORROSIVE HAZARDS: Materials which are corrosive shall be stored in containers which are compatible with the material contained and shall be stored and handled so that contact with other materials which would present a Reactive Hazard upon mixing is prevented.</p> <p>When using corrosive materials, laboratory workers shall use appropriate protective equipment. At a minimum this means:</p> <ul style="list-style-type: none"> • lab coat or apron, • sufficient eye and face protection to prevent corrosive material from contacting the eyes or face (goggles for operations using corrosive liquids), • Additional Controls may be required when using concentrated or hot corrosive liquids, • gloves made of rubber or other material impervious to the corrosive hazard, • handling in a fume hood those materials which are (or produce) corrosive gases (e.g. ammonia and concentrated solutions of ammonia, chlorine, hydrogen chloride and concentrated solutions of HCl (muriatic acid), etc.), • Limiting the amount of material to be used and/or present in the laboratory (viz. scale-down of the procedure) shall be considered as a Control strategy whenever experiments are being planned or performed, • Disposal of waste material which is a Corrosive Hazard shall be managed in accordance with section 3.5 and 3.6 of this CHP.
--	---

Examples of materials which can be CORROSIVE HAZARDS are (but are not limited to):
Mineral Acids (hydrochloric acid, hydrobromic acid, hydrofluoric acid, hydroiodic acid, sulfuric acid, nitric acid, phosphoric acid) all concentrations greater than 0.01N), Alkali (Sodium Hydroxide, Potassium Hydroxide, Ammonium Hydroxide, Ammonia – aqueous (water solution)), Phenol crystals or liquid (10% or greater), Acetic Acid – glacial (approx. 100%), Hydrogen Peroxide – 30% and greater, Ethyl Amine, Methyl Amine

Section 8. INFORMATION AND TRAINING FOR LABORATORY WORKERS

8.1 Responsibility to provide Information and Training

The Laboratory Supervisor shall be responsible for providing to laboratory workers information and training concerning the hazardous materials and processes in their laboratory (laboratories). This means training provided directly by the Laboratory Supervisor or training provided by others (e.g. individual faculty instructor assigned to teach in a laboratory) at the request of the Laboratory Supervisor. Training shall occur at the time of the employee's initial assignment with work where hazardous chemicals are present and prior to assignments involving new exposure situations.

8.2 Information and Training shall include:

- a. a description of the content and location of the written form of the CHP for the specific laboratory. This shall include a description of the contents and location of the campus CHP for the University, if it is different than the CHP in use in the specific laboratory.
- b. a description of the names and hazardous properties of hazardous materials used in the laboratory, or a summary of the types of possible hazards where the list is extensive. A description of material names and hazardous properties may be given on a day to day basis as new materials are introduced or encountered in the laboratory.
- c. a description of control measures to be taken such as, gloves, lab coat/apron, goggles/face shield, hood, glove box, shielding, amount limitations, reagent choice, etc., to prevent exposure to hazardous materials in the laboratory.
- ~~d.~~ a description of the signs and symptoms associated with exposure to hazardous materials.
- e. a description of sources of information on the hazardous properties of hazardous materials present in the laboratory. These sources of information may include Material Safety Data Sheets (MSDS), manufacturers' labels on containers, manufacturers'/vendors' catalogs, this CHP, or other reference works available in the laboratory. Note: At Cal Poly, MSDS information is available on line from any computer in RSS. These services provide a legal source of MSDS information where paper copies are not kept in the lab and there is an accessible computer to reach these web sites.
- f. the methods and observations that may be used to detect the presence or release (leak or spill) of any of the hazardous chemicals present in the laboratory. What does a wet puddle on the floor or counter mean? What does an unusual odor in the room mean?
- g. A description of the step or steps to be taken in the event of an accident (injury, exposure, leak, spill). An example of basic outline of items is below:
 - Get Help. A 911 call will bring help if none is readily at hand.
 - Warn others in the area of a chemical spill
 - Remove the victim (if there is one) from chemical exposure if it is safe for you and the victim to do so. Refer to information in Section 3.9
 - Manage a chemical spill as outlined in section 3.7

8.3 Documentation of Training

- a. A written record of all information and training shall be kept. This record shall include:
- a written summary of the information given,
 - the name and of each laboratory worker who receives this information and training,
 - the duration of the training for each individual,
 - the date on which the training was completed,
 - any other written material generated by this training (i.e. tests given and the score achieved by each lab worker taking the test.)

Section 9. PRIOR APPROVAL

9.1 Prior Approval (35, 47) - Definition

Each Laboratory Supervisor should identify laboratory activities which (due to the potential hazard), require prior approval **each time** before such an activity is carried out. The lab supervisor should also develop the procedure and documentation by which approval is to be granted by the Laboratory Supervisor. All laboratory personnel should be informed of which activities require prior approval and of the approval procedure which has been developed. The Office of Environmental Health and Safety and the Chemical Hygiene Officer can assist as a resource providing information to help minimize hazards and identify activities which may require prior approval. The following guidelines are offered to assist in that decision making process:

9.2 Circumstances Requiring Prior Approval

- a. Prior approval needs to be considered especially for procedures or materials which are Highly Hazardous (have the potential to cause irreversible damage, injury, or death), or when one or more of the following are true:
 1. There is a new procedure or process, even if it is similar to older practices;
 2. It is likely that a procedure will cause one or more PEL's to be exceeded or that other hazards are possible;
 3. There is a change in a procedure, process, even if it is similar to older practices.
 4. "Change in a procedure, process" means:
 5. There is a substantial increase or decrease in the amount of one or more of the ingredients used;
 6. There is a substitution or deletion of any of the ingredients used;
 7. There is a substantial change in other conditions under which the procedure is being conducted;
 8. There is a change in the location of the procedure, process;
 9. There has been a previous failure of any of the equipment used in the process, especially a failure of safeguards such as fume hoods, power supplies, or support apparatus;
 10. A prior experiment or procedure gave radically unexpected results;
 11. Members of the laboratory staff become ill due to exposure to materials used in the procedure, suspect that they or others have been exposed to unacceptable levels of contaminants from the procedure, or otherwise suspect the failure of any safeguards.
- b. Any new procedures, especially those involving Highly Hazardous Materials, should be reviewed to assure that all safety considerations are in place prior to implementation.

Section 10. Special Procedures for the Use of Highly Hazardous Materials: Carcinogens, Highly Toxic Substances, Reproductive Toxins, and materials of Unknown Toxicity:

10.1 Definitions:

- a. Carcinogens- for the purposes of this CHP, are any substances defined in Federal OSHA or Cal OSHA regulations as a “Select Carcinogen” or identified in the NIOSH/NTP Annual Report on Carcinogenesis as “known to be carcinogenic”. The term carcinogen includes (but is not limited to) the following compounds:

2-acetylaminofluorene	dimethyl sulfate
acrylamide	ethylene dibromide (EDB)
acrylonitrile	ethylene oxide (ETO)
aflatoxins	ethyleneimine
4-aminobiphenyl	formaldehyde
arsenic and certain As compounds	hexamethylsophosphoramide
asbestos	hydrazine
azathioprine	melphalan
barium chromate	4,4'-methylene-bis- (2-chloroaniline) (MBOCA)
benzene	mustard gas (bis(2-chloroethyl) sulfide)
benzidine	N,N-bis(2-chloroethyl)-2-naphthyl amine (chlornaphthazine)
bis(chloromethyl)ether (BCME)	alpha-naphthyl amine
1,4-butanediol dimethylsulfonate	beta-naphthyl amine
chlorambucil	nickel carbonyl
chloromethyl methyl ether	4-nitrobiphenyl
certain Cr compounds	N-nitrosodimethylamine
cyclophosphamide	beta-propiolactone
1,2-dibromo-3-chloropropane (DBCP)	thorium dioxide
3,3'-dichlorobenzidine & its salts	treosulfan
diethylstilbesterol	vinyl chloride monomer
4-dimethylaminoazobenzene	methylene chloride

(This list is quoted from National Research Council, Prudent Practices in the Laboratory, Handling and Disposal of Chemicals, National Academy Press, Washington, D.C. 1995.)

- b. Highly Toxic Substances - for the purpose of this CHP, are those materials having an oral LD50 of less than 50 mg/kg, or a skin contact LD50 of less than 200 mg/kg, or an inhalation LC50 of less than 200 ppm for 1 hour or 2000 mg/m³ for 1 hour.
- c. Reproductive Toxins - are those materials which can cause chromosomal damage (mutagens) and materials which can have lethal or teratogenic effects (malformation) on fetus. Many reproductive toxins are chronic toxins that cause damage after repeated or long-duration exposures with effects that become evident only after long latency periods. The term reproductive toxin includes (but is not limited to) the following materials:
- arsenic and certain arsenic compounds
 - benzene
 - cadmium and certain cadmium compounds

CHEMICAL HYGIENE PLAN

- carbon disulfide
- ethylene glycol monomethyl ether (methyl cellosolve)
- ethylene glycol monoethyl ether (ethyl cellosolve, or “cellosolve”)
- ethylene oxide (ETO)
- lead compounds
- mercury compounds
- toluene
- vinyl chloride monomer
- xylene

10.2 Procedure(s) for the Use of Highly Hazardous Materials:

Carcinogens, Reproductive Toxins, Substances having a High Degree of Acute Toxicity

(Note: Reference for this section is National Research Council, Prudent Practices in the Laboratory: Handling and Disposal of Chemicals, National Academy Press, 1995, pp. 90-93.)

- a. Careful **planning** needs to precede any experiment involving a highly hazardous material. Planning needs to include 1) the possibility of substituting a less hazardous material and 2) the use of the smallest amount of material that is practicable for the experiment. Planning should take into consideration such things as the likelihood of exposure inherent in the proposed experimental procedure, toxicological and physical properties of the materials to be used, the concentrations and amounts involved, the duration of potential or expected exposure, and known toxicological effects.
- b. A **written experimental protocol** which addresses additional safeguards (from acquisition of material to final disposal) must be in place before the experiment begins. If the planning process indicates that exposure levels could exceed a Cal-OSHA established PEL or action level, then area monitoring and/or medical surveillance needs to be established to ensure the safety of experimenters.
- c. Experimental procedures involving Highly Hazardous Materials must be performed within a **designated area**. The designated area could be a hood, glove box, or Biosafety cabinet (as appropriate), or an entire room. The designated area must be posted with a sign defining the designated area and the materials in use. It is not necessary to restrict the use of a designated area to the handling of a Highly Hazardous Material as long as the laboratory personnel are aware of the nature of the substances being used and of the precautions that are necessary, and have been trained appropriately for emergency response.

10.2 Procedure(s) for the Use of Highly Hazardous Materials (continued):

- d. **Access to the designated area** during the time a Highly Hazardous Material is in use must be limited to those laboratory workers who have been advised of the precautions that may apply and have been trained in the use of the materials and in emergency procedures involving the Highly Hazardous Material(s). Access may be controlled using administrative procedures or physical barriers. It is important that any locks used to prevent access do not also compromise emergency exits from the laboratory nor hinder entrance for emergency response.

- e. **Unattended experiments** involving Highly Hazardous Materials must have fail-safe backup options, automatic shutoff devices, or interlocks which will place the experiment in a safe mode in the event of loss of electricity, cooling water, compressed gas supply (e.g. for inert gas atmosphere), or ventilation (hood failure). The fail-safe should be designed so that the experiment does not restart when the lost resource/utility is automatically restored. (See also sec. 3.1 (n): Unattended Operations, in this CHP)

- f. **Laboratory Practices and Precautions** for Highly Hazardous Materials:
 1. Procedures involving Highly Hazardous Materials that can generate dust, vapors, or aerosols must be conducted in a **hood, glove box, Biosafety cabinet, or other suitable containment device**. Adequate operation of the hood/glove box/Biosafety cabinet should be confirmed before beginning any experiment using Highly Hazardous Materials contained inside.

 2. Laboratory workers performing procedures involving Highly Hazardous Materials must wear **gloves** which will protect the hands and forearms from contact with the materials. The gloves must be selected as to be impervious to the materials being used and of sufficient thickness to allow reasonable dexterity. In the event that impervious gloves for a specific material are not available, the procedure
 - a. may be performed using an alternate, less hazardous material which is suitable to gloves which are available,
 - b. may be performed in a way that prevents contact with the material (e.g. using remote manipulators), or
 - c. must be discontinued until appropriate gloves are available.

 3. Laboratory workers performing procedures involving Highly Hazardous Materials must wear **face and eye protection**. When hazardous substances that could generate vapors, aerosols, free liquids, or dust are used, eye and face protection must be achieved by additionally using full-face shields. Transparent “explosion” shields (the portable type or the hood sash itself, pulled down) must also be used to protect against liquid splash or other release.

 4. **Equipment** used in procedures using Highly Hazardous Materials must be **suitably isolated from the general laboratory environment**. Vacuum pumps used with these substances must be protected by high efficiency scrubbers or HEPA filters and vented into a fume hood.

10.2 Procedure(s) for the Use of Highly Hazardous Materials (continued):

f. **Laboratory Practices and Precautions** for Highly Hazardous Materials: (continued)

5. **Good laboratory hygiene** must be practiced by experimenters who are using Highly Hazardous Materials. After using these materials, the laboratory worker must wash his or her, hands, face, neck and arms. Equipment used in the procedure, including re-usable protective equipment such as gloves, must be thoroughly cleaned before removal from the designated area.
6. **Transport of Highly Hazardous Materials** must be planned and executed carefully. Handling of these materials outside the designated area should be minimized. Highly Hazardous Materials must be transported, when outside the designated area, in unbreakable secondary containers.
7. **Preparation for accidents and spills** must be accomplished before beginning any experiment involving Highly Hazardous Materials. This preparation must include creating or acquiring a spill control kit containing all the materials needed to clean up a spill of all the Highly Hazardous Material present in the designated area. The spill kit should be located near, but not immediately next to, the experimental area, so that access to the spill kit is not compromised by an accident or spill. The contents of the spill kit should be validated before beginning the experiment.
8. Experiments involving Highly Hazardous Materials should be **performed within secondary containment**. This can be an impervious tray or absorbent mat of sufficient liquid capacity which can contain all the material in the apparatus if spilled.
9. **Information** about the Highly Hazardous Materials in use should be **available near**, but not immediately next to, the experimental site to ensure availability in emergency situations.
10. **Non-disposable equipment** and glassware used in the experiment with Highly Hazardous Materials should be **cleaned/decontaminated at the end of the experiment** and before being removed from the designated area.

g. **Waste materials** must be handled according to Section 3.6 of this CHP.

Section 11. References

- Campus Respiratory Protection Plan, <http://www.afd.calpoly.edu/ehs/docs/RespiratoryProtection.pdf>
- ANSI Z87.1 (Standard for Occupational and Educational Eye and Face Protection) concerning Laboratory operations, hard copy only
- ANSI Z358.1-1990 (Standard for Emergency Eyewash and Shower Equipment) hard copy only
- CCR Title 8, sec 5191 (the Lab Standard) <http://www.dir.ca.gov/Title8/5191.html>
- CCR Title 8, sec 5155 (list of PEL's) <http://www.dir.ca.gov/title8/5155a.html> Follow the link to Table AC-1
- CCR Title 8, sec. 5154.1 (Ventilation Requirements for Laboratory-Type Hood Operations), http://www.dir.ca.gov/title8/5154_1.html
- Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Research Council - Committee on Hazardous Substances in the Laboratory, 1995
- Biosafety in Microbiological and Biomedical Laboratories, BMBL, 5th Edition; <https://www.cdc.gov/biosafety/publications/bmbl5/index.htm>

Section 12. Appendices

- Sample Labels for Hazardous Waste
- Sample of Hazardous Waste Pick-up Form
- Compatible Chemical Storage Categories and Storage Guidelines

APPENDICES

Examples of appropriate labels for Hazardous Waste:

Please photocopy as needed. Attach to the container(s) with spray adhesive or clear tape.

<p>HAZARDOUS WASTE, START DATE-→</p> <p>WASTE NAME/DESCRIPTION: _____</p> <p>_____</p> <p>_____</p> <p>CIRCLE ONE: SOLID / LIQUID</p> <p>CIRCLE ONE: Toxic Corrosive Flammable</p> <p> Combustible Reactive</p> <p>Cal Poly, San Luis Obispo, CA 93407</p>

<p style="text-align: center;">KEEP THIS CONTAINER CLOSED.</p> <p>1. <u>HAZARDOUS WASTE</u> 2. Start Date _____</p> <p>3. Contents:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>4. Physical State: (circle) SOLID LIQUID</p> <p>5. Hazard: (circle) TOXIC CORROSIVE (ACID OR ALKALI ?)</p> <p> FLAMMABLE / COMBUSTABLE REACTIVE</p> <p>Source Department: _____</p> <p>FOR QUESTIONS CONCERNING THIS CONTAINER CONTACT THE ENVIRONMENTAL SAFETY OFFICE, (805) 756-6661</p> <p>6. California Polytechnic State University, San Luis Obispo, CA 93407</p> <p>EPA ID No. CAD 094455102</p>
--

(APPENDIX TO CHP – PHOTO COPY AS NEEDED)

Environmental Safety

**HAZARDOUS WASTE
 PICK-UP/DISPOSAL REQUEST**

Instructions: Please be as complete as possible; include a contact name and phone. Information may be found on labels or on Material Safety Data Sheets (MSDS) for the materials. Please list the constituents of mixtures, with concentrations, if known. Please do not transport materials to Environmental Safety without prior approval. When complete, fold this form in half, staple, and place in the campus mail; it is pre-addressed.

Note: Materials must be in closed and leak-tight containers before they can be transported from your area.

If you have any questions, contact the Environmental Safety Office at extension 6- 6661 or 6-6662.

03/97

Requester Name: _____ Dept.: _____
 Phone: _____ Date: _____

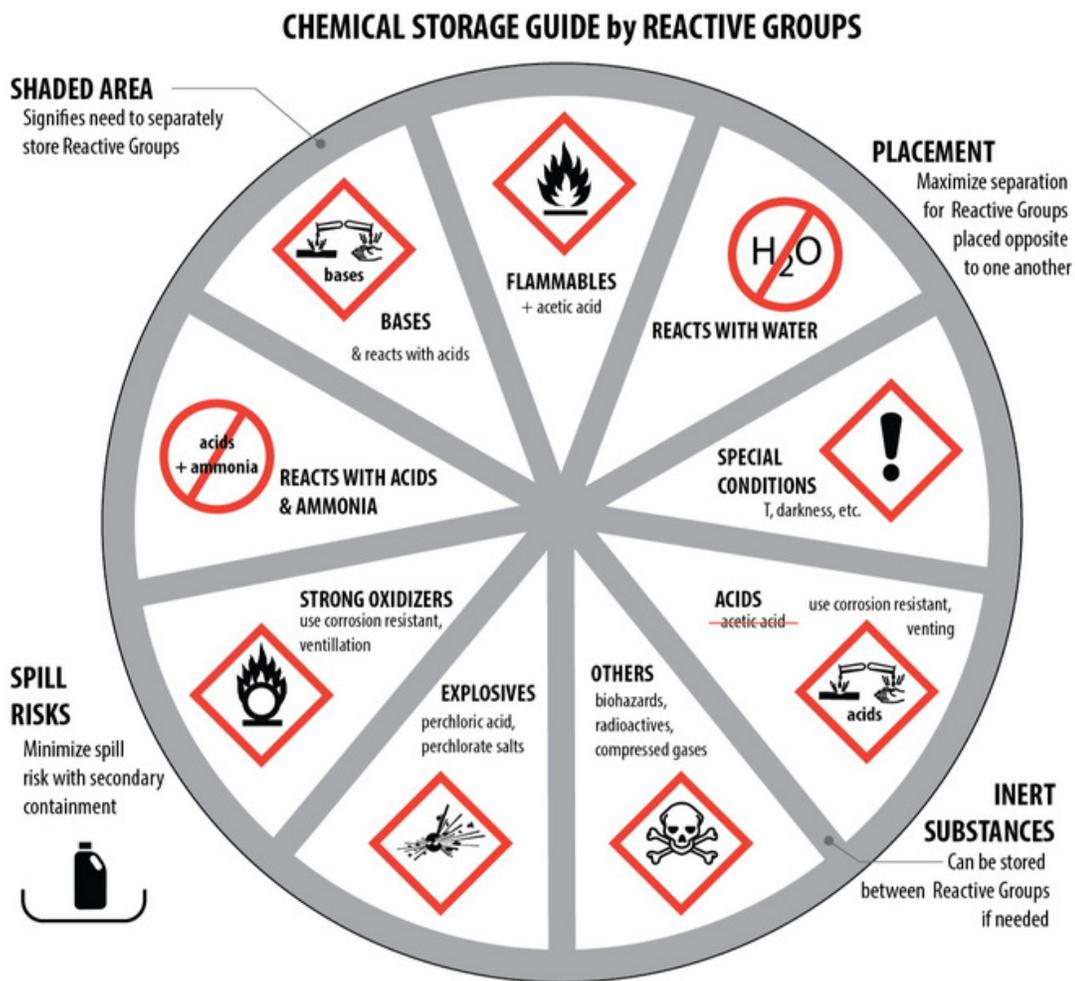
Location of Waste (building & room): _____

LN	ES Num	NAME OR DESCRIPTION OF THE WASTE (Major ingredients and approx. percents, if known)	HOW MANY	CONTAINER SIZE (Qt, gal, 5gal, 55gal, lb, 50lb, 100g, kg, etc.)	
1					
2					
3					
4					
5					
6					
7					
8					

QUESTIONS? - CALL THE ENVIRONMENTAL SAFETY OFFICE AT EXTENSION 6- 6661 or 6-6662.

Environmental Safety Use Only

pud=



Hazardous Storage by [Linda Vanasupa](#) is licensed under a [Creative Commons Attribution 4.0 International License](#).
Materials Engineering Department, California Polytechnic State University, San Luis Obispo, CA