TABLE OF CONTENTS

I. Introduction.............................................................................................................. I-1
   1. Responsibilities................................................................................................. I-1
   2. Chemical Hygiene Standard............................................................................ I-2
   3. Chemical Hygiene Officers............................................................................. I-3
   4. Bruin Safety Program..................................................................................... I-4
      A. Hazard Identification.................................................................................... I-4
      B. Record Keeping............................................................................................ I-4

II. Emergency Response
   1. UCLA Campus Emergency Notification...................................................... II-1
   2. Other Phone Numbers.................................................................................... II-2
   3. Personal Injury in the Laboratory................................................................. II-3
   4. Fire Response.................................................................................................. II-7
      A. Small Fire..................................................................................................... II-7
      B. Large Fire.................................................................................................... II-7
      C. Clothes on Fire........................................................................................... II-8
   5. Chemical Spill................................................................................................... II-10
      A. Minor Spill.................................................................................................. II-10
      B. Major Spill.................................................................................................. II-11
      C. Hazardous Chemical Spill on Skin............................................................ II-11
      D. Hazardous Chemical Splash in Eyes......................................................... II-12
   6. Biohazardous Material Spill............................................................................ II-13
      A. Personal Contamination............................................................................. II-13
      B. From a pipet in the Biological Safety Cabinet........................................... II-13
      C. In the Lab, Biosafety Level 1 or 2............................................................... II-13
      D. In the Lab, Biosafety Level 3..................................................................... II-14
      E. In a Centrifuge............................................................................................ II-15
      F. Outside the lab, During Transport.............................................................. II-15
      G. How to Pick Up Contaminated Sharps...................................................... II-15
   7. Radioactive Material Spill.............................................................................. II-16
      A. Minor Spill.................................................................................................. II-16
      B. Major Spill.................................................................................................. II-17
      C. Personal Contamination............................................................................. II-17
   8. Earthquake Response...................................................................................... II-19

III. Safety Equipment -- Personal Protection
   1. Eye and Face Protection................................................................................... III-1
      A. Splash Goggles............................................................................................ III-1
      B. Safety Glasses............................................................................................. III-1
      C. Face Shields............................................................................................... III-1
      D. Contact Lenses.......................................................................................... III-1
   2. Protective Clothing.......................................................................................... III-1
      A. Gloves......................................................................................................... III-1
      B. Laboratory Coat.......................................................................................... III-2
   3. Respiratory Protection..................................................................................... III-2

Revised by EH&S: May 2008
IV. Safety Equipment -- Facilities

1. Fire Extinguishers
   A. Fire Response
   B. Fire Extinguisher Replacement

2. Fire Hoses

3. Fire Blankets
   A. Uses

4. Alarms and Intercom

5. First-Aid Kits

6. Eye Wash Station

7. Safety Showers

8. Spill Kits

9. Fume Hoods
   A. Uses
   B. Reminders
   C. Prior to Use
   D. While In Use
   E. After Use

10. Biological Safety Cabinets
    A. Uses
    B. Reminders
    C. Prior to Use
    D. While In Use
    E. After Use

11. Equipment Maintenance
    A. Fire Extinguishers
    B. Eyewash Stations and Safety Showers
    C. Fume Hoods

V. Safety Procedures -- Standard Operating Procedures

1. Summary of Laboratory Safety Rules
   A. General Safety
   B. Personal Hygiene
   C. Personal Apparel
   D. Personal Protection
   E. Chemical Safety
   F. Laser Safety
   G. Biological Safety
   H. Shop Safety
   I. Emergency Preparedness
   J. Warning Signs
   K. Electrical Safety
   L. Equipment Maintenance

2. Disposal Procedures
   A. Chemical Waste Disposal
      1. Waste Management Program
      2. Waste Containers in Laboratories
      3. Chemical Waste Pick-Up Procedure
      4. Dangerous Chemical Waste, Unknowns, and Lab Clean-Out Procedures
      5. Chemical Waste Pick-Up Schedule
   B. Biohazardous Waste Disposal
   C. Non-Biohazardous Sharps Waste Disposal
I. INTRODUCTION
This laboratory safety manual and chemical hygiene plan is provided to your laboratory in order to comply with the requirements of the California Code of Regulations, Title 8, Section 5191. These regulations state that a chemical hygiene plan must be present and readily available where hazardous chemicals are used. The goal of the manual is to protect the health of those working in a laboratory setting.

The following is a list of topics that is required to be included in the laboratory safety manual and chemical hygiene plan to satisfy Title 8, Section 5191.

(A) Standard operating procedures (all laboratory procedures);
(B) Control measures that reduces laboratory personnel exposure to hazardous chemicals including introducing engineering controls, the use of protective equipment, and hygiene practices;
(C) Fume hoods usage;
(D) Protective equipment shall function properly;
(E) Documented personnel training;
(F) List of experimental procedures that requires prior approval from supervisors;
(G) Provisions for medical consultation and medical examinations;
(H) Designation of personnel responsible for implementation of the Chemical Hygiene Plan including the assignment of a Chemical Hygiene officer;
(I) Provisions for additional employee protection for work with particularly hazardous substances (i.e., select carcinogens, reproductive toxins).

Questions concerning the information in this document can be addressed to the Office of Environment, Health and Safety by contacting:

- **Manamohan (Manu)**, ext. 45647 or gkmanamohan@ehs.ucla.edu
- **Neil Mansky**, extension 60509 or nmansky@ehs.ucla.edu

This document will be reviewed annually. Suggestions for changes and/or additions that will make this document more useful will be greatly appreciated. Manamohan (Manu) X45647 or Neil Mansky X60509 with suggestions.

1. **RESPONSIBILITIES**

   It is the responsibility of all **laboratory personnel**:

   - to know the safety hazards in their work areas;
   - to follow safe work practices required for the task;
   - to report unsafe conditions to the principal investigator or immediate supervisor;
   - to report all facts pertaining to exposure incidents or accidents to the principal investigator or immediate supervisor;
   - to report imminent hazards posing an immediate danger to life and health to EH&S when your principal investigator or supervisor does not take action to eliminate the hazard.
Principal investigators and supervisory personnel have the primary responsibility for the activities of their staff and for conditions in the rooms and areas under their control. It is the responsibility for principal investigators and supervisory personnel to:

- acquire knowledge and information needed to provide safe working conditions for all laboratory personnel;
- continually educate all laboratory personnel on the potential hazards associated with a specific task and the precautionary measures (laboratory practices, engineering controls, and personal protective equipment) appropriate for the hazards;
- monitor staff to ensure safe work practices are followed;
- advise and assist in improvement/development of safe work practices;
- investigate accidents and initiate corrective actions which ensure safe working conditions;
- write and keep accident reports, including corrective action taken, if any;
- implement new work practices or policies recommended by safety committees or the Office of Environment, Health & Safety;
- meet the legal requirements of governmental legislation for occupational health and safety;
- provide a written safety manual describing the proper use of machinery, equipment and experiments that are specific to that laboratory;
- decide who is responsible for the collection and maintenance of the material safety data sheets (MSDSs);
- chemical storage procedures including chemical segregation, and waste disposal in the laboratory as advised by the Office of Environment, Health & Safety;
- fabricate standard operating procedures (SOPs) for specific tasks, including the use of fume hoods, and the need for protective eyewear, gloves and other protective equipment;
- develop and conduct training or informational programs for laboratory personnel on health and safety issues;
- provide procedures for working with particularly hazardous chemical (select carcinogens, reproductive toxins, substances with a high degree of toxicity).

The Office of Environment, Health & Safety is responsible for assisting departments, principal investigators, and supervisory personnel in:

- identifying safety hazards in the laboratory;
- providing technical guidance on matters of laboratory safety;
- assist in developing and conducting training or informational programs for laboratory personnel on health and safety issues;
- assist in developing and improving safe work practices and policies;
- investigating accidents and developing corrective actions which ensure safe working conditions;
- meeting the legal requirements of governmental legislation for occupational health and safety, and waste disposal in laboratories.
2. THE CHEMICAL HYGIENE STANDARD

The California Occupational Safety and Health Act's (Cal/OSHA) Chemical Hygiene Standard requires each laboratory to have a written Chemical Hygiene Plan. The purpose of the Chemical Hygiene Plan is to minimize laboratory personnel exposures to chemical hazards and meet the requirements of the Cal/OSHA Chemical Hygiene Standard. The written Chemical Hygiene Plan must contain the following components:

2. Statements of Criteria Used to Determine and Implement Control Measures to Reduce Exposure to Hazardous Chemicals (engineering controls, personal protective equipment, personal hygiene practices).
3. Circumstances which Prior Approval is Required Before Conducting Experiments.
5. Description of Maintenance of Equipment Used to Control Exposure (e.g., fume hoods).
6. Training and Information Provided to Employees.
7. Medical Consultation and Examinations.
8. Designation of a Chemical Hygiene Officer.

This manual addresses, generally, all the required components of the written Chemical Hygiene Plan. In addition, the Chemical Hygiene Standard requires that each laboratory provide a written copy of its unique laboratory procedures which involve the use of hazardous chemicals. Place these procedures at the back of the manual in Appendix J.

3. CHEMICAL HYGIENE OFFICERS

Manamohan (Manu) and Neil Mansky are the Chemical Hygiene Officer for the School of Engineering, Letters and Science, Physical Science Department, Department of Geology, Institute of Geophysics and Planetary Physics, and the Department of Earth and Space Sciences. Each Principal Investigator's (PI's) research group should designate in the space provided below the Chemical Hygiene Officer(s) in their group. This person is responsible for chemical safety in the research group and for maintaining this document.

RESEARCH GROUP CHEMICAL SAFETY OFFICER ________________
___________________________________
___________________________________
4. **Bruin Safety Program**

The Bruin Safety Program is UCLA’s Injury and Illness Prevention Program (IIPP). The purpose of the Bruin Safety Program is to reduce workplace injuries and illnesses, increase productivity, and promote a safer and healthier working environment. The IIPP is a Cal/OSHA requirement. It has a very broad application encompassing all occupations including laboratory workers. The Bruin Safety Program addresses Hazard Communication, Accident Investigation, Hazard Identification (safety inspections), Hazard Mitigation (corrective action), Training, and Record keeping (documentation). Requirements of the Bruin Safety Program include:

A. Hazard Identification. Hazard identification can be accomplished by conducting safety inspections. A laboratory safety survey for this purpose is included in Appendix G of this manual.

B. Record keeping. Records of safety training, safety meetings, safety inspections, accident investigations and corrective actions are required to be kept.
II. EMERGENCY RESPONSE
1. **UCLA CAMPUS EMERGENCY NOTIFICATION**

**911** (Do not dial 8-911)
(310) 825-1491 from a **Cell Phone**

Emergency Phone Numbers which can be used Monday through Friday 8 AM to 5 PM:

- Chemical Spills 55689
- Biohazard Spills 55689
- Radioactive Spills 55689

**Procedure for an Emergency:**

1. Evacuate the laboratory.
2. Close all doors.
3. In case of fire or explosion, pull nearest fire alarm.
4. Call 911 or other emergency phone number.
### 2. OTHER PHONE NUMBERS

<table>
<thead>
<tr>
<th>Service</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office of Environment, Health &amp; Safety</td>
<td>55689</td>
</tr>
<tr>
<td>Laboratory Safety</td>
<td>45647</td>
</tr>
<tr>
<td>Biological Safety</td>
<td>63929</td>
</tr>
<tr>
<td>Fire Safety</td>
<td>68680</td>
</tr>
<tr>
<td>Chemical Waste Disposal</td>
<td>61887</td>
</tr>
<tr>
<td>Industrial Hygiene</td>
<td>45773</td>
</tr>
<tr>
<td>Injury and Illness Prevention Program</td>
<td>47312</td>
</tr>
<tr>
<td>Radiation Safety</td>
<td>56995</td>
</tr>
<tr>
<td>CHS Environmental Services -(Custodians)</td>
<td>55001, 55002</td>
</tr>
<tr>
<td>Facilities - Trouble Calls - 24 HR</td>
<td>59236</td>
</tr>
<tr>
<td>Problems with Fire Extinguishers</td>
<td>62911, 59236</td>
</tr>
<tr>
<td>CHS Engineers</td>
<td>51423</td>
</tr>
<tr>
<td>Technical Safety Services, Inc. (TSS)</td>
<td>800-877-7742</td>
</tr>
<tr>
<td>Student Health Services</td>
<td>54073</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>56771</td>
</tr>
<tr>
<td>UCLA Emergency Medical Center</td>
<td>52111</td>
</tr>
<tr>
<td>Poison Control Center</td>
<td>800-222-1222</td>
</tr>
</tbody>
</table>

**Website**

UCLA Environment, Health and Safety  
[www.ehs.ucla.edu](http://www.ehs.ucla.edu)
3. PERSONAL INJURY IN THE LABORATORY

UCLA EMPLOYEE (includes student employees)

All laboratories need to maintain signed copies of the form "UCLA Employee's Referral Slip for Industrial Injury" (form WC 1000) in a known location in the laboratory in case an injury occurs when your supervisor is not present. Make sure your supervisor, P.I., or department chair has signed the forms.

If an injury occurs that requires medical attention:

1. Take a signed "UCLA Employee's Referral Slip for Industrial Injury" form WC 1000 to Occupational Health with the injured person (Sample form is on next page). Occupational Health is open Monday to Friday 7:30AM to 4:00PM. At all other times go to UCLA Emergency Medicine.

2. Have someone accompany the injured person to Occupational Health or Emergency Services.

   - **Occupational Health is located in CHS room 67-120** (see map).

   - **UCLA Emergency Medicine is located off Tiverton Ave. in CHS room BE-133** (see map).

3. Report all laboratory-related injuries and illnesses to your supervisor and write an accident report.

4. All serious work-related injuries must be reported immediately in accordance to the California Division of Occupational Safety and Health (DOSH, a division of Cal/OSHA). A serious injury or illness is defined as, “any injury or illness occurring in a place of employment or in connection with any employment which requires inpatient hospitalization for a period in excess of 24 hours for other than medical observation or in which an employee suffers a loss of any member of the body or suffers any serious degree of permanent disfigurement or death.” In addition, DOSH defines immediate reporting as eight hours after the employer knows of the injury or illness. Cal/OSHA has instituted a $5,000 fine for failure to report within this time period.

Injuries Report Hotline 59797
UCLA STUDENT

1. Call the Student Health Services at 47918 M-F between 8AM and 5PM (except Tuesday, 9AM to 5PM). Bring the injured person's registration card and photo ID with them. At all other times go to UCLA Emergency Medicine for treatment.

2. Have someone accompany the injured person to Student Health Services or UCLA Emergency Service for treatment.

   • Student Health Services is located in the Arthur Ashe Health & Wellness Center (next to the Wooden Center).
     Student Health Services Triage Nurse  54073

   • UCLA Emergency Medicine is located off Tiverton Ave. in CHS room BE-133 (see maps).
     UCLA Emergency Medicine   52111

3. Report all laboratory related injuries and illnesses to your supervisor and write an accident report.

VISITORS OR GUEST

1. Take guests to the UCLA Emergency Center located in CHS room BE-133 off Tiverton Ave. There will be a service charge to the visitor or guest.

   • If an injured person does not want to be taken to the UCLA Medical Center call 911 for an ambulance.

2. Complete an accident report of the incident.
EMPLOYEE’S REFERRAL SLIP FOR INDUSTRIAL INJURY AND REPORT OF ACCIDENT

Supervisors are responsible for completing and submitting this form WITHIN 24 HOURS of first notice of an employee's injury. All items must be completed in order to properly process this form. Distribute the copies as noted on the bottom of this form. This information is critical to the injured employee's claim for benefits. DO NOT DELAY. This form must be completed even if the employee did not receive medical attention or if the injury seems minor. If you have questions, please call one of the following numbers:

CAMPUS EMPLOYEE: Office of Insurance & Risk Management........... 794-6952; 794-6948 / Fax: 794-6957

Date: ____________

Check One: [ ] Campus Employee [ ] Volunteer [ ] Student

1. Name __________________________ Social Security Number ____________
2. Home Address __________________ City ______ Zip ______
3. □ Male □ Female ____________________ Home Telephone ______
4. Department ___________________________________________ Job Title ______
5. Job Status: [ ] Full Time [ ] Part Time [ ] Temporary
   Date of Injury ____________ Time of Injury (am/pm) ______ Date Reported ______
6. Nature of Injury (sprain, contusion, etc.) ____________ Part of Body Affected ______
7. What was employee doing when injured? ______
8. How did the injury occur? Please describe in detail. ______
9. Name and contact number of the person that this injury was reported to__________ Extension ______
10. Supervisor’s Name (PLEASE PRINT) ______

INVESTIGATION OF ACCIDENT (TO BE FILLED OUT BY SUPERVISOR)

11. Time employee began work (exact hour) ______ (am/pm). Did employee lose time off due to injury? ______
12. Date last worked ______ Date returned to work ______
13. Was the employee paid full wages for the day of injury or last day worked? ______
14. Location of Accident (Building, Room #, Floor, Corridor, etc.) ______
15. Were there materials or equipment associated with the injury? ______
16. Were there any witnesses? ______
17. Injury evaluated by: [ ] Self [ ] Emergency Room [ ] Other (please specify) ______
18. Was employee exposed to blood/bodily fluid other than his/her own? ______ If yes, write their name, address and contact number ______
19. ______

RETURN TO WORK (RTW) OFFER TO COMPLETE

20. Can immediately RTW [ ] Yes [ ] No ______ Date ______
21. Can RTW with these restrictions: ______
22. Estimated period of absence ______
23. Next scheduled visit ______
24. Medical Provider Signature ______

FILING OF THIS FORM IS NOT AN ADMISSION OF LIABILITY


May 1997
4. **FIRE RESPONSE**

A fire within a laboratory and/or classroom can grow in both size and severity, rapidly and without warning. Extreme caution must be used particularly, if the decision is made to attempt to extinguish a fire, of any size.

Some basic information, regardless of the size of the fire;

- Notify personnel in the immediate area, that there is a fire.
- Identify someone to **DIAL 911** to report the fire, if you are alone in the area, make the call yourself. Get emergency services started your way, even if it is just a “Small” fire; it could increase in size rapidly.
- If you were involved with the fire, identify yourself to the response personnel, you may have important information regarding the substance involved, personnel in the area, location or extent of the fire, etc.,
- If you must evacuate the area, close doors behind you and do not re-enter the building until told by the Fire or Police Officials.
- Do not “Swipe” or attempt to “Brush” at a small fire with your hand, rag, towel, or similar object. You may spread the fire further or spill and ignite other flammable liquids.
- Do not attempt to extinguish a fire if:
  a) You feel it is unsafe to do so.
  b) You notice odd colored smoke or experience physical symptoms of exposure such as eye or skin irritation, difficulty breathing, coughing, dizziness or nausea. (Always, obtain medical attention immediately when experiencing any of these symptoms. **DIAL 911**.)
  c) You do not have the proper equipment or training.
- Have the used extinguishers recharged immediately.
- When you hear and/or see a fire alarm activate within your building, **EVACUATE THE BUILDING IMMEDIATELY**.

**Small Fire**

1. Notify people in the immediate area that there is a fire.
2. Identify someone to call 911 to report a fire, if you are alone in the area, make the call yourself.
3. Some small fires, within **contained vessels**, can be easily smothered using a beaker, watch glass, or similar glassware, if it is safe to do so.
4. A properly operated fire extinguisher can be used on a small fire if necessary.
Large Fire

1. Notify people in the immediate area that there is a fire.
2. Make sure all people are evacuated from the fire area.
3. If possible, notify your supervisor and/or floor warden.
4. Confine the fire. Close all doors and windows. Close the fume hood sash if the fire is inside the fume hood.
5. Activate the nearest fire alarm.
6. Locate the nearest campus telephone away from the fire area and DIAL 911. (Cell phones will connect you with California Highway Patrol, dialing 8-911 will connect you with off-campus dispatch, and both of these causing delay to responding resources.)
7. When leaving the room where there is a fire, do not enter into another room where smoke or fire is already present.
   a) Test the door by using the back of your hand before entering any room.
   b) If the door is hot or warm, do not open the door.
   c) If smoke is present, crawl on your hands and knees to keep your head low and out of the smoke.
   d) If your exit is blocked by smoke or fire, hang a piece of cloth out a window, nearest the street (if possible). Make sure all doors and windows are closed into the room.
8. Evacuate the area by USING THE STAIRWELLS. Never use the elevators and follow the evacuation plan for your laboratory.
9. NEVER re-enter the building until told by Fire or Police Officials.

Clothing on Fire

1. If your clothes catch on fire, remember to STOP-DROP-&-ROLL-ROLL-ROLL. This action will smother the fire. Protect your face with your hands.
2. Safety showers or fire extinguishers are useful only when immediately at hand. Do not use a fire blanket.
3. Always obtain medical attention when burned. Dial 911

Note: Wrapping a fire blanket around a victim who’s clothing is burning, is not recommend. It may smother the fire on the body of the victim, but it will cause the fire to move to the victim’s head.
# Fire Classification

<table>
<thead>
<tr>
<th>Letter Symbol</th>
<th>Picture Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>![A Symbol]</td>
<td><strong>Type A:</strong> Ordinary Combustibles: wood, cloth, paper, rubber, many plastics and other common materials that burn easily.</td>
</tr>
<tr>
<td>B</td>
<td>![B Symbol]</td>
<td><strong>Type B:</strong> Flammable Liquids: gasoline and other flammable liquids, oil, grease, tar, oil-based paint, lacquer and flammable gas.</td>
</tr>
<tr>
<td>C</td>
<td>![C Symbol]</td>
<td><strong>Type C:</strong> Electrical Equipment: energized electrical equipment, including wiring, fuse boxes, circuit breakers, machinery and appliances.</td>
</tr>
<tr>
<td>D</td>
<td>![D Symbol]</td>
<td><strong>Type D:</strong> Combustible Metals</td>
</tr>
</tbody>
</table>

---

## To Operate Extinguisher

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull</td>
<td>Pull the pin.</td>
</tr>
<tr>
<td>Aim</td>
<td>Aim the nozzle at the base of the fire.</td>
</tr>
<tr>
<td>Squeeze</td>
<td>Squeeze the operating handle to release the extinguishing agent.</td>
</tr>
<tr>
<td>Sweep</td>
<td>Sweep from side to side at the base of the fire until it goes out.</td>
</tr>
</tbody>
</table>

![Diagram of extinguisher usage]

---

II-9
5. CHEMICAL SPILL

Factors to consider when a chemical is spilled:

- the quantity spilled,
- the size of the spill area,
- the toxicity and other hazardous characteristics of the chemical,
- the clean-up materials available in the laboratory,
- the level of knowledge or training of the persons cleaning-up the spill.

A. Minor Chemical Spill

1. A minor liquid chemical spill is a small spill which you can absorb and bag in 5-10 minutes. You can probably clean-up spills of about one liter or less of:

   a) dilute acids and bases,
   b) most solvents,
   c) materials which you know the toxic hazard of the spilled material,
   d) and mercury spilled from a broken thermometer (see MERCURY SPILL KIT in the APPENDIX C-1 for clean up instructions).

2. You must have the proper protective equipment and clean-up materials to clean-up these spills. Check the chemical's Material Safety Data Sheet (MSDS) for spill clean-up procedures or call EH&S at 55689 for advice.

3. Help anyone who may have been contaminated. Use emergency eyewashes/showers by flushing the skin or eyes for at least 15 minutes. Call for medical assistance by dialing 911.

4. Evacuate all nonessential persons from the spill area.

5. Post someone just outside the spill area to keep people from entering. Avoid walking through contaminated areas.

6. Turn off sources of flames, electrical heaters, and other electrical apparatus, close flammable storage cabinets, and close valves on gas cylinders if the chemical is flammable.

7. Confine the spill to a small area. Do not let it spread.

8. Avoid breathing vapors from the spill.

9. Wear personal protective equipment, including safety goggles, gloves, arm protection, and a lab coat or other protective garment to clean-up the spill.

10. Work with another person to clean-up the spill. Do not clean-up a spill alone.

11. DO NOT ADD WATER TO THE SPILL.
12. Use an appropriate kit to neutralize and absorb inorganic acids and bases (see Chemical Spill Kit in the Appendices). For other chemicals use the appropriate kit or absorb the spill with sorbent pads, paper towels, vermiculite, dry sand, or diatomaceous earth. For mercury spills see Mercury Spill Kit in the Appendices.

13. Collect the residue, place it in a clear plastic bag. Double bag the waste and label the bag with the contents. Take it to the Chemical Waste Pick-up for your building.

B. Major Chemical Spill

1. A major chemical spill is a spill which you need help from EH&S to clean-up. Between 8AM and 5PM call 55689, or 911 for assistance cleaning-up a spill. After hours call 911.

2. Do not clean-up a spill if:

   a) you feel it is unsafe to do so,
   b) you do not know what the spilled chemical is,
   c) you lack the necessary materials to clean-up the spill safely,
   d) the quantity of the spill is greater than you can handle,
   e) the spill is spread over a large area,
   f) you feel any physical symptoms of exposure -- eye or skin irritation, difficulty breathing, coughing, dizziness, nausea.

3. Attend to the injured and/or contaminated person(s) and remove them from exposure.

4. Confine the spill area, if reasonably achievable.

5. Post someone just outside the spill area to keep people from entering. Avoid walking through contaminated areas.

6. Avoid breathing vapors of the spilled material.

7. Leave on or establish exhaust ventilation.

8. If possible, turn off all sources of flames, electrical heaters, and other electrical equipment if the spilled material is flammable.

9. Evacuate the laboratory closing the door behind you.

10. Between 8AM and 5PM call for assistance at 55689, or 911. After hours call 911.

C. Hazardous Chemical Spill on Skin

1. Remove contaminated clothing and flush the affected skin area with water for 15 minutes.

2. For extensive exposure remove all clothing including shoes and undergarments while under the safety shower.

3. Rinse body thoroughly in emergency shower for at least 15 minutes.
4. Seek medical attention whether or not symptoms persist. The effects of some chemicals are delayed. Bring the MSDS for the chemical spilled on the skin to the medical treatment facility.

D. Hazardous Chemical Splash into the Eye(s)

1. Use the eyewash to immediately rinse eyeball and inner surface of the eyelid with water continuously for 15 minutes. Have someone help hold the eyelids open to ensure an effective wash behind the eyelids.
2. Seek medical attention whether or not symptoms persist. Bring the MSDS for the chemical splashed into the eye(s) to the medical treatment facility.
6. **BIOHAZARDOUS MATERIAL SPILL**

Biohazardous material spills outside a biosafety cabinet generate aerosols containing the hazardous agent. The aerosols are likely to spread throughout the room and may lead to infection of laboratory workers. The proper emergency response for a biohazardous material spill outside a biosafety cabinet will depend upon the hazard of the material and the volume. For assistance cleaning up a spill call EH&S at 55689 M-F, 8AM to 5PM. Otherwise dial 911.

**A. What to do if you get biohazardous materials on yourself:**

1. Do not clean-up material spilled on the floor, bench or equipment.

2. Do not walk around wearing the clothing or gloves that are contaminated. Stay where the spill occurred and immediately remove the gloves or clothing which became contaminated from the spilled material. Place clothing and gloves inside an autoclave/biohazard bag or a bucket with a lid. Depending on the type of exposure and the infectious material either rinse exposed skin areas with water or wash them with a disinfecting soap.

3. Receive medical treatment for the exposure. Medical treatment can be received at Occupational Health Facility (OHF) or Emergency Medicine.

**B. How to clean up a drop of biohazardous material spilt from a pipet in the cabinet**

1. Complete what you are doing noting where the drop is located. Do not drag your lab coat through the spill or place things on top of the spill.

2. If working on a hard surface, take a chem-wipe and soak with disinfectant. Wipe up the spill carefully. If working on a lab-diaper squirt disinfectant on the diaper where the spill occurred.

**C. How to clean up a biohazardous spill when working at biosafety level 1 or 2**

Work conducted at biosafety level 1 is with biohazardous materials which have no known or minimal potential hazards to healthy adults or the environment.

Work conducted at biosafety level 2 involves indigenous moderate risk biohazardous materials present in the community and associated with a broad range human disease of varying severity. Exposure in
the laboratory usually occurs by skin puncture, penetration through skin or mucous membrane contact or ingestion.
1. Wear disposable gloves.
2. Soak paper towels with disinfectant and place them over the entire spill.
3. Disinfectant can then be poured around and into the spill area.
4. Let it set for a contact time sufficient to inactivate the biohazard. Contact time depends on the disinfectant used and the material in the spill.
5. Clean up the spill area using paper towels.
6. Dispose of the towels in an autoclave bag.
7. If there is broken glass, sweep any glass into a dustpan using a handful of disinfectant soaked paper towels or use forceps to pick-up the glass. Do not use your hands.
8. Wash your hands following the clean up.

Commercially available granular materials impregnated with disinfectant can be use to clean up these spills. Follow the manufacturers’ directions.

D. How to clean up a biohazardous spill when working at biosafety level 3

Biosafety level 3 is used to work with indigenous or exotic agents or materials with a potential for respiratory transmission, and which may cause serious and potentially lethal infection.

1. Immediately notify other room occupants of the spill.
2. All occupants should hold their breath and immediately leave the room.
3. Close the door.
4. Everyone should wash their hands and face with a disinfecting soap.
5. Do not re-enter the room until the room ventilation system has cleared the aerosol from the room and the aerosol has had time to settle -- about 30 minutes.
6. Put on a long sleeved gown or lab coat, 2 pairs of disposable gloves, shoe covers, a face shield and/or HEPA filtered respirator. Personal protective equipment worn will depend on the material spilled.
7. Soak paper towels with disinfectant and place then over the entire spill.
8. Disinfectant can then be poured around and into the spill area.
9. Let it set for a contact time sufficient to inactivate the biohazard. Contact time depends on the disinfectant used and the material in the spill.
10. Clean up the spill area using paper towels.
11. Dispose of the towels in an autoclave bag.
12. If there is broken glass, sweep any glass into a dustpan using a handful of disinfectant soaked paper towels or use forceps to pick-up the glass. Do not use your hands.
13. Wash taking a shower using a disinfecting soap.

E. Inside A Centrifuge
1. Clear area of all personnel.
2. Wait 30 minutes for aerosol to settle before attempting to clean spill.
3. Wear a lab coat, safety glasses, and gloves during the cleanup.
4. Remove rotors and buckets to nearest BSC for cleanup.
5. Thoroughly disinfect inside of centrifuge.
6. Discard contaminated disposable materials in appropriate biohazardous waste container for autoclaving.

F. Outside The Laboratory, During Transport
1. Transport labeled biohazardous materials in an unbreakable, well-sealed primary container placed inside of a second unbreakable, lidded container (cooler, plastic pan or pail) labeled with the biohazard symbol.
2. Should spill occur in a public area, do not attempt to clean it up without appropriate PPE.
3. Secure the area, keeping all people well clear of the spill.
4. Call EH&S at 55689 or 911 to assist in cleanup.
5. Standby during spill response and cleanup activity and provide assistance only as requested or as necessary.

G. How To Pick Up Contaminated Sharps
1. Obtain a sharps container.
2. If sharps are contaminated with biohazardous materials such as blood, then put on protective clothing, including a lab coat, goggles or face shield, and disposable gloves.
3. NEVER pick up the sharp item with gloved hand alone. Use tongs, forceps, or pair of pliers to lift the sharps into the sharps container. Use dustpan and broom as a secondary alternative remembering to minimize potential aerosolization of the biohazardous material.
4. After the sharps have been recovered, place paper towels over contaminated area. Pour a small amount of disinfectant over the area. Allow at least ten minutes contact time.
5. Using tongs, remove the towels and place into a biohazard bag. Be careful for shards of sharp material which may not have been recovered during the initial sharps pickup.
7. RADIOACTIVE MATERIAL SPILL

Spreading of radiation beyond the spill can easily occur by the movement of personnel involved in the spill or clean up effort. Prevent spread by confining movement of personnel until they have been monitored and found free of contamination. Spills are divided into two categories, minor and major. A minor spill is a localized spill inside a laboratory that can be cleaned up by trained laboratory personnel. Major spills are defined as those requiring outside assistance for cleanup or those involving areas outside the authorized radioactive material use laboratory. The Radiation Safety Division should be notified immediately for spills in public areas (any area not authorized for radioactive material use). The Radiation Safety Division will aid in evaluation and provide guidance on decontamination.

General guidelines for immediate and follow-up actions are provided below:

A. MINOR SPILLS

1. Notify persons in the area that a spill has occurred.

2. Determine whether anyone is injured. The treatment of life-threatening injuries takes precedence over contamination concerns. Call campus 911 for medical emergencies.

3. Avoid the spread of contamination to nearby areas, and prevent uninjured persons from leaving the spill area until personal contamination checks have been conducted.

4. Prevent unauthorized persons from entering the spill area.

5. Cover the spill with absorbent paper to prevent the spread of contamination.

6. Use disposable gloves and, if necessary, remote handling tongs to clean up contamination. Change gloves frequently. Carefully insert contaminated items such as gloves and absorbent paper into a plastic bag and dispose as radioactive waste.

7. Survey the area with a low-range survey meter appropriate to the radioisotope involved. Check hands, clothing, and the area around the spill for contamination. Note that tritium (H-3) cannot be detected using portable instrumentation (a liquid scintillation counter must be used).

8. Document the incident in the laboratory survey record. Documented information should includes the date and time the incident occurred, the isotope(s) and quantities involved, affected personnel, actions taken, and survey results.
B. MAJOR SPILLS

1. Notify all persons not involved in the spill to vacate the room or area.

2. Determine whether anyone is injured. The treatment of injuries takes precedence over contamination concerns. Call campus 911* for medical emergencies.

3. Cover the spill with absorbent pads, but do not attempt to clean it up.

4. The spill should be shielded only if it can be done without further spread of contamination or without significantly increasing personnel radiation exposure.

5. Isolate the spill area. If possible close and lock the room. For spills outside of the authorized use area, use physical boundaries to isolate the spill. Verify contamination boundaries by scanning with the appropriate radiation detection instrument. Note that tritium (H-3) cannot be detected using portable instrumentation (a liquid scintillation counter must be used).

6. Call the Radiation Safety Division at 5-5396 during working hours. Call campus 911* during off-work hours.

C. INHALATION OR INGESTION

1. Determine the radioisotope involved, the chemical form, and if possible, the amount ingested.

2. Call the Radiation Safety Division at 5-5396 during working hours. Call campus 911* during off-work hours.

D. EXTERNAL CONTAMINATION

1. Remove contaminated clothing.

2. Rinse contaminated skin with tepid water, and mild soap. Give special attention to areas between fingers and around fingernails. Repeat as necessary. Stop decontamination effort if the skin begins to redden or become irritated.
**SPECIAL CASE:** Eye contamination should be washed with copious amounts of warm water only.

1. A safety shower (or other shower if safety shower is not available) should be used for extensive personnel contamination.

2. Call the Radiation Safety Division at **5-5396** during working hours. Call 911 during off-work hours.

3. Do not leave the immediate area until instructed to do so by Radiation Safety Division personnel.
8. **EARTHQUAKE RESPONSE**

During an earthquake take cover in the laboratory or hallway.

- Move away from windows, chemical shelves, and objects or apparatus which may fall.

- Take cover underneath a sturdy desk, table, or the laboratory bench. It is not recommended to stand in a doorway. Doors can swing closed and crush fingers.

- Hold on to the furniture and be prepared to move with it.

- If there is not adequate cover in the laboratory move to the corridor or hallway, sit on the floor, and brace yourself against a wall. Cover or protect your head and neck with your arms.

After the shaking has stopped:

**MINOR QUAKE** - Remain in the building. Check laboratory area for hazards. Check natural gas burners, gas cylinders valves, and electrical equipment. Report conditions to the floor wardens.

**MAJOR QUAKE** - Evacuate the building. Do not use the elevators; use the stairwells. Depending on the situation, some routes may be blocked. Go to your designated meeting area outside.
III. SAFETY EQUIPMENT - PERSONAL PROTECTION
1. EYE AND FACE PROTECTION

Eye protection --safety glasses, goggles, or face shields-- must be worn by all persons in areas were chemicals or other potential eye hazards are used. Some of the potential hazards include impact from an object, chemical splashes, splashes from cultures of infectious agents, UV light, laser generated light, penetration by radioactive particles.

A. Wear chemical SPLASH GOGGLES:
   1. whenever there is any possibility of splashes to the eye when handling chemicals which are hazardous to the eye (e.g., pouring acids, bases, solvents).
   2. when working with liquids hotter than 60°C (140 degrees Fahrenheit).
   3. Note: Safety goggles of the impact type are not suitable for chemical splash protection. Impact goggles are intended to provide greater protection from solid particles than are safety glasses.

B. Wear SAFETY GLASSES with side shields:
   1. when using UV light (use safety glasses specified for UV protection),
   2. when using radioactive isotopes which emit penetrating particles (e.g., 32P),
   3. when working in the laboratory.
   4. Visitors must wear safety glasses in the laboratory.

C. Wear FACE SHIELDS:
   1. when protection is required for the face and neck (e.g., working with cryogenics such as liquid nitrogen or when using UV light).

D. CONTACT LENSES:
   1. If possible, avoid wearing contact lenses when working with chemicals.
   2. Wear chemical splash goggles when wearing contact lenses and working with any liquid chemical. Soft contact lenses can absorb solvent vapors.
   3. Notify coworkers that you wear contact lenses. Contact lenses need to be removed and are hard to remove when chemicals have splashed into the eye(s). Reports indicate that chemicals splashed into the eye become trapped under the lenses causing more serious damage to the eye than if contact lenses were not worn.

2. PROTECTIVE CLOTHING

A. Wear GLOVES whenever you handle or there is a chance for contact with rough or sharp-edged objects, very hot or very cold materials, chemicals, radioactive materials or pathogenic organisms. Brand specific glove selection charts are available from manufacturers. Consult these charts when selecting gloves. Gloves made from the same materials by different manufacturers can have different
protective properties. Appendix E gives general guidelines for glove selection.
1. Select gloves on the basis of the material being handled, the particular hazard, and their suitability for the operation.
2. Glove materials are eventually permeated by chemicals. They are made of various compositions and thicknesses and material which have different resistance to various chemical substance.
3. Replace gloves periodically depending on the frequency of use and the permeability to the substance handled.
4. Inspect reusable heavy gloves for leaks prior to each use. Rubber gloves can be inflated, immersed in water and examined for air bubbles.
5. Use leather gloves for handling broken glass, inserting tubes into stoppers, or other similar operations.
6. Use insulated gloves made from synthetic materials such as Nomex and Kelvar for temperature extremes.
7. Change surgical and exam gloves frequently when working with pathogenic organisms or radioisotopes.
8. Remove gloves before leaving the laboratory, answering the telephone, or handling anything which is usually handled without gloves.
9. Immediately replace disposable gloves when they become contaminated with chemicals, radioisotopes, or biohazardous materials.

B. The purpose of the LABORATORY COAT is to prevent chemicals, radioisotopes, and pathogenic organisms from reaching your skin. Wear your laboratory coat when working with:

1. large volumes of hazardous chemicals,
2. extremely dangerous chemicals,
3. radioisotopes,
4. pathogenic organisms,
5. or tissues or fluids that may contain pathogenic organisms.

Do not wear your laboratory coat outside the laboratory areas. Remove gloves and laboratory coats when leaving your laboratory area. Wearing any protective equipment such as gloves or a laboratory coats outside the laboratory may cause alarm to the general public and non-laboratory personnel.

3. RESPIRATORY PROTECTION

Usually respiratory protection devices are not needed in a laboratory. Under most circumstances safe work practices and engineering controls (fume hoods, biosafety cabinets, and room ventilation) protect workers from chemical and biological hazards. Three circumstances when respiratory protection is needed are:
1. An accidental spill such as:
   a) a chemical spill outside the fume hood
   b) or a spill of biohazardous material outside a biosafety cabinet.

2. when performing an unusual operation that can not be performed under the fume hood or biosafety cabinet.

3. when weighing powdered chemicals or microbiological media outside a glove box or other protective device. Wear a dust-mist mask when weighing the powdered media.

Various kinds of respirators are available. The selection of the proper respirator for the exposure and the fit of the respirator are important considerations when purchasing respirators. Contact Manamohan (Manu) at extension 45647, Neil Mansky at extension 60509, or EH&S at extension 55689 for selection information and fit testing. For more training information, also refer to Section VIII of the manual.
IV. SAFETY EQUIPMENT - FACILITIES
Everyone should familiarize themselves with the availability, location, and the proper use of the various types of safety equipment in their building and in their laboratory.

1. **FIRE EXTINGUISHERS.**

   There are fire extinguishers located in the corridors and/or in each laboratory. Learn the location of the fire extinguishers in your laboratories and in the corridors where you work.

   A. See **FIRE RESPONSE** in Section II for an explanation of types of fire extinguishers and how to use them.

   B. **FIRE EXTINGUISHER REPLACEMENT.** Have any extinguisher that has been used or which has a broken seal replaced immediately. Contact facilities at 62911 to replace fire extinguishers.

2. **FIRE HOSES.**

   Fire hoses may be located in some corridors. The fire hoses are for use only by the L.A. City Fire Department. The high pressure of the water coming through the hose makes it difficult to keep the heavy nozzle from violently whipping around.

3. **FIRE BLANKETS.**

   Fire blankets may be located in some corridors. According to fire fighters the current uses for fire blankets are listed below.

   A. Uses.

   1. **Do not use them when clothes catch on fire.** Wrapping the blanket around a person causes the fire to move up toward the head. Burns to the head are likely to occur. It is better to drop to the floor and roll to smother the fire.

   2. **Use the blanket when moving through areas of fire.** Wrap yourself in the blanket and go through the fire area only as a last resort.

   3. **Use the blanket to maintain the body temperature of a person in shock.**

4. **ALARMS.**

   Know how the fire alarms in your area are activated. Know how to respond to an alarm.

5. **FIRST AID KITS.**

   Each research group should have a stocked first aid kit located in the laboratory. Know the location of the kit and its contents.
6. **EYE WASH STATION.**

Each laboratory which uses solvents, acids or bases should have an eye wash station located near the area(s)--reachable within 10 seconds by an injured person--where these chemicals are used. Know the location of the eye wash station. See CHEMICAL SPILL in Section II for how to flush eyes.

7. **EMERGENCY SHOWERS.**

Emergency showers are located in the corridors and inside some laboratories. Know the location of the nearest emergency shower. See CHEMICAL SPILL in Section II for how to use the showers.

8. **SPILL KITS.**

Each research group should have a chemical spill kit. See Appendix B CHEMICAL SPILL KIT. If an infectious agent is used in the laboratory a disinfecting solution of bleach diluted 1:10 should be freshly made to clean up a spill. See BIOHAZARDOUS MATERIAL SPILL in section II. Know where the materials for the spill kits are located.

9. **FUME HOODS.**

Fume hoods are used to contain and exhaust the vapors or aerosols of toxic, offensive, or flammable materials. They also give protection from chemical splashes, fires, and minor explosions when the sash is lowered.

1. Check that the airflow is adequate before using the fume hood. Check the alarm or check the flow by the pull the hood has on a kimwipe tissue held inside the hood. (Do not let the tissue escape into the hood.)

2. When working in the hood keep the sash at or below the level of the top of the green tape to maintain adequate airflow rates. (Fume hood air flow rates are certified annually at 100 linear feet per minute across the face of the hood by EH&S.)

3. When you are not working in the hood keep the sash closed.

4. Use equipment and chemicals 5-10 cm back from the front edge into the hood.

5. Keep the laboratory doors closed when using the fume hood to maintain the proper airflow through the hood. Opening and closing the laboratory doors can disrupt the airflow inside the fume hood.
6. Do not allow other people in the laboratory to walk by the fume hood when in use. They will disrupt the airflow inside the fume hood and may cause chemical vapors to escape into the laboratory.

7. Limit fume hood storage of chemicals which are too toxic, smelly, or volatile to store in the laboratory. Storing chemicals or apparatus in the fume hood will decrease the efficiency of the hood by blocking the airflow.

8. Do not decrease the airflow by storing items against the back wall of the fume hood. Elevate items stored in the back by placing them on a test tube rack or other apparatus which allows air to flow through it.

9. Be careful not to allow paper to enter the exhaust ducts in the back of the hood. The paper will reduce the airflow, requiring a shut down for cleaning out the paper.

10. Do not conduct procedures in the fume hood in which perchloric acid is heated. A specially designed fume hood is required for this procedure. Manamohan (Manu) at 45647 or Neil Mansky at 60509 if you need to heat perchloric acid.

11. The blower or fan that serves the fume hood should be left on at all times. Do not turn off the hood, even if there is a switch.

10. BIOLOGICAL SAFETY CABINETS.

A. Biological Safety Cabinets are used to:
   1. contain aerosols of biohazardous materials and cytotoxic agents
   2. minimize contamination of materials
   3. and protect the environment

B. REMINDERS:
   1. Radioisotopes and chemicals are not to be used in biological safety cabinet unless the particular cabinet was purchased for this purpose. Class II Type B2 cabinets are designed for using volatile toxic chemicals and radioisotopes in experiments. Trace amounts of volatile chemical and radioisotopes can be used in Class II Type B1 and B3 cabinets.
   2. Do not store equipment or supplies inside the cabinet.
   3. Do not use the top of the cabinet for storage.
   4. They are required by Cal/OSHA to be certified annually when working with infectious agents, recombinant DNA or cytotoxic drugs. The private company Technical Safety Services, Inc.(TSS) currently has the UCLA contract to certify and repair all biosafety cabinets. They provide their service for a fee and service can be scheduled by calling TSS at 1-800-877-7742.

C. PRIOR TO USE:
   1. If the blower is not left ON continuously, do not use the cabinet for 10 minutes after turning the blower ON.
2. If UV light is used, make sure that it is OFF.
3. Check for cabinet airflow after turning the blower ON prior to each use.
4. Decontaminate the cabinet surface with a disinfectant (1:10 dilution of household bleach or 70% alcohol) before use.

D. WHILE IN USE:
1. Do not block the front or rear perforated grills.
2. Perform all work on the solid work surface using a limited number of slow movements. Quick movements can disrupt the airflow of the cabinet.
3. Opening and closing the laboratory doors can disrupt the airflow inside the cabinet.
4. Do not allow other people in the laboratory to walk by the cabinet when using it. They will disrupt the airflow inside the cabinet.
5. Bunsen burners should not be used in a cabinet.
6. Segregate sterile from non-sterile items in the cabinet.
7. Avoid placing contaminated material and hands upstream airwise from non-contaminated materials.
8. To avoid movement in and out of the cabinet, discard used pipets and other materials to a tray or other receptacle located inside the cabinet.

E. AFTER USE:
1. If bunsen type burner is used, make sure that is on OFF.
2. Ideally, leave the blower ON at all times, including when the cabinet is not in use.
3. Decontaminate the cabinet surface with a disinfectant (1:10 dilution of household bleach or 70% alcohol) after use.
4. If UV light is used, turn it OFF when anyone is in the room.

11. EQUIPMENT MAINTENANCE
A. FIRE EXTINGUISHERS. Fire extinguishers are checked monthly by facilities for an intact seal and charge.
B. EYEWASH STATIONS and EMERGENCY SHOWERS. Plumbed eyewash stations and emergency showers are required by Cal/OSHA to be activated monthly to flush stale water from the line and verify proper operation. Campus plumbers activate each shower unit annually. Each research group must flush their eyewash stations monthly.
C. FUME HOODS. To prevent harmful exposure to hazardous substances, fume hoods are required to have an average air flow rate of 100 linear feet per minute (fpm) at the hood face. EH&S annually certifies the airflow rate and sash height to maintain 100 fpm at the hood face. EH&S posts a green colored tape indicating the maximum sash height to maintain 100 fpm air flow at the hood face. The date of certification is written on the tape.
V. SAFETY PROCEDURES - STANDARD OPERATING PROCEDURES
1. SUMMARY OF LABORATORY SAFETY RULES

A. General Safety:
   1. Avoid practical jokes or other behavior that might confuse, startle, or
distract another worker.
   2. Keep work areas clean, chemicals properly stored and labeled, and
equipment properly stored.
   3. Place all chemicals and equipment in their assigned storage areas at
the end of each day.
   4. Avoid working alone in a building.
   5. Do not work alone in a laboratory if the procedures being conducted
are hazardous.
   6. Make arrangements to cross check between individuals working alone
in separate laboratories.
   7. Take proper precautions when running an operation overnight.

B. Personal Hygiene:
   1. Avoid eating, drinking, smoking, or chewing gum or tobacco in the
laboratory rooms where chemicals or radioisotopes are stored or
used.
   2. Store, handle, and consume food and beverages in an area well
separated from the work area and hazardous substances.
   3. Do not use laboratory refrigerators, freezers, ice chests, cold rooms
for storing food and beverages.
   4. Do not use laboratory glassware as food or beverage containers.
   5. Do not apply cosmetics in the laboratory.
   6. Wash hands with soap and water after work in the laboratory and after
spill clean-ups.
   7. Wash promptly with soap and water whenever a chemical has
contacted the skin.
   8. Avoid inhalation of chemicals. Do not "sniff" to test chemicals.
   9. Do not mouth pipet or use mouth suction for starting a siphon.

C. Personal Apparel:
   1. Always wear a lab coat in the laboratory.
   2. Wear appropriate eye protection -- goggles or safety glasses -- for the
task.
   3. Avoid wearing contact lenses in the laboratory. When wearing contact
lenses take precautions from chemical exposure when working with
chemicals. Notify co-workers that you wear contact lenses.
   4. Wear appropriate protective gloves when working with corrosive,
sensitizing, radioactive, or toxic chemicals, or potentially biohazardous
materials.
   5. Wear respiratory protection when necessary.
   6. Tie back or secure long hair and loose clothing. Keep beards trimmed.
   7. Wear shoes that protect or cover your feet. Avoid wearing sandals
and perforated shoes.
8. Wear clothes that can serve as a layer of protection without presenting other hazards. Avoid wearing shorts, short skirts, extremely loose clothing, or extremely tight clothing.
9. Do not wear laboratory coats, gloves and other protective clothing outside the laboratory. (See page III-1).

D. Personal Protection:
1. Monitor where applicable for radioactivity or other hazardous contamination.
2. Know the hazards of the chemicals, radioactive isotopes, and infectious agents you use. Take proper precautions when using them.
3. Know the proper disposal procedures for hazardous chemicals, infectious agents, and radioactive material.
4. Use the appropriate equipment or engineering controls for the task to prevent exposure to hazardous agents.

E. Chemical Safety:
1. Know the location of Material Safety Data Sheets (MSDS).
2. Do not store incompatible chemicals together. Store chemicals by reactive group first, then, if desired, alphabetically.
3. Store and transport all chemicals in secondary containers (i.e. Nalgene tubs). Secondary containers will serve to contain spills and can be used to segregate incompatibles.
4. Clearly label all chemical containers with the chemical identity (including water).
5. Do not use the fume hood for storing excessive amounts of chemicals, apparatus or other materials.
6. Do not block the airflow into the back wall slot by storing items against the back wall.
7. Use a fume hood with the sash lowered to the indicated operating height.
8. Check the fume hood airflow prior to use.
9. Do not keep more than 10 gallons of flammable liquids outside the flammable storage cabinet.
10. Store flammable and combustible liquids not in use in a flammable storage cabinet.
11. Label refrigerators, freezers, and walk-in cold rooms as to suitability for flammable liquid storage.
12. Do not store flammable chemicals in refrigerators, freezers, or cold rooms not approved for storage of flammable chemicals.
13. Label all chemicals with the date received or prepared and hazard information.
14. Discard out dated chemicals in a timely manner.
15. Do not keep peroxide forming chemicals longer than one year after opening.
16. Thoroughly rinse any chemical bottle before discarding it in the trash.
17. Do not purchase greater quantities of chemicals than you need for your experiments.
F. Laser Safety
1. Prepare laser safety operating procedures prior to commencing laser operations.
2. Request EH&S review of equipment and design and laser safety procedures when fabricating new systems or making major alterations of existing systems.
3. Assure that laser operators and users have completed a medical eye examination as required.
4. Receive pre-assignment and termination eye examinations when working with Class IIIB or Class IV lasers.
5. Ensure that lasers made “in house” meet the criteria of the applicable standards including ANSI Z136.1 and 21 CFR part 1040. These lasers should be reviewed by EH&S.
6. Observe all safety rules, and properly use all prescribed personal protective equipment.
7. Receive training before the usage of laser. To receive consultation from EH&S, contact Manamohan (Manu) at x45647.
8. Contact Manamohan (Manu) at x45647 to obtain a Laser Safety Manual.

G. Biological Safety
1. Mouth pipetting is prohibited and may lead to the accidental ingestion of biohazardous materials.
2. Specimens of blood or other potentially infectious materials should be placed inside a leak proof, unbreakable container during handling, processing, storage, transport or shipping.
3. All work surfaces should be cleaned with a suitable disinfectant at the conclusion of the experiment or immediately after a spill.
4. Place a label with the international biohazard symbol on any work surface or piece of equipment where biohazardous materials are stored or used.
5. Personal protective equipment, such as gloves and a lab coat should be worn whenever biological work is conducted in the lab. Additional items of personal protective equipment, such as a face shield for splash hazards should be considered whenever hazards cannot be abated by good work practice or engineering controls.

H. Shop Safety
1. Obtain and review operating manual and prepare operating procedures prior to use.
2. All equipment should have a written job safety analysis (standard operating procedure).
3. All users should have documented training prior to use.
4. Appropriate personal protective equipment, such as safety glasses, work gloves, and tight fitting clothes, should be worn prior to operation.
5. Welding by students is prohibited.
6. All users must know the location of the nearest first aid kit and phone.
7. Contact Jose Zavala at x45718 for consultation or to obtain a guard.

I. Emergency Preparedness:
1. Know where emergency equipment is located: first-aid kit, eyewash, safety shower, fire extinguishers, spill kits.
2. Know how to respond in case of a hazardous spill, fire, or medical emergency.
3. Maintain a spill kit for chemical, biological and radioactive spills.
4. Maintain aisles and exits clear of obstructions. Do not block access to emergency equipment or electrical panels.
5. Keep gas cylinders double chained to the wall and capped when not in use.
6. Store materials secured and limited in height to prevent material from falling.
7. Seismically anchor all equipment where necessary.
8. Store chemicals inside cabinets or on open shelving with seismic restraining bars.

J. Warning Signs:
1. Post emergency response phone numbers by the phone.
2. Keep the NFPA diamond posted on the laboratory door. Contact Manamohan (Manu) at x45647 or Neil Mansky at x60509 to update information on the sign.
3. Post warning signs in the areas where there are: biological hazards, carcinogens, lasers, radioactivity, UV light, or other special hazards.
4. Label refrigerators either approved for storage of flammable liquids or not approved for storage of flammable liquids.

K. Electrical Safety:
1. Check for worn, frayed, abraded, or corroded electrical wires.
2. Do not use "octopus" adapters.
3. Use grounded plugs for all electrical equipment. Use the three-wire plugs.
4. Powerstrips and extension cords for electrical equipment may not be "daisy chained" to each other. An extension cord may only be plugged directly into a wall outlet. Running several powerstrips and extension cords off one another is a fire hazard.

L. Equipment Maintenance:
1. Certify fume hoods, biological safety cabinets, and laminar flow benches annually.
2. Clean refrigerators and freezers regularly.
2. DISPOSAL PROCEDURES

A. CHEMICAL WASTE DISPOSAL

1. Waste Management Program

The Department of Environment Health & Safety has a Chemical Waste Management Program. They collect chemical waste and arrange for proper disposal of the waste. In addition they manage the Hazardous Waste Minimization Program. Some general guidelines for chemical waste disposal are:

a) Eliminate the need for disposal of unused chemicals by not purchasing more than the quantity of chemicals needed for your experiments.
b) Try to use non-hazardous chemicals in place of hazardous chemicals whenever possible.
c) Do not dispose of flammables, organic solvents, toxic materials, corrosive materials, reactive materials, odorous chemicals, or water insoluble materials down the drains.
d) Dispose of Ethidium Bromide as a chemical hazardous waste. Refer to Appendix F for guidelines.

2. Waste Containers in the Laboratory

a) Labeling:
   - All waste containers must be labeled with the words "hazardous waste" or "laboratory waste," the chemical composition of the waste, its hazards, and the accumulation start date (the date the waste is first produced). EH&S requires a UCLA "Hazardous Waste ID Tag" be completed and placed on the container when it is first designated as a waste. See the following page for an example tag.
Online Tag-Program

HAZARDOUS WASTE

☐ Ready for Disposal
Select "ready for disposal" in OTP

Accumulation Start Date: Oct 17 2003
Waste must be given to EHS by Jan 15 2004

Generator Account Name: IBrui (Research)
Your Name: Joe Bruin
Phone: x51234
Building: EH&S Services Building
Room: 550

CONTENTS Chemical Name
Water
Acetone
Methanol

Hazardous Properties
☐ Flammable
☐ Corrosive Acid (pH ≤ 2)
☐ Corrosive Base (pH ≥ 12.5)
☐ Toxic
☐ Reactive
☐ Oxidizer
☐ Extremely Hazardous (EH)

Physical State:
☐ Solid ☐ Gas ☐ Liquid

Comments:

Container Size: 3.00 Liter

Address:
501 Westwood Plaza, 4th Floor, Los Angeles 90095

State and Federal law prohibit improper disposal.
If found or in case of emergency call 911 (Campus Phone)

- Each Principal Investigator (PI) will have a user name and password for the whole lab.
- To Sign up, send an e-mail to:
  The Hazardous Waste Program Manager (Mike Spicer mspicer@facnet.ucla.edu)
Include the first and last name of the Principal Investigator (PI), Name of Safety/Waste Coordinator, Funding Source (Research, Hospital, Instructional, Facilities, or Other), PI Phone Extension, PI E-mail Address, up to two people to send additional e-mail notifications to.
b) Accumulation time limits:
- UCLA policy states that waste can only be stored in a lab for 90 days. Full containers are required to be removed from labs within 2 weeks.

c) Container and packaging requirements:
- The waste must be accumulated in containers that are in good condition.
- The waste must be compatible with the container it is stored in.
- The container must be kept closed except when the waste is being added to or removed from the container.
- Liquids must be collected in containers with screw tops or sealed lids. Do not completely fill the container. Leave the container less than 90% full.
- Dry waste must be double bagged in clear plastic bags. Bench diapers are not hazardous waste unless hazardous chemicals were spilled on the diaper.
- Liquids are required to be separated from solids (e.g., empty liquids from microfuge tubes).
- Mercury must be collected in a screw cap bottle. Double bag mercury contaminated items and broken thermometers in clear plastic bags.

d) Waste storage amount limits:
- The maximum amount of waste allowed to be stored in a laboratory is:
  (a) 55 gallons
  (b) one quart acute / extremely hazardous waste

- The maximum amount of solvent allowed to be stored in a lab is 60 gallons including waste solvents.

3. Chemical Waste Pick-Up Procedure

a) Chemical waste is picked up on a regular schedule by EH&S staff. Each laboratory must package, tag, and transport (See page V-19 for information on how to transport chemicals.) their waste to the pick-up site for their building at the scheduled time. The pick-up schedule is listed on page V-10.
b) Separate incompatible chemicals during transport and storage. Store and transport chemicals by hazard classes:

- Flammable Solid
- Flammable or Combustible Liquid/Solvent
  - nonhalogenated, halogenated
- Corrosives
  - Acids – also separate organic, inorganic, nitric
  - Bases
- Oxidizers
- Poisons or Toxics
  - carcinogens, mutagens, irritants, formaldehyde
- Explosives/Shock Sensitive
  - Water reactives
  - organic peroxides
- Heavy Metals

References to use to determine hazard classification and compatibility.
- the Aldrich chemical catalog
- the label from the original chemical container
- the MSDS

c) These items will not be accepted at chemical waste pick-ups:
- Leaky containers.
- Containers with exterior chemical contamination.
- Containers which are too full. Do not fill containers over 90%.
- Radioactive waste or biohazardous waste.
- Bags containing protruding glass and other sharps such as needles, blades or glass pipettes.
- Materials packed in infectious waste or biohazard bags or labeled as a biohazard.
- Bench diapers unless hazardous chemicals were spilled on the diaper.

4. Dangerous Chemical waste, Unknowns, and Lab Clean-out Procedures

a) Acutely dangerous waste
- Do not move acutely dangerous or unknown wastes which are shock sensitive or whose containers are leaking due to corrosion or which have no labels.
b) Unknown wastes
   - Unknowns which are properly packaged and accompanied by a completed “Recharge Order Request” form will be accepted at the chemical waste pick-up. Place a tag on the container and write “UNKNOWN” in the substance ID box. A cost of $65 per container may be charged to identify the waste.

c) Large quantities (Lab Clean-out or Lab Closure)
   - Schedule to have large quantities of chemical waste (e.g., lab clean-out) picked-up at a time different from the routine building pick-up. Call 61887.

d) Peroxide forming chemicals
   - Once a peroxide forming chemical has been opened, the lab has one year to use it. After one year, it has to be disposed of as hazardous waste.
   - All peroxide forming chemicals (PFCs) that are kept by users beyond the expiration date will result in a $65 recharge. PFCs normally will not start forming explosive peroxides if they are not expired. As long as we receive PFCs before their expiration date, there will be no extra charges.
   - Refer to Appendix H for a list of peroxide forming chemicals and the disposal policy for PFCs.
5. Chemical Waste Pick Up Schedule

(Effective July 1, 2007)

<table>
<thead>
<tr>
<th>Time</th>
<th>Applicable Buildings</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MONDAY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 a.m. - 11:00 a.m.</td>
<td>BSRB/OHRC, Boyer Hall, Life Science</td>
<td>BSRB/OHRC Loading Dock</td>
</tr>
<tr>
<td><strong>TUESDAY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 a.m. - 9:25 a.m.</td>
<td>Young Hall (Solvents Only)</td>
<td>MSB Loading Dock</td>
</tr>
<tr>
<td>9:35 a.m. - 10:00 a.m.</td>
<td>Young Hall, MSB, Geology, Slichter Hall, Franz Hall</td>
<td>MSB Loading Dock</td>
</tr>
<tr>
<td>10:30 a.m. - 11:00 a.m.</td>
<td>MRL, Gonda, NRB</td>
<td>MRL Loading Dock</td>
</tr>
<tr>
<td><strong>WEDNESDAY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30 a.m. - 11:00 a.m.</td>
<td>CHS, Factor, NPI, BRI, Reed, Marion Davies, JSEI, JLNRC</td>
<td>CHS 1st Floor Loading Dock</td>
</tr>
<tr>
<td><strong>THURSDAY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:45 p.m. - 2:15 p.m.</td>
<td>Engineering 1, IV, V, Boelter Hall, Math Sciences</td>
<td>Engineering IV Receiving &amp; Loading Area</td>
</tr>
<tr>
<td>2:30 p.m. – 3:00 p.m.</td>
<td>CNSI</td>
<td>CNSI Loading Dock</td>
</tr>
<tr>
<td><strong>FRIDAY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 a.m. - 9:25 a.m.</td>
<td>Young Hall (Solvents Only)</td>
<td>MSB Loading Dock</td>
</tr>
<tr>
<td>9:35 a.m. – 10:00 a.m.</td>
<td>Young Hall</td>
<td>MSB Loading Dock</td>
</tr>
</tbody>
</table>
Note:

1. **Applicable Buildings**: Only buildings that are listed are allowed to drop off waste at the locations in which they are associated. Do NOT cross streets with waste. If your building is not listed above, please call x61887 for pickup times.

2. **Routine Wastes Only**: The listed scheduled pickups are for routinely generated chemical waste only. Call EH&S Hazardous Waste Line at x61887 for lab clean-outs of large quantities or special projects.

3. **Wastes Not Accepted**: No medical wastes x53323 (pathological or biohazard), no radioactive wastes x56995, and no controlled substances x59216 will be accepted.

**Waste Disposal Information:**

1. **Identification**: All waste must be labeled/tagged with a **UCLA On-line Hazardous Waste Tag** when the first drop is added.

2. **Container Requirements**:
   - **Liquid Wastes**
     a) Containers must be **free of exterior contamination**.
     b) Containers must be chemically compatible and the size should be suitable for the material stored.
     c) Containers must be in good condition with screw tops or sealed lids.
     d) Containers MUST NOT be leaking, rusting or have any other defects.
     e) Containers MUST NOT be filled to the top. (Leave 10% air space)
   - **Dry Wastes**
     f) Dry waste must be double bagged in transparent, sturdy bags and cannot have sharp or protruding edges.

3. **Transportation to Pick-up**: All waste brought to the pickup must be transported in a sturdy cart and with secondary containment.

4. **Unknown chemicals** require the generator to bring a University Recharge Request Form (P-39) completed and signed to cover the costs of analysis.

5. **Laboratory Clean-outs**: Obtain and complete the lab clean-out form from the website listed below and contact the Hazardous Waste Manager to schedule a pick-up.

For additional information, contact EH&S Hazardous Materials Manager @ x45569 or visit [www.ehs.ucla.edu](http://www.ehs.ucla.edu).
B. BIOHAZARDOUS WASTE DISPOSAL

1. CONTAINMENT
   a) Use RED biohazard bags to contain biohazardous or medical waste. Do not use orange or clear bags.
   b) RED biohazard bags must be labeled with the words “Biohazardous Waste” or the word “BIOHAZARD” and the international biohazard symbol.

2. BIOHAZARD BAG CONTAINERS
   a) RED biohazard bags in use must be kept inside rigid, leak-resistant containers. The container must have a lid that fits. Do not use hampers or wire baskets to hold biohazard bags. Do not tape bags to the wall or equipment.
   b) The container can be any color.
   c) The container must be labeled “Biohazardous Waste” or with the word “BIOHAZARD” and the international biohazard symbol on the lids and sides so that the label is visible from any lateral direction.
   d) Biohazard waste containers must be sanitized when soiled with waste. They must be sanitized by exposure to hot water at 180°C for 15 seconds or exposure for 3 minutes to any one of the following disinfectants: hypochlorite (i.e., bleach) solution (500 ppm available chlorine), phenolic solution (100 ppm active agent), Iodoform solution (100 ppm iodine) or quaternary ammonium solution (400 ppm active agent).

3. SHARPS CONTAINERS
   a) All sharps containers must be rigid, puncture resistant and leak resistant. Cardboard does not meet these requirements.
   b) Sharps containers may be any color.
   c) Sharps containers must be labeled with the words, “Sharps Waste” or the international biohazard symbol and the word, “BIOHAZARD.”

4. BAG AND CONTAINER USE
   a) Do not overfill RED biohazard bags or the biohazard bag container. The lid must be able to fit tightly on the container and the bags must be able to be tied closed easily.
   b) Lids must be kept on containers unless the container is in use or the container is empty.
   c) Never allow sharps to stick out of the opening of the sharps container. Place them entirely inside the container.
   d) Do not use RED biohazard bags for regular trash, transporting non-biohazardous items, or covering equipment such as microscopes.
   e) Do not remove any biohazardous waste from the RED bag once it has been placed in the bag.
f) Do not place items in the RED biohazard bag that can pierce the bag.

5. HUMAN TISSUES AND BIOHAZARDOUS ANIMALS
   d) Human tissues and biohazardous animals are required to be placed in RED biohazard bags. The bags are required to be placed inside a leak resistant container labeled with the words “Pathology Waste” or “PATH”.
   e) When storing human tissues or biohazardous animals that are waste in a freezer, the bags must be tagged with the date and a description of the contents. This is not required until the human or animal tissue becomes a waste.
   f) Return human tissues to the department you received them from or from Autopsy (CHS 13-165).
   g) Return animals to Department of Laboratory Animal Medicine (DLAM).

6. TRANSPORT AND STORAGE
   a) Tie-close filled RED biohazard waste bags before transporting them.
   b) All closed and filled biohazard bags must be transported inside a rigid biohazard bag container and may be placed on a cart. The bag itself may not be transported in an autoclave pan, cardboard box, or on a cart. They may not be carried by hand.
   c) Do not set or store full, RED biohazard bags on the floor, in an autoclave pan or cardboard box. They must be inside a biohazard bag container at all times except when inside the autoclave.
   d) Store containers of biohazardous waste in a secure area such as a laboratory or autoclave room. Do not set or store them in the hallway.
   e) Do not store RED bags of biohazardous waste for more than 7 days at a temperature above freezing. Dispose of the bags as soon as possible.
   f) Do not store full sharps containers for more than 7 days at a temperature above freezing. Dispose of the full sharps containers as soon as possible.
   g) Do not store biohazardous waste, full sharps containers or human tissues and animals that are waste for more than 90 days in a freezer.
   h) Do not compact bags of biohazardous waste when placing them in a storage container.

7. TREATMENT /DECONTAMINATION
   i) Follow written procedures for treatment or decontamination of biohazardous waste and sharps waste.
8. DISPOSAL

9. Dispose of all full, RED biohazard bags and sharps containers inside the biohazard containers provided by the treatment company. Keep the lid on the container except when placing bags or sharps containers inside. **Do not over fill the container.** The lid must fit on tightly on the container.

10. Biohazardous waste or sharps waste combined with hazardous chemical waste must be disposed of as hazardous chemical waste.

11. Biohazardous waste or sharps waste combined with radioactive waste must be disposed of as radioactive waste.

12. Biohazardous waste or sharps waste combined with hazardous chemical waste and radioactive waste must be disposed of as radioactive waste.

C. NON-BIOHAZARDOUS SHARPS WASTE DISPOSAL

What Are Sharps?

- Needles with or without attached syringe or tubing,
- Blades, scalpels, razors,
- Glass: broken pipets, whole or broken Pasteur pipets, broken vials.

1. Disposal Procedures
   a) Do not discard sharps into the regular trash can. They can cause injury to the custodians.
   b) Do not recap or clip needles.
   c) As sharps are used or generated, place them into a sharps container. A sharps container is "a rigid puncture-resistant container which, when sealed, is leak-resistant and cannot be reopened without great difficulty". Do not use cardboard sharps containers because they leak. Use plastic or other kinds of leak-proof containers.
   d) Place sharps into a sharps container which is not labeled with biohazardous stickers. These containers do not have to be labeled in a specific way. When the container is nearly full, seal it and dispose of the sealed container with broken glass.

D. GLASS DISPOSAL

1. Do not mix broken or unbroken glass with regular trash. Glass mixed with regular trash could cause an injury to your custodian.
2. Dispose of large glass containers such as solvent bottles in the dumpsters located in the loading dock area. Rinse and dry the glass containers before disposal.
3. Dispose of broken glass in a separate trash container designated for and labeled "Broken Glass".
E. RADIOACTIVE MATERIALS DISPOSAL

1. Dry Radioactive Waste

a) Segregation Requirements

All dry radioactive waste must be segregated into one of the following categories prior to acceptance by the Radiation Safety Office (RSO).

- Alpha emitters
- Sealed sources, including check sources
- Sr-90, I-129
- Stored for decay waste:
  (a) $T_{1/2} < 15$ days (P-32, Ga-67, Tc-99m, In-111, Tl-201, etc.)*
  (b) $15 < T_{1/2} < 90$ days (Cr-51, I-125, etc.)*
  (c) $61 < T_{1/2} < 90$ days (S-35, etc.)*


- $T_{1/2} > 90$ days (H-3, C-14, Na-22, Ca-45, Co-57, etc.)
- Lead.

Radioactive waste mixed with biohazardous, infectious or hazardous waste cannot be accepted without prior permission by the RSO.

OPTIONS:

- Biohazardous or infectious waste can be sterilized. After sterilization, delete biohazardous or infectious warning signs. Place sterilized bag inside radioactive waste collection. Cold sterilization techniques which use ethylene oxide or formaldehyde are not authorized.

- Store for decay (minimum of seven half-lives) and dispose of as biohazardous, infectious or hazardous.

b) Handling, Packing And Transportation

- All segregation waste must be accumulated in strong transparent plastic bags, within a rigid support container.
- Double bagging is recommended whenever containment integrity is in question.
- If accumulating high energy beta of beta/gamma emitters, the support container should be constructed of a material that will provide shielding.
• High energy beta and beta/gamma emitters require shielding at all times.
• Any objects considered "sharps" (needles, scalpels, broken glass) must be packaged in a rigid container.
• The "sharps" container must be properly sealed and labeled separately.
• Attach a completed "Dry Radioactive Waste" tag with the following:
  (a) activity in millicurie or micro curies for each radioisotope listed (Do not use "Less Than")
  (b) lead pigs do not require activity unless contaminated
  (c) responsible user, department, and date
• If a transportation cart is used, it must have side rails, or some means of securing the waste.
• Please do not use patient elevators.
• If elevator use is required, please try to use one that is not already occupied.
• Properly packaged waste will contain all contamination. Therefore, use of gloves during transport is not recommended. However, gloves should be taken along for use in the unlikely event of a spill.
• All animal carcasses and excreta must be securely packaged in opaque plastic bags.
• All animal carcasses and excreta may be delivered to the CHS Radiation Safety Office during normal working hours.
• Accurate accounting of radioisotope, radioactivity, and date radioactivity was calculated is very important for all animal carcasses and excreta. Please include this data on a completed "Dry Radioactive Waste" tag.

c) Disposal Practices

• Short lived contaminated laboratory trash is placed in cardboard boxes labeled with the date stored for a minimum of seven half-lives. Segregation of stock solution vials may reduce the holding time for decaying short-lived radioactive wastes.
• Long lived waste is compacted into D.O.T. approved 55 gallon drums. The dry radioactive waste is reduced to approximately 30% of its original volume.
• Animal carcasses and excreta are incinerated locally.
• Uncontaminated lead shielding is recycled.
2. Liquid Radioactive Waste

a) Segregation Requirements

- All liquid radioactive waste must be readily soluble or dispersible in water.
- Radioactive liquid waste mixed with biohazardous, infectious or hazardous waste cannot be accepted without prior permission by the Radiation Safety Office (RSO).

b) Handling, Packaging And Transportation

- Liquids waste must be accumulated in strong leak proof containers
  (a) polyethylene or glass are acceptable.
- Contents limited to liquids, containers will not be accepted with solids or laboratory trash such as pipettes and vials.
- Container volume is limited to 10 liters
  (a) fill volume should not exceed 75% of the total volume
- Containers must be capped when not in use.
- Secondary containment must be used at all times.
- Secondary containment volume must exceed liquid waste volume.
- Attach a completed "Liquid Radioactive Waste" tag with the following:
  (a) activity (millicuries of micro curies) for each radioisotope listed (Do Not Use Less Than; Take a sample and count in a liquid scintillation counter to calculate activity.)
  (b) chemicals present
  (c) responsible user, department, and date
- If a transportation cart is used, it must have side rails, or some means of securing the waste.
- Please do not use patient elevators.
- If elevator use is required, please try to use one that is not already occupied.

- Properly packaged waste will contain all contamination. Therefore, use of gloves during transport is not recommended. However, gloves should be taken along for use in the unlikely event of a spill.
• Shielding must be provided for storage and transportation of high energy beta (P-32, Sr90), and beta/gamma emitters (Fe-59, I-131, Na-22).

c) Disposal Practices

Liquids which are readily soluble or dispersible in water may be disposed of by release into the sanitary sewer system. This must be done by qualified RSO personnel, at a designed site, so that the conditions and provisions outlined in the U.C.L.A. Radioactive Material License and California Code of Regulations, Title 17. are met.

3. Liquid Scintillation Vials

a) Segregation Requirements

All liquid scintillation vials must be segregated into the following categories prior to acceptance by the Radiation Safety Office (RSO).

- Radioisotope.
  (a) H-3 and/or C-14
  (b) regulated radioisotopes (P-32, I-125, S-35, etc.)

- Composition.
  (a) plastic (a recharge may soon be imposed on these)
  (b) glass

- Size.
  (a) mini
  (b) standard (~20 ml)
  (c) other

- Liquid scintillation fluid used.
  (a) environmentally benign or biodegradable
  (b) organic solvent based
b) Handling, Packaging And Transportation

- Vials must be accumulated in:
  (a) stacked cardboard racks within two transparent bags
  (b) cardboard box lined with a plastic bag
  (c) any sturdy sealed container with prior RSO approval

- Contents limited to vials, containers will not be accepted with solids or laboratory trash.
- Vials must be capped.
- Attach a completed "Liquid Radioactive Waste" tag with the following:
  (a) activity (millicuries of micro curies) for each radioisotope listed
  (b) responsible user, department, and date
  (c) scintillation fluid brand name and type must appear on the tag

- If a transportation cart is used, it must have side rails, or some means of securing the waste.
- Please do not use patient elevators.
- If elevator use is required, please try to use one that is not already occupied.
- Properly packaged waste will contain all contamination. Therefore, use of gloves during transport is not recommended. However, gloves should be taken along for use in the unlikely event of a spill.

c) Disposal Practices

- All organic solvent based (e.g., p-dioxane, xylene, or pseudocumene) liquid scintillation cocktails must be subdivided into the following categories:

  (a) Exempt fluids - are liquid scintillation fluids containing C-14 and/or H-3 with concentrations not exceeding 0.05 micro curies per gram.
  (b) Regulated fluids - are liquid scintillation fluids containing radionuclides such as S-35, P-32 and Na-22.
• Environmentally benign or biodegradable liquid scintillation cocktails use long-chain and multi ringed aromatic compounds (e.g., linear alkylbenzenes) as solvents. These have not been identified as hazardous by the Environmental Protection Agency. These cocktails have lower toxicities and higher flash points, than the organic solvent based type. Disposal by release to the sanitary sewer system is used at this time. This must be done by qualified Radiation Safety Office personnel, at a designated site, so that the conditions and provisions outlined in the U.C.L.A. Radioactive Material License and California Code of Regulations, Title 17, are met.

4. Mixed Waste and Lead

Mixed waste is a category of radioactive waste that is controlled by both the Nuclear Regulatory Commission and the Environmental Protection Agency because of chemical or otherwise hazardous properties besides radiotoxicity. Title 40, Sections 260-266 of the Code of Federal Regulations (40 CFR) lists several substances which may fall under the category of mixed waste.

The relevance of this to the UCLA radioisotope/radiation community is that contaminated lead shielding is classified as mixed waste material owing to the potential problems of lead poisoning. For this reason, lead dry waste needs to be separated from other dry waste before being delivered to RSO personnel at designated waste pick-up sites and times.
Radioactive Waste Pick Up Schedule

Effective July 1, 2007

<table>
<thead>
<tr>
<th>Date and Time</th>
<th>Waste</th>
<th>Building and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:10 am -- 9:30 am</td>
<td>All</td>
<td>Warren Hall</td>
</tr>
<tr>
<td>9:45 am -- 10:30 am</td>
<td>All</td>
<td>CHS Loading Dock, 1st Floor</td>
</tr>
<tr>
<td><strong>Tuesday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:50 am – 9:10 am</td>
<td>All</td>
<td>Rehabilitation Center / Med. Plaza</td>
</tr>
<tr>
<td>9:15 am -- 9:35 am</td>
<td>All</td>
<td>SRB2 Loading Dock</td>
</tr>
<tr>
<td>9:45 am -- 10:30 am</td>
<td>All</td>
<td>MRL / GRL (Rm. B-726)</td>
</tr>
<tr>
<td><strong>Wednesday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 am -- 9:30 am</td>
<td>All</td>
<td>MBI / Boyer Hall Loading Dock</td>
</tr>
<tr>
<td>9:35 am -- 10:00 am</td>
<td>All</td>
<td>Molecular Sciences Building (MSB) Loading Dock</td>
</tr>
<tr>
<td>10:05 am -- 10:25 am</td>
<td>All</td>
<td>Life Sciences Loading Dock</td>
</tr>
<tr>
<td>10:30 am -- 10:40 am</td>
<td>All</td>
<td>Botany [See Notes]</td>
</tr>
<tr>
<td><strong>Thursday</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:15 am -- 9:30 am</td>
<td>All</td>
<td>Brentwood Facility</td>
</tr>
<tr>
<td>9:45 am -- 10:30 am</td>
<td>All</td>
<td>CHS Loading Dock, 1st Floor</td>
</tr>
<tr>
<td><strong>Friday</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

- *Pick-up by appointment only.* To schedule, please call the Isotope Desk @ x5-5396 at least 24 hours in advance.
- Please be advise that, radioactive wastes may not be transported outside your complex.
- Please be aware of holidays. The Radiation Safety Division will not have pick-ups during the Christmas and New Year holidays to allow staff to visit with their families.
- Call x5-5396 to request a radioactive waste container return.
3. **CHEMICAL STORAGE AND USE**

- Obtain quantities of chemicals which will be used in a reasonable time period.
- Keep all chemicals labeled with the name, formula, and hazard precautions at all times.
- Store large containers of chemicals on low shelves.
- Date chemicals when they are received.
- Discard chemicals that may become hazardous with prolonged storage before they become a hazard (such as ether or picric acid).
- Use secondary containers.
- Segregate incompatible chemicals.

**A. GAS CYLINDERS**

1. Store gas cylinders in the laboratory chained to the wall above their center of gravity and with the safety cap in place. It is required to install and use 2 chains to restrain gas cylinders. One chain should be placed at the top of the cylinder (one third of the way up). The other should be placed at the bottom of the cylinder (one third of the way down).
2. Move gas cylinders with the safety cap in place and using the two wheeled cart designed for this purpose.
3. Hoses which carry flammable or toxic gases from cylinders must have all connections wired. Clamp or wire water hose connections, particularly on flammable solvent stills. Inspect these connections frequently for deterioration.
4. Compressed oxygen gas cylinders shall be stored at least 20 feet from combustible materials and flammable gases.

**B. FLAMMABLE AND COMBUSTIBLE LIQUIDS**

1. Store flammable and combustible liquids inside a flammable storage cabinet or a refrigerator or freezer which is approved for the storage of flammable substances.
2. Do not store flammable or combustible liquids on the floor or in any exit access.
3. The maximum quantity allowed to be kept outside a flammable storage cabinet, safety can, or approved refrigerator is 10 gallons of flammable and combustible liquids.
4. Handle flammable and combustible substances in areas free of ignition sources.
5. Use them under a fume hood.
6. Keep only the amount required for the experiment or procedure on the laboratory bench.
7. Avoid skin contact. Wear protective gloves, goggles, and a laboratory coat or apron when using large amounts of these liquids. Immediately wash liquids from your skin that come in contact with your skin. Use a non-abrasive soap or hand cleaner.
C. CHEMICAL SEGREGATION

Segregate and group chemicals according to the manner in which they will react with other chemicals and also, their degree of reactivity. Neglecting the chemical and physical properties of stored materials can result in fires, explosions, and emissions of toxics.

Some of the chemical companies have recently developed color coded labeling schemes for chemical segregation. They use red for flammables, blue for health hazards, yellow for oxidizers, white for corrosives, and a fifth color for less hazardous materials. Their scheme is general and can aid in chemical segregation. Some additional segregation is recommended in these categories.

For storage chemicals should be grouped into the following main classes:

- Flammables and Combustibles
- Organic Acids
- Oxidizing Acids
- Mineral Acids
- Bases
- Oxidizers
- Peroxide Formers
- Highly Toxics
- Water Reactives

1. Flammables and Combustibles
   a) Segregate from oxidizing acids and oxidizers.
   b) Store away from ignition sources.
   c) Store in flammable storage cabinet or approved safety can.
   d) Store highly volatile flammable liquids in an approved refrigerator.
   e) Keep fire fighting equipment readily available.
   f) Keep spill cleanup materials handy.

2. Acids
   a) Segregate mineral acids from organic acids.
   b) Segregate oxidizing acids from flammable and combustible substances.
   c) Segregate acids from bases.
   d) Segregate acids from active metals such as sodium, potassium, magnesium, etc.
   e) Segregate acids from chemicals which could generate toxic gases upon contact such as sodium cyanide, iron sulfide, etc.
f) Store acids in individual trays which are large enough to contain the total volume of liquid.
g) Store acids below eye level.
h) Store perchloric acid by itself.
i) Picric acid must contain at least 10% water to inhibit explosion.
j) Keep spill cleanup materials handy.

3. Bases
   a) Segregate bases from acids.
   b) Store liquid bases below eye level.
   c) Keep spill cleanup materials handy.

4. Oxidizers
   a) Store in a cool, dry place.
   b) Keep away from flammable and combustible materials such as wood and paper, and flammable organic chemicals.
   c) Keep away from reducing agents such as zinc, alkaline metals, and formic acid.

5. Water Reactives
   a) Store in a cool, dry place.
   b) Keep away from moisture and water.

6. Highly Toxic Chemicals
   a) Store according to the hazardous nature of the chemical. Use appropriate security when necessary.
   b) Store carcinogens/reproductive hazards in secondary containers.
   c) Label the storage area with a toxic substance label or carcinogen label.

7. Peroxide Forming Chemicals
   a) Store in airtight containers in a dark, cool, and dry place.
   b) Label containers with the date received and the date opened.
   c) Dispose of peroxide forming chemicals before peroxide formation or within one year after opening and one year after receiving.
   d) Test for the presence of peroxides periodically.

D. CARCINOGENS, ALLERGENS, EMBRYOTOXINS, AND TOXIC CHEMICAL USE

1. Establish a designated area or controlled area:
   a) Use and store these substances in areas of restricted access posted with special warning signs.
   b) Advise other people working in the laboratory (including maintenance workers) of the toxic substance, restricted area, and precautions to take.
c) Store these substances, properly labeled, in an adequately ventilated area and inside an unbreakable secondary container.

d) Maintain an inventory of these chemicals including the quantities purchased and the date received.

e) Working quantities (not including stored quantities) should be kept to a minimum.

f) Access doors to work areas should be kept closed while experiments involving these chemicals are in progress.

2. Use of containment devices such as fume hoods or glove boxes:

a) Always use a fume hood or other containment device for procedures which may result in generation of aerosols or vapors containing the substance. Examples of aerosol producing procedures are: the opening of closed vessels, transfer operations, preparation of feed mixtures, blending, open vessel centrifugation, and the application, injection, or intubation of a chemical into experimental animals.

b) Tissue culture and other biological procedures may be conducted in a Class II type B Biological Safety Cabinet. A Class II type A Biological Safety Cabinet may be used if the cabinet's exhaust air is discharged to the outdoors.

3. Work area:

a) Cover all work surfaces with stainless steel, or plastic trays, dry absorbent plastic backed paper, or other impervious material.

b) Protect each vacuum service line (house vacuum line) with an absorbent liquid or liquid trap and HEPA filter.

c) When using a volatile chemical, a separate vacuum pump should be used.

4. Personnel protection:

a) Always avoid skin contact. Wear a laboratory coat with long sleeves, gloves, and eye protection appropriate for the task.

b) Do not wear the laboratory coat or gloves used for this work outside the laboratory.

c) Discard disposable gloves after each use and immediately after overt contact with a chemical carcinogen.

d) Clothing overtly contaminated by chemicals should be removed immediately and disposed of or decontaminated prior to laundering.

e) Never mouth pipet.
5. Decontamination procedures:
   a) Always wash hands, arms, face immediately after working with these substances.
   b) If possible decontaminate or inactivate the substance by chemical conversion.
   c) Never dry sweep these chemicals. Use special clean-up procedures developed for the individual compound.

6. Procedures for safe removal of contaminated waste:
   a) Follow UCLA chemical waste disposal procedures (See CHEMICAL WASTE DISPOSAL).

E. TRANSPORT OF CHEMICALS

1. Use safety carriers to move chemical containers made of glass a significant distance.
2. Transport large bottles of corrosives in corrosive resistant safety carriers.
3. When moving several glass containers at one time:
   a) transport the bottles on a low, stable cart with a substantial rim around the edge,
   b) transport the bottles on a cart inside a secondary container which can hold the volume of their contents,
4. Segregate chemicals by reactive groups into separate secondary containers.
5. Prevent bottles from knocking against each other.
6. When transporting chemicals from one floor to another, take the freight elevator if possible.
7. Transport gas cylinders with the safety cap in place and using a two-wheeler designed for this purpose.

F. WHEN PRIOR APPROVAL IS REQUIRED BEFORE CONDUCTING EXPERIMENTS

1. Prior approval from the laboratory manager or principal investigator must be obtained when:
   a) It is likely that the toxic limit concentrations could be exceeded or that other harm is likely.
   b) Members of the laboratory have become ill or have had symptoms of exposure to the particular hazardous substance(s) in the past.
   c) Equipment and safeguards have previously failed.
   d) A new procedure or a change in procedure is planned.
Each person wishing to use radioisotopes must receive prior approval from the Radiation Safety Division. Contact the Radiation Safety Office at 56995.

Research projects involving infectious agents, laboratory animals, or recombinant DNA must be registered and approved by the Animal Research Committee or the Institutional Biosafety Committee. Contact the Biosafety Officer at 63929 for information on registration.
VI. HAZARD COMMUNICATION AND IDENTIFICATION
VI. HAZARD COMMUNICATION AND IDENTIFICATION

Research laboratories must do the following to meet the requirements of the Cal/OSHA’s Hazardous Communication Standard and the Chemical Hygiene Standard.

a. Each laboratory must ensure that labels of incoming containers of hazardous substances are not removed or defaced.

b. Each container must be labeled, tagged, or marked with the:
   • identity of the hazardous substance in the container, and
   • appropriate hazard warnings for the substance.

c. Each laboratory must maintain any material safety data sheets (MSDS’s) that are received with incoming shipments of hazardous substances.
   • Material Safety Data Sheets provide information about the physical hazards, health hazards, handling procedures, and emergency procedures for a specific chemical. Other sources of this type of information are listed in the appendix REFERENCES.
   • The laboratory must have a MSDS for each hazardous substance used.
   • The MSDS’s must be readily available to laboratory workers.
   • **MSDS sheets can be obtained on the internet at:**
     
     http://msds.ehs.ucla.edu
     http://www.ucop.edu/riskmgmt/ohp/msds.html
VII. MEDICAL CONSULTATION AND EXAMINATIONS
VII. MEDICAL CONSULTATION AND EXAMINATIONS

1. The Cal/OSHA Safety Order titled "Occupational Exposure to Hazardous Chemical in Laboratories" (the Chemical Hygiene Standard) states that all employees who work with hazardous chemicals shall have an opportunity to receive medical attention when:

a) the employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed.

b) exposure monitoring reveals an exposure level routinely above the action level for a Cal/OSHA regulated substance or above the exposure limit for non-Cal/OSHA regulated chemicals for which there are exposure monitoring and medical surveillance requirements.

c) an event takes place in the work area such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure.

2. The affected employee must be provided an opportunity for a medical consultation to determine the need for an examination. Medical examinations and consultations are provided under the direct supervision of a licensed physician without cost to the employee, without loss of pay, and at a reasonable time and place.

3. Follow the procedures in Section II, PERSONAL INJURY IN THE LABORATORY to receive medical attention under the above circumstances.

EXPOSURE DETERMINATION

a) If there is reason to believe that exposure levels for a regulated substance routinely exceed the action level for a Cal/OSHA regulated substance or exposure limit for non-Cal/OSHA regulated substance, exposure levels and conditions can be determined by EH&S personnel. Contact Manamohan (Manu) at 45647, Neil Mansky at 60509 or Bill Peck at 45773 for exposure determinations.
VIII. INFORMATION AND TRAINING
VIII. INFORMATION AND TRAINING

1. Training and information on the hazards of chemicals in the laboratory must be provided:
   a) before the new employee begins work,
   b) before the employee begins a new procedure with new exposure situations,
   c) as refresher training annually.

2. Training must include:
   a) Methods and observations that may be used to detect the presence or release of a hazardous chemical.
   b) The physical and health hazards of chemicals in the laboratory.
   c) The measures laboratory workers can take to protect themselves from the hazards.

3. Document safety training in writing. Record the date, topics covered, the person(s) trained and their building and department, and the instructor’s name.

4. Information that must be available to the employee includes:
   a) The contents of California Code of Regulations, Title 8, Section 5191, Occupational Exposure to Hazardous Chemicals in Laboratories. This regulation is the Chemical Hygiene Standard and is available from Manamohan (Manu) at 45647, Neil Mansky at 60509, or EH&S.
   b) The location and availability of this written Chemical Hygiene Plan.
   c) The exposure limits for Cal/OSHA regulated chemical or recommended exposure limits. This information is available from Manamohan (Manu) at 45647, Neil Mansky at 60509, or EH&S.
   d) The signs and symptoms associated with exposures to hazardous chemicals used. This information is available from the MSDS's, the UCLA library references listed in the appendices, or from references at EH&S.
   e) The location and availability of known reference materials on hazards, safe handling, storage and disposal of hazardous chemicals including MSDS's. This information is available from the UCLA library references listed in the appendices, or from references at EH&S.

5. **Respirator Training and Fit Testing** must be received annually for all users of respirators. Lab personnel must contact EH&S Training at x45328 or training@ehs.ucla.edu yearly. The training is located at the Strathmore Building, room 117 at 2:00pm on the first non-holiday Tuesday of every month.

6. **Hazardous Chemical Waste Training** must be received by all users of hazardous chemicals that generate waste. RSVP by contacting EH&S Training at x45328 or training@ehs.ucla.edu. The training is at the Strathmore Building, room 117 at 2:00pm every Friday.
LABORATORY SAFETY TRAINING REQUIREMENT LIST

1. Orientation training subjects:

Every employee must be trained on the following safety topics before they begin their work in the lab:

<table>
<thead>
<tr>
<th>Training Subject</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake and Emergency Preparedness</td>
<td>II-19, Appendix A, VIII-12</td>
</tr>
<tr>
<td>Emergency/Contact Phone Numbers</td>
<td>II-1,2</td>
</tr>
<tr>
<td>Injury in Lab</td>
<td>II-3-6</td>
</tr>
<tr>
<td>Usage and Location of Chemical Spill Kit</td>
<td>II-10-12, Appendix B</td>
</tr>
<tr>
<td>Fire Safety</td>
<td>II-7-9, IV-1,4, VIII-10,11</td>
</tr>
<tr>
<td>Hazard Communication</td>
<td>VI-1</td>
</tr>
<tr>
<td>Personal Protective Equipment</td>
<td>III-1,2, V-1&amp;26, Appendix E</td>
</tr>
<tr>
<td>Personal Hygiene</td>
<td>V-1</td>
</tr>
<tr>
<td>Bruin Safety</td>
<td>I-4, VIII-8,9</td>
</tr>
<tr>
<td>Standard Operating Procedures</td>
<td>V-1-4, Appendix J</td>
</tr>
<tr>
<td>Usage and Location of First Aid Kit</td>
<td>IV-1</td>
</tr>
<tr>
<td>Chemical Segregation/Storage</td>
<td>V-23 &amp; 24, Appendix K</td>
</tr>
<tr>
<td>Usage and Location of Emergency Shower/Eyewash</td>
<td>IV-2</td>
</tr>
<tr>
<td>Usage and Location of Fire Extinguisher</td>
<td>II-9, VIII-10</td>
</tr>
<tr>
<td>Location of Chemical Hygiene Plan and MSDSs</td>
<td>I-3, VI-1</td>
</tr>
<tr>
<td>Chemical Waste</td>
<td>V-5-12</td>
</tr>
<tr>
<td>Safe Lifting/Back Injury Prevention</td>
<td>VIII-13,14</td>
</tr>
</tbody>
</table>

2. Annual refresher training subjects:

Annual refresher training on the following topics must be provided to all lab workers.

<table>
<thead>
<tr>
<th>Training Subject</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake</td>
<td>II-19, Appendix A, VIII-12</td>
</tr>
<tr>
<td>Emergency/Contact Phone Numbers</td>
<td>II-1,2</td>
</tr>
<tr>
<td>Injury in Lab</td>
<td>II-3-6</td>
</tr>
<tr>
<td>Usage and Location of Chemical Spill Kit</td>
<td>II-10-12, Appendix B</td>
</tr>
<tr>
<td>Fire Safety</td>
<td>II-7-9, IV-1,4, VIII-10,11</td>
</tr>
<tr>
<td>Hazard Communication</td>
<td>VI-1</td>
</tr>
<tr>
<td>Personal Protective Equipment</td>
<td>III-1,2, V-1&amp;26, Appendix E</td>
</tr>
<tr>
<td>Personal Hygiene</td>
<td>V-1</td>
</tr>
<tr>
<td>Bruin Safety</td>
<td>I-4, VIII-8,9</td>
</tr>
<tr>
<td>Standard Operating Procedures</td>
<td>V-1-4, Appendix J</td>
</tr>
<tr>
<td>Usage and Location of First Aid Kit</td>
<td>IV-1</td>
</tr>
<tr>
<td>Chemical Segregation/Storage</td>
<td>V-23 &amp; 24, Appendix K</td>
</tr>
<tr>
<td>Usage and Location of Emergency Shower/Eyewash</td>
<td>IV-2</td>
</tr>
<tr>
<td>Usage and Location of Fire Extinguisher</td>
<td>II-9, VIII-10</td>
</tr>
<tr>
<td>Location of Chemical Hygiene Plan and MSDSs</td>
<td>I-3, VI-1</td>
</tr>
<tr>
<td>Chemical Waste</td>
<td>V-5-12</td>
</tr>
<tr>
<td>Biosafety</td>
<td>V-13, Biosafety Manual</td>
</tr>
<tr>
<td>Electrical Safety</td>
<td>V-4</td>
</tr>
</tbody>
</table>
3. Job specific training subjects:

Every employee must be trained on the following safety topics as their job requires:

<table>
<thead>
<tr>
<th>Training Subject</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Updating Fire Diamond</td>
<td>Appendix I</td>
</tr>
<tr>
<td>Asbestos Awareness</td>
<td>EH&amp;S</td>
</tr>
<tr>
<td>Biosafety: ABC’s level 2</td>
<td>EH&amp;S</td>
</tr>
<tr>
<td>Biosafety: Medical Waste Management</td>
<td>EH&amp;S</td>
</tr>
<tr>
<td>Biosafety: Biological Safety Cabinets</td>
<td>IV-3, EH&amp;S</td>
</tr>
<tr>
<td>Biosafety: Shipping Biological Materials</td>
<td>EH&amp;S</td>
</tr>
<tr>
<td>Radiation: New Worker’s Radiation Quiz</td>
<td>EH&amp;S</td>
</tr>
<tr>
<td>Hazardous Waste Training</td>
<td>EH&amp;S</td>
</tr>
<tr>
<td>Respirator Training and Fit Test</td>
<td>VIII-1, 6, 7 &amp; EH&amp;S</td>
</tr>
<tr>
<td>Carcinogen Usage</td>
<td>V-25, 26</td>
</tr>
<tr>
<td>Standard Operating Procedures</td>
<td>Appendix J, job specific</td>
</tr>
<tr>
<td>Cryogenic Safety (Liquid Nitrogen)</td>
<td>Appendix M</td>
</tr>
<tr>
<td>Gas Cylinders</td>
<td>V-23</td>
</tr>
<tr>
<td>Autoclave Use</td>
<td>EH&amp;S</td>
</tr>
<tr>
<td>Biohazardous Material Spill</td>
<td>II-13-15</td>
</tr>
<tr>
<td>Radioactive Material Spill</td>
<td>II-16-18</td>
</tr>
<tr>
<td>Biohazardous Waste Disposal</td>
<td>V-13-15</td>
</tr>
<tr>
<td>Fume Hood</td>
<td>IV-2, Appendix L</td>
</tr>
<tr>
<td>Biological Safety Cabinet</td>
<td>IV-3</td>
</tr>
<tr>
<td>Mercury Spill</td>
<td>Appendix C</td>
</tr>
<tr>
<td>Peroxide Forming Chemicals</td>
<td>Appendix H</td>
</tr>
<tr>
<td>Ethidium Bromide</td>
<td>Appendix F</td>
</tr>
<tr>
<td>Laser Safety</td>
<td>V-3</td>
</tr>
</tbody>
</table>

4. Optional training subjects:

The following safety training topics are recommended for lab employee.

<table>
<thead>
<tr>
<th>Training Subject</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ergonomics</td>
<td><a href="http://www.ehs.ucla.edu">www.ehs.ucla.edu</a></td>
</tr>
<tr>
<td>Computer Work Station Safety</td>
<td><a href="http://www.ehs.ucla.edu">www.ehs.ucla.edu</a></td>
</tr>
</tbody>
</table>
Training Documentation Form

Topic: _____________________

Principal Investigator ____________________  Building/Lab Rooms ________________

Items Discussed:

• ______________________________
• ______________________________
• ______________________________
• ______________________________

<table>
<thead>
<tr>
<th>Employee Name (Print Name)</th>
<th>Employee Name (Signature)</th>
<th>Employee ID#</th>
<th>Instructor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VIII-4
Laboratory Safety Manual
and Chemical Hygiene Plan

Principal Investigator ________________________________

Building/Lab Rooms ________________________________

All laboratory personnel must sign below to indicate having read the Laboratory Safety Manual and Chemical Hygiene Plan.

<table>
<thead>
<tr>
<th>Employee Name (Print Name)</th>
<th>Employee Signature</th>
<th>Employee ID#</th>
<th>Date</th>
</tr>
</thead>
</table>
Environment, Health & Safety

RESPIRATOR TRAINING AND FIT-TESTING SESSIONS

EH&S conducts monthly respirator training and fit-testing.
This training is required for all respirator users and will cover topics such as:
- How respirators work
- Limitations of a respirator
- Cleaning and storage
- Fit-testing

To schedule a session and complete your training, please...

1. RSVP by calling or emailing EH&S Training at x45328 or training@facnet.ucla.edu, please indicate to us what type of respirator you plan to use
2. Complete the bottom and back portions of this form (by providing your group’s name as well attendee information) and bring it with you to your session
3. Bring the respirator that you plan to use to your training session

Location: Strathmore Building, Room 117
Time: 2pm on the first non-holiday Tuesday of every month

Department______________________________________________________
Training/Testing Date_________________  Number of Attendees__________
Respirators Used (make, model) _____________________________________

*** Shaded portion for EH&S use only***

<table>
<thead>
<tr>
<th>Name of Attendee (last, first)</th>
<th>Employee # (or SS #)</th>
<th>Work/Pager #</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department/ Facilities</td>
<td>Supervisor Name (last, first)</td>
<td>Supervisor Work #</td>
<td>Supervisor Email</td>
</tr>
</tbody>
</table>

Notes:__________________________________________________________
Pass
Fail
Respirator Issued (type, model, size):__________________________

(continue on back)

VIII-6
Bruin Safety Training
Discuss the following with Supervisors and employees.

Objectives of Bruin Safety
- Create, maintain and reinforce a safe university environment to protect the health and safety of employees, students and visitors.
- Demonstrate management commitment and concern for employee safety.
- Maintain compliance with health and safety codes.
- Improve efficiency by reducing the lost work time due to illness and injuries.
- Reduce workers’ compensation claims and costs.

Supervisor & Employee Responsibility
- Supervisors, Principle Investigator Responsibility:
  - Set area specific policies and procedures
  - Provide general and job specific safety training
  - Ensure employees are wearing the appropriate personal protective equipment (i.e. non-skid sole shoes, hearing protection, gloves, goggles)
  - Take immediate corrective actions to mitigate hazards in the work place
  - Take disciplinary actions against those employees/students that do not adhere to Bruin Safety and other safety policies and requirements.

- Individual’s Responsibility:
  - Following established work procedures and safety guidelines
  - Report unsafe equipment or hazards in the workplace
  - Using appropriate personal protective equipment (i.e. non-skid sole shoes, hearing protection, gloves, goggles)

How to Identify Hazards
- What forms to fill out & who to notify
- How often inspections are needed to be conducted by person with authority
- Proper documentations of inspections
- Discuss how to properly utilize the checklist

Accident Investigations
- How to conduct accident investigations
- Who should conduct accident investigations (someone at the supervisor level or higher)

Hazard Mitigation
- What to do in case of a serious or concealed hazard
- How to correct minor hazards with supervisor’s approval

Training
- Discuss the importance of trainings and that supervisor’s must ensure all employees receive Bruin Safety required trainings in addition to all job specific required trainings.
- Employees must ensure that they have received all the required trainings for their specific job title. They must inform their supervisor’s if they have not fulfilled all their job specific trainings.
**Communication**
- Discuss different options employees have to communicate safety concerns without the fear of reprisal (Anonymous Safety Recommendation Form)
- Discuss how to properly conduct safety meetings are required of all employees and managers
- Hazard Communication

**Compliance**
- Discuss the University’s Disciplinary Action Guidelines and the possible disciplinary actions that will be taken if they do not follow Bruin Safety and other safety guidelines including:
  - Verbal warning
  - Written warning
  - Written Performance Evaluations
  - Sanctions
  - Termination
FIRE SAFETY TRAINING

Be Prepared
- Know the exit routes from your office, floor, and building. Study these in advance. It is easy to become disoriented during an actual emergency.
- Know the locations of fire extinguisher and how to use them take the time to the directions. Report any missing extinguishers immediately.
- Make sure that emergency numbers are posted on your telephone. Include your room number.
- Report any unsafe conditions to the fire protection division at once at x68680 or x55689.

Fire do's and don'ts
- **DO**: Close all doors. This will slow the spread of fire. Activate the nearest fire alarm pull station.
- **DO**: Report the fire; don’t assume someone else will do it. Call the campus police at 911. They will call the fire department.
- **DO**: Use stairs to vacate the building. Assemble outside.
- **DON'T**: Use elevator. Elevators can be very dangerous in a fire, even when they appear to be safe. **Never use elevators to exits!**
- **DON'T**: Arbitrarily break windows. Falling glass is a serious threat to pedestrians and fire fighters or rescue personnel below.
- **DON'T**: Exit until you have felt the top of exit door. If the door is hot, or if excessive smoke prevents your exit, keep the door closed.
- **DON'T**: Go back for your personal belongings if ordered to leave the building.

Types of Fires and Extinguishers

A- Ordinary combustibles such as paper, rags, wood
B- Flammable liquids such as oil, flammable solvent, gasoline, grease
C- Electrical fires
D- Combustible metals

Pressurized water extinguisher use only on Class A fires. Do not use on Class B or C fires. This could cause fire spread or electrical shock.

**Dry chemical** use on Class A, B or C fires.

**Carbon Dioxide** use on Class B or C fires

How to use a Fire Extinguisher

The P.A.S.S method
- **Pull** ring from extinguisher handle.
- **Aim** nozzle at base of fire.
- **Squeeze** Handle.
- **Sweep** nozzle back and forth as you advance

Fire extinguisher training is available from the Fire Protection Division Call x68680 or x55689
Fire Prevention

- Do not permit aisles, corridors, and routes of egress to become obstructed with stored materials. Keep lanes of egress clear.
- Try to avoid using extension cords, ungrounded plugs, and multiple outlet adapters for various small appliances. These are not permitted and tend to over load electrical circuits, causing fires to occur.
- Do not storage of materials in corridors, stairways, fan rooms, equipment rooms, and electrical rooms. These areas must be kept clear at all times.
- Always keep fire resistive doors closed. These doors are designed to slow the spread of fire and protect egress routes.
- Avoid improper handling and storage of chemicals and flammable liquids. Hazardous materials must be stored in limited quantities in appropriate containers and be kept in approved flammable liquids storage cabinets.
Emergency Preparedness/Earthquake Safety Training

Emergency Planning
Immediately after an emergency, essential services may be cut-off and local disaster relief and government responders may not be able to reach you right away. One of the most important steps you can take to prepare for emergencies is to develop a disaster plan.

Creating a Disaster/Evacuation Plan: Learn about the natural disasters that could occur in your community from your local emergency management office or American Red Cross chapter. Learn whether hazardous materials are produced, stored or transported near your area.

- Ask your local emergency management office about community evacuation plans. Learn evacuation routes. If you do not own a car, make transportation arrangements with friends or your local government.
- Ask a supervisor to be the “checkpoint” so that everyone in both locations can be counted for.
- Discuss and plan how your employees would stay in contact if you were separated. Identify two meeting places: the first should be near your building & the second should be away from building case you cannot return.
- Draw, display and discuss a floor plan of your building with all exits, hazards and evacuation routes.
- Ensure employees know where emergency telephone numbers are posted (preferably by telephones).
- Local authorities suggest having most of the staff take a first aid and CPR class.
- Make a disaster plan notebook with all above info available to all employees and ensure all employees have been trained in its contents.
- Know how to shut off electricity, gas and water supplies at main switches and valves in your building. Have the tools you would need to do this (usually adjustable pipe and crescent wrenches).

Disaster Supply Kits
You may need to survive for three days or more whether at the office or at home. This means having your own water, food and emergency supplies. Try using backpacks or duffel bags to keep the supplies together. Here are suggested items that should be included in the disaster supply kit in your office, (may be made for personal use at home)

A. Consider having additional supplies for sheltering confinement for up to two weeks.
B. A car kit of emergency supplies, including food and water, to keep stored in your car at all times.
   This kit would also include flares, jumper cables, and seasonal supplies
C. Have a check off list of disaster supply kit
D. You will need to change the stored water and food supplies every six months, so be sure to write the date you store it on all containers. Select an employee to be responsible for periodically updating and inspecting the disaster kit.

Earthquake Safety Recommendation: Train employees in the Following
- Drop, cover, and hold; move only as far as necessary to reach a safe place.
- If indoors, stay there. Many fatalities occur when people run outside, only to killed by falling debris.
- If outdoors, find a spot away from buildings, trees, streetlights, power lines, and overpasses.
- If in a vehicle, pull over at a clear location and stop
- Secure bookshelves, water heaters, and tall furniture to wall studs.
- Store heavy and breakable objects on low shelves.
- If in a high-rise building, expect the fire alarms and sprinklers to go off during an earthquake. Do not use the elevators.
Safe Lifting/Back Injury Prevention

Forklifts, hoists, dollies and other types of lifting equipment should be used to lift heavy objects. However, sometimes it is necessary to load or unload moderate to heavy objects by hand. Therefore knowing the proper ways to lift can save you a great deal of pain and misery from a sprained back.

Assess the situation: Before lifting or carrying a heavy object, ask yourself:

- Can you lift this load safely without blocking your view, or is it a two-person lift?
- How far will you have to carry the load?
- Is the path clear of clutter, cords, slippery areas, overhangs, stairs, curbs or uneven surfaces?
- Will you encounter closed doors that need to be opened?
- Can the load be broken down into smaller parts?
- Should you wear gloves to get a better grip and protect your hands?

Size up the load:

- Test the weight by lifting one corner. If it is too heavy or awkward, try to break up the load down to smaller parts. If unable to reduce load stop and ask for help, or use a lift or hand truck.

Use good lifting techniques:

- Center yourself close over the load and stand with your feet shoulder width apart.
- Tighten your stomach muscles. Tight abdominal muscles increase intra-abdominal pressure and help to support the back.
- Get a good handhold and pull the load close to you. The farther the load is from your body, the heavier it will feel.
- Bending your knees is the single most important thing you can do when you lift moderate to heavy objects. Squat down like a weightlifter, bend your knees, keep your back in its natural arch, & let your legs do the lifting. Leg muscles are much more powerful than the smaller muscles in your back.
- Do not jerk. Use a smooth motion and lift straight up. Hold the load close and keep it steady.
- Do not twist or turn your body while lifting. Keep your head up, and look straight ahead.

Carrying the load:

- Change direction by turning your feet, not your back. Your nose and your toes should always be pointing in the same direction. Any sudden twisting can result in taking out your back.
- Rest if you fatigue. Set the load down and rest for a few minutes.
Setting the load down:

- Bend your knees. Squat down and let your legs do the work.
- Keep your back curves. Remember not to twist your body while setting down a load, keep your head up and keep the load close.
- Plan your release. Once the load is where you want it and secured, release your grip.

Using hand trucks and pushcarts:

- Push rather than pull with both arms. It's easier & safer to use your body weight to assist when pushing.
- Keep close and lock your arms. Try not to lean over and keep your back in its natural arches.
- Use tie-downs, if necessary, to secure the load.
APPENDIX A - EARTHQUAKE PREPAREDNESS

1. Chemical storage.
   a) Segregate and store chemicals by reactive groups.
   b) Place earthquake restraining bars across open shelves where chemicals are stored.
   c) Keep gas cylinders double chained to the wall using welded-link chains mounted to the wall. Gas cylinders clamped to laboratory benches using a C-clamp and cloth belt have fallen in past earthquakes. The C-clamp shakes loose from the bench and the clamp, belt, and cylinder fall.
   d) Keep safety caps on gas cylinders in place when cylinders are not in use.

2. Cabinets and items with doors.
   a) Cabinets with hinged doors need to have positive latching devices.
   b) Keep cabinets doors closed and latched, and keep sliding doors closed.
   c) Install refrigerator clasp locks on refrigerators with magnetic door latches. Use the clasp at all times.

3. Freestanding office and laboratory equipment.
   a) Secure bookcases, file cabinets and other cabinets to the wall studs.
   b) Secure equipment (analytical instruments, balances, computers, aquariums, etc.) with clamps, stands, straps or velcro made to anchor equipment. Some anti-theft security devices will also secure equipment during an earthquake.

4. Other
   a) Store heavy items on lower shelves or in lower cabinets. Heavy items stored above eye level must be restrained.

Located on the other side of the sheet are the Campus Evacuation Areas for Major Emergencies or Disasters
APPENDIX B - CHEMICAL SPILL KIT

Commercial spill kits are available which include protective equipment such as goggles and gloves, neutralizing and absorbing materials, bags, and a scoop. Another alternative is to make-up your own spill kit which contain the materials described below.

Sodium Bicarbonate
Citric Acid
Vermiculite or other diking material
pH paper
1 pair neoprene or nitrile gloves
1 pair goggles
1 scoop
Spill pillows, sorbent pads
Disposable shoe covers (plastic bags may work)

1. Weak Inorganic Acid or Base Spill Clean Up Procedure

   a) Wear gloves, goggles, laboratory coat and shoe covers.
   b) To clean-up a spill of weak inorganic acid or base neutralize the spilled liquid to pH 5 to 8 using a Neutralizing Agent such as:
      • Sodium bicarbonate
      • Sodium bisulfate
      • Soda ash
      • Citric acid
   c) Absorb the neutralized liquid with an Absorbent such as:
      • Sorbent pads
      • Sponges
      • Diatomaceous earth
      • Paper towels
      • Dry sand
      • Vermiculite
   d) Rinse the sorbent pads or sponges in a sink with water. Scoop or place the other absorbent materials into a clear plastic bag. Double bag and tag the bag with a chemical waste tag. Take it to your chemical waste pick-up.

2. Solvent Spill

   a) Absorb the spill with a non-reactive material such as:
      • vermiculite
      • dry sand
      • paper towels
      • sponges
   b) Package as described above. Do not rinse or dispose of any chemicals down the sink.
APPENDIX C - MERCURY SPILL CLEAN UP PROCEDURES

1. Mercury spill kits are commercially available. They usually include gloves, sponges impregnated with a material to absorb mercury, absorbent powder that reacts with mercury to form a harmless amalgam, and plastic bags for disposal. Some kits may include a small pump. Another alternative is to make your own spill kit. You will need:
   • disposable gloves
   • disposable shoe covers (plastic bags will work)
   • index card or rubber squeegee
   • disposable syringe or a vacuum trap flask fitted with tubing and a Pasteur pipet
   • inactivating solutions and/or powders

2. Broken Thermometer
   A thermometer contains about 1.5 grams of mercury. A spill from a broken thermometer can be cleaned-up by laboratory personnel.
   a) Clean-up the spill immediately after it has occurred.
   b) Prevent the spread of the spilled mercury. Do not allow people to walk through spill area.
   c) Wear disposable gloves and shoe covers or place plastic bags over your shoes during the clean-up.
   d) Push the mercury droplets together into a bead using an index card or rubber squeegee.
   e) Aspirate the beaded mercury into a disposable syringe, or use a disposable Pasteur Pipet attached with tubing to a vacuum flask to aspirate the mercury into the flask. The flask should contain water. Always have a second vacuum flask between the mercury flask and the house vacuum.
   f) Chemically inactivate any residual mercury. There are several methods to inactivate the residual mercury:
      • Use a commercial inactivating powder following its directions for use.
      • Sprinkle zinc powder over the spill area. Then moisten the zinc with a 5 to 10 percent sulfuric acid solution until a paste is formed. Scour the contaminated surface and allow the paste to dry. Sweep up the dried paste.
      • Wash the contaminated area with a detergent solution. Rinse and then swab the area with a calcium polysulfide solution containing two to four tablespoons of calcium polysulfide per gallon of water.
   g) Place the collected mercury and materials used in the clean-up into a clear plastic bag. Double bag and label the waste. Take it to the chemical waste pick-up for your building.

3. For assistance cleaning-up larger mercury spills contact EH&S at 55689 or 911.
APPENDIX D - CHEMICAL SAFETY REFERENCES

Below are listed some references available at the Biomed or Chemistry libraries at UCLA. Other references not listed can be found by searching the following Subject Headings on ORION:

Chemicals Safety Measures
Laboratories Standards
Accidents Occupational Prevention Control

In addition, the Biomed reference librarians can search the online data bases from the National Library of Medicine for the chemical safety information of specific chemicals. There is a small fee for this service.

Biomed Core Reference Collection QD 51 M215a 1991

Biomed Core Reference Collection WA 440 S272h 1989

Biomed WA 485 R365f 1990

Chemistry QD 51 M31g 1972.

Chemistry TP 243 G83 1983 (Ready Reference)

Chemistry T 55.3 H3 G85 1983 (Ready Reference)

Handbook of laboratory health and safety measures. S. B. Pal (ed.). Lancaster; Boston. MTP Press. 1985
Biomed Wa 485 H235 1985

Chemistry T 55.3 H3 B755 1985 (Ready Reference)

Handling chemical carcinogens; a safety guide for the laboratory researcher. Lenexa, KA, Chemsyn Science Laboratories, 1986. Chemistry RC 268.6 D67 1986 (Ready Reference)


The Sigma-Aldrich library of chemical safety data. Lenga, Robert E. Milwaukee, WI, Sigma-Aldrich, 1988. Chemistry T55.3 H3 S54 1988 (Ready Reference)
<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>Baby Rubber</th>
<th>Chlorinated Polyethylene</th>
<th>Viton/Neoprene</th>
<th>Natural Rubber</th>
<th>Neoprene</th>
<th>Nitrile + Polyvinyl Chloride</th>
<th>Nitrile</th>
<th>Polyethylene</th>
<th>Polyvinyl Acetate</th>
<th>Polyvinyl Chloride</th>
<th>Vitron</th>
<th>Butyl Neoprene</th>
<th>Other Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaldehyde</td>
<td>RR</td>
<td>RR</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Acetic acid, glacial</td>
<td>R</td>
<td>π</td>
<td>n</td>
<td>RR</td>
<td>NN</td>
<td>RR</td>
<td>n</td>
<td>n</td>
<td>RR</td>
<td>NN</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Acetone</td>
<td>RR</td>
<td>RR</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Acetonitrile</td>
<td>RR</td>
<td>π</td>
<td>n</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>π</td>
<td>π</td>
<td>NN</td>
<td>π</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Ammonium hydroxide</td>
<td>R</td>
<td>r</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>n</td>
<td>NN</td>
<td>NN</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Amyl alcohol</td>
<td>π</td>
<td>r</td>
<td>NN</td>
<td>RR</td>
<td>NN</td>
<td>n</td>
<td>n</td>
<td>π</td>
<td>NN</td>
<td>n</td>
<td>r</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Aniline</td>
<td>RR</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Benzaldehyde</td>
<td>n</td>
<td>n</td>
<td>R</td>
<td>π</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td>R</td>
<td>n</td>
<td>r</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Benzene</td>
<td>NN</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Butyl acetate</td>
<td>RR</td>
<td>π</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butyl alcohol</td>
<td>R</td>
<td>r</td>
<td>n</td>
<td>R</td>
<td>RR</td>
<td>RR</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Butane</td>
<td>n</td>
<td>n</td>
<td>N</td>
<td>R</td>
<td>n</td>
<td>n</td>
<td>π</td>
<td>n</td>
<td>π</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Butyraldehyde</td>
<td>RR</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>R</td>
<td>RR</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Calcium hypochlorite</td>
<td>R</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>yes</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Carbon disulfide</td>
<td>NN</td>
<td>NN</td>
<td>N</td>
<td>N</td>
<td>n</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Carbon tetrachloride</td>
<td>N</td>
<td>n</td>
<td>R</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td>N</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Chloroacetone</td>
<td>R</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>π</td>
<td>π</td>
<td>n</td>
<td>r</td>
<td>π</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Chloroform</td>
<td>N</td>
<td>NN</td>
<td>R</td>
<td>n</td>
<td>n</td>
<td>N</td>
<td>N</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Chromic acid</td>
<td>n</td>
<td>π</td>
<td>π</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Cyclohexane</td>
<td>N</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>yes</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Dibenzylic ether</td>
<td>R</td>
<td>n</td>
<td>N</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>r</td>
<td>n</td>
<td>R</td>
<td>r</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Diethanolamine</td>
<td>r</td>
<td>n</td>
<td>π</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Diethyl ether</td>
<td>NN</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>N</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Dimethyl sulfide</td>
<td>π</td>
<td>RR</td>
<td>R</td>
<td>RR</td>
<td>π</td>
<td>π</td>
<td>n</td>
<td>n</td>
<td>N</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Ethyl acetate</td>
<td>π</td>
<td>n</td>
<td>N</td>
<td>NN</td>
<td>n</td>
<td>N</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Ethyl alcohol</td>
<td>π</td>
<td>R</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>yes</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>R</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>R</td>
<td>R</td>
<td>r</td>
<td>r</td>
<td>n</td>
<td>yes</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Ethylene chlorohydrin</td>
<td>NN</td>
<td>r</td>
<td>R</td>
<td>RR</td>
<td>RR</td>
<td>RR</td>
<td>RR</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Formaldehyde, 37%</td>
<td>RR</td>
<td>r</td>
<td>NN</td>
<td>NN</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Formic acid, 90%</td>
<td>R</td>
<td>r</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>RR</td>
<td>N</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Glycerol</td>
<td>r</td>
<td>r</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>yes</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Hexane</td>
<td>NN</td>
<td>r</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td>NN</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Hydrobromic acid</td>
<td>r</td>
<td>r</td>
<td>R</td>
<td>r</td>
<td>r</td>
<td>R</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>yes</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Hydrochloric acid, conc.</td>
<td>n</td>
<td>π</td>
<td>RR</td>
<td>RR</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>π</td>
<td>yes</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Hydrofluoric acid</td>
<td>π</td>
<td>r</td>
<td>RR</td>
<td>n</td>
<td>NN</td>
<td>π</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
</tbody>
</table>
## Chemical Protective Clothing Recommendation by Chemical (Cont.)

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>Butyl Rubber</th>
<th>Chlorinated Polyethylene</th>
<th>Viton Neoprene</th>
<th>Natural Rubber</th>
<th>Neoprene</th>
<th>Nitrile + Polyvinyl Chloride</th>
<th>Nitrite</th>
<th>Polyethylene</th>
<th>Polyvinyl Alcohol</th>
<th>Polyvinyl Chloride</th>
<th>Viton</th>
<th>Butyl Neoprene</th>
<th>Other Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen peroxide</td>
<td>n</td>
<td>r</td>
<td>R</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Isobutyl alcohol</td>
<td>r</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>R</td>
<td>NN</td>
<td>n</td>
<td></td>
<td>r</td>
</tr>
<tr>
<td>Methylamine</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>N</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Methyl alcohol</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Methylene chloride</td>
<td>NN</td>
<td>nn</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Methyl ethyl ketone</td>
<td>RR</td>
<td>nn</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>n</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Perchloric acid</td>
<td>r</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Phenol</td>
<td>R</td>
<td>nn</td>
<td>NN</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Phosphoric acid, conc.</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>n</td>
<td>r</td>
<td>n</td>
<td>r</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Potassium hydroxide</td>
<td>r</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>N</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Pyridine</td>
<td>r</td>
<td>R</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Sodium Hydroxide</td>
<td>n</td>
<td>R</td>
<td>R</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>r</td>
<td>n</td>
<td>r</td>
<td>n</td>
<td></td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>n</td>
<td>RR</td>
<td>N</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Toluene</td>
<td>NN</td>
<td>r</td>
<td>NN</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>NN</td>
<td>n</td>
<td>NN</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Triethanolimine</td>
<td>r</td>
<td>r</td>
<td>N</td>
<td>R</td>
<td>n</td>
<td>R</td>
<td>R</td>
<td>n</td>
<td>r</td>
<td>n</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Xylene</td>
<td>n</td>
<td>n</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>RR</td>
<td>NN</td>
<td>n</td>
<td></td>
<td>yes</td>
</tr>
</tbody>
</table>

**Note:** This table is not a complete list of chemicals found in research laboratories. Consult the Source for information about other chemicals, the MSDS or glove vendor’s charts.

**Source:** Guidelines for the Selection of Chemical Protective Clothing. 1987. American Conference of Governmental Industrial Hygienists, Inc., Cincinnati, Ohio.

**Legend:**
- RR = recommended based on strong data
- R  = recommended based on data
- NN = not recommended based on strong data
- n  = not recommended based on data
- nR = recommended based on judgement

*Other materials are recommended. Consult the Source or vendor's glove selection charts.*
GUIDELINES FOR THE DISPOSAL OF ETHIDIUM BROMIDE WASTE

Introduction:

Ethidium bromide (EtBr) is both an irritant and a mutagen. It may be harmful by inhalation, ingestion, or skin absorption. The material is irritating to the eyes, skin, mucous membranes, and upper respiratory tract. Chronic effects include the possible alteration of the genetic material. Ethidium bromide is a frameshift mutagen, which intercalates double-stranded DNA and RNA resulting in the inhibition of DNA synthesis. When possible, substitute with a less hazardous material in your procedures or use micro or semi-micro techniques to minimize the generation of hazardous waste.

Materials resulting from the use of ethidium bromide which need to be handled as hazardous waste include the following: ethidium bromide crystals or powder, stock solutions, gels, running buffers and contaminated labware. Contaminated labware includes materials such as microfuge tubes, pipet tips, lab bench diapers, gloves, etc. that have come in contact with ethidium bromide. Dilute solutions of ethidium bromide (less than .01mg/l) may be deactivated in the lab by pouring the dilute solution through a commercially available filter cartridge designed to sequester EtBr and disposing the filtered liquid down the drain. Spent cartridges must be handled as hazardous waste.

The following procedures apply only for chemical waste, and not medical or radioactive waste. For medical or radioactive waste, follow the specific UCLA guidelines for disposal of medical or radioactive waste.

Preparation for Waste Collection and Storage

Gels:
Collect gels in clear containers that can be closed or sturdy (>4mm thick) clear bags. Double bag the gels. Seal the bags or close containers with tight sealing lids. Label the container or outer bag with a UCLA Hazardous Waste Tag and store in a secondary container.

Crystals, powders, and stock solutions:
Label the original container or stock solution container with a UCLA Hazardous Waste tag and store in a secondary container.

Contaminated labware (Dry waste):
Place contaminated labware in a sturdy (>4mm thick) clear bag. Double bag dry waste. Red biohazard bags containing EtBr dry waste will not be accepted. Sharps must be placed in an approved sharps container before being placed in a clear bag. Bags will not be accepted at the chemical waste pick-up with any protruding objects, such as pipets. Seal the bags and label the outer bag with a completed UCLA Hazardous Waste Tag. The description should state “Ethidium Bromide Dry Waste.”
**Microfuge Tubes:**
Segregate liquid waste from dry waste. Microfuge tubes containing ethidium bromide solution will not be accepted for disposal. Pour the liquid from the tubes into a container designed for EtBr liquid waste and dispose of the collection container according to UCLA guidelines for disposal of hazardous (chemical) liquid waste. Collect the empty microfuge tubes as dry waste in clear plastic bags as described above.

**Disposal**
For disposal, refer to section V-II in this lab safety manual or the EH&S website for the time and location of the chemical waste pickup for your building. Transport all packaged waste in leak-proof secondary containers (do use not cardboard boxes) on sturdy cars or inside bottle carriers. All bags and containers brought to the chemical waste pick-up must be free of external contamination, must be sealed or have a tightly closing lid, and must be labeled with a completed UCLA Hazardous Waste ID Tag prior to being brought to the waste pickup point.

**Additional Information**
If you have any questions please feel free to contact UCLA Environment, Health & Safety at extension 45569 or 45369.

**UCLA Office of Environment, Health & Safety**
www.ehs.ucla.edu
## Chemical Storage/ Compatibility

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>1</td>
<td>Less than 10 gal. Flammables kept outside flammable storage cabinet</td>
</tr>
<tr>
<td>2</td>
<td>Maximum of 60 gallons flammable liquids per lab</td>
</tr>
<tr>
<td>NA</td>
<td>Flammables kept in refrig./freezer approved for storage of flammables</td>
</tr>
<tr>
<td>ADEQUATE COMPLIANCE</td>
<td>Minimal amount of acids stored outside acid/corrosive cabinet</td>
</tr>
<tr>
<td>N/A</td>
<td>Acids and bases stored in secondary containers</td>
</tr>
<tr>
<td>0</td>
<td>Acids and bases stored segregated</td>
</tr>
<tr>
<td>1</td>
<td>Chemicals stored in unsafe manner</td>
</tr>
<tr>
<td>2</td>
<td>Incompatible chemicals stored segregated</td>
</tr>
<tr>
<td>NA</td>
<td>Ethers and other peroxide formers dated or tested</td>
</tr>
<tr>
<td>0</td>
<td>Water reactives stored separately</td>
</tr>
<tr>
<td>2</td>
<td>Carcinogens stored separately</td>
</tr>
<tr>
<td>NA</td>
<td>Corrosives stored separately</td>
</tr>
</tbody>
</table>

## Fume Hoods

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>1</td>
<td>Current certification date(s)</td>
</tr>
<tr>
<td>2</td>
<td>Proper sash height indicated</td>
</tr>
<tr>
<td>NA</td>
<td>Sash at or below marked approval level</td>
</tr>
<tr>
<td>0</td>
<td>Sash stoppers functional</td>
</tr>
<tr>
<td>2</td>
<td>Safety shields in place</td>
</tr>
<tr>
<td>1</td>
<td>Hood illumination functional</td>
</tr>
<tr>
<td>2</td>
<td>Audible/ visual alarm functional</td>
</tr>
<tr>
<td>NA</td>
<td>Minimal clutter in hood (equipment, chemicals)</td>
</tr>
<tr>
<td>0</td>
<td>Proper equipment placement in fume hood</td>
</tr>
<tr>
<td>2</td>
<td>Cleanliness</td>
</tr>
<tr>
<td>NA</td>
<td>Room cross drafts and turbulence controlled</td>
</tr>
</tbody>
</table>

## Fire Safety

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>1</td>
<td>Exits/aisles/corridors are not blocked; 36” min. width</td>
</tr>
<tr>
<td>2</td>
<td>Laboratory doors kept closed</td>
</tr>
<tr>
<td>NA</td>
<td>Second exit from lab maintained</td>
</tr>
</tbody>
</table>

## Seismic Safety

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>1</td>
<td>Equipment, cabinets, etc., anchored or restrained</td>
</tr>
<tr>
<td>2</td>
<td>Storage shelves have seismic restraints</td>
</tr>
<tr>
<td>NA</td>
<td>Cabinet doors have seismic restraints</td>
</tr>
<tr>
<td>0</td>
<td>High overhead storage is secured</td>
</tr>
</tbody>
</table>

## Mechanical and Electrical Safety

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>1</td>
<td>Moveable parts guarded on equipment</td>
</tr>
<tr>
<td>2</td>
<td>Electric panel accessible</td>
</tr>
<tr>
<td>NA</td>
<td>Plugs, cords, outlets in good condition</td>
</tr>
<tr>
<td>0</td>
<td>Extension cords or other cords out of way</td>
</tr>
</tbody>
</table>
# UCLA LABORATORY SAFETY SURVEY CHECK LIST

**P.I._________________________ Department________________________________**

**Date___________ Bldg./Rms._________________ Inspector______________**

0 NOT ACCEPTABLE  2 GOOD LAB PRACTICE  1 ADEQUATE COMPLIANCE  N/A NOT APPLICABLE

## Emergency and Safety Information

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Emergency assistance information posted</td>
<td>1</td>
<td>Lab safety manual accessible</td>
</tr>
<tr>
<td>2</td>
<td>Current occupants/responsible person(s) listed</td>
<td>NA</td>
<td>NFPA fire diamond posted</td>
</tr>
</tbody>
</table>

## Safety Equipment and Supplies

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Fire extinguisher present/charged/ accessible</td>
<td>1</td>
<td>Approved eyewash present or available in 10 seconds</td>
</tr>
<tr>
<td>2</td>
<td>Emergency shower present</td>
<td>NA</td>
<td>First-aid kit present and stocked</td>
</tr>
<tr>
<td>0</td>
<td>Chemical spill material or kit available</td>
<td>1</td>
<td>Flammable storage cabinet present</td>
</tr>
<tr>
<td>2</td>
<td>Refrigerator available for storing flammables</td>
<td>NA</td>
<td>Gas cylinders secured</td>
</tr>
<tr>
<td>0</td>
<td>Gas cylinder valve protection cap in place when not in use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Hazard Communication

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>MSDS available / location known</td>
<td>1</td>
<td>Containers labeled with name and hazard warning</td>
</tr>
<tr>
<td>2</td>
<td>Current chemical inventory present</td>
<td>NA</td>
<td>Annual training/inspection/accidents documented</td>
</tr>
</tbody>
</table>

## Housekeeping/ Personal Protection

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Food and drink not in lab areas</td>
<td>1</td>
<td>Gloves, lab coat worn only in lab areas</td>
</tr>
<tr>
<td>2</td>
<td>Lab coats worn when handling hazardous materials</td>
<td>1</td>
<td>Gloves worn when handling hazardous materials</td>
</tr>
<tr>
<td>2</td>
<td>Eye protection worn in lab</td>
<td>NA</td>
<td>Glass bottles not stored on floor</td>
</tr>
<tr>
<td>0</td>
<td>Minimal glassware on bench/ in sink/ in fume hood</td>
<td>1</td>
<td>Proper waste disposal of glass (vial, pipets, etc.) and sharps</td>
</tr>
</tbody>
</table>

## Chemical Waste Disposal and Transport

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Safety cans available for disposal of halogenated solvents</td>
<td>1</td>
<td>Safety cans available for disposal of non-halogenated solvents</td>
</tr>
<tr>
<td>2</td>
<td>Waste cans and containers properly labeled and dated</td>
<td>NA</td>
<td>Waste manifests or tags near safety cans and bottles</td>
</tr>
<tr>
<td>0</td>
<td>Bottle carrier available for transport of chemicals</td>
<td>1</td>
<td>Chemical waste disposal procedures posted</td>
</tr>
</tbody>
</table>

G-2
Peroxide-Forming Chemicals (PFCs)

Due to rising costs of chemical waste disposal, all peroxide forming chemicals (PFCs) that are kept by users beyond the expiration date will result in a $65 recharge. This new policy will become effective June 1, 2003. This will provide an amnesty period in which researchers may dispose of their expired PFCs free of charge.

PFCs normally will not start forming these explosive peroxides if they are not expired. As long as we receive PFCs before their expiration date, there will be no extra charges. It is important for the user to keep a record of when these PFCs will expire so you will not have to pay any additional disposal costs.

Materials that are susceptible to peroxide formation (i.e., autooxidation) are ones that typically react with air, moisture, or impurities and produce a change in their chemical composition in normal storage. Peroxides are highly reactive and can explode upon shock or spark. The peroxides that form are less volatile than the solvent itself and thus tend to concentrate. This is particularly dangerous if peroxides are present during a distillation, where the applied heat to the concentrated solution may trigger a violent explosion. Equally dangerous is to allow a container of this material to evaporate to dryness, leaving the crystals of peroxide at the bottom of the container. Each container of peroxide forming chemicals should be dated with the date received and the date first opened. There are three classes of peroxide forming chemicals. The examples listed below each class do not compose a complete list of peroxide forming chemicals.

Disposal Requirements
Why PFC’s should be disposed of within the expiration date (even if unopened) or within one year from the date of opening?

Reason: The inhibitors get chewed up in a sealed PFC container over a period of time. Hence they should be disposed of within the expiration date (even if unopened) or within one year from the date of opening.

Class 1
These chemicals form peroxides after prolonged storage. These chemicals should be tested for the formation of peroxides on a periodic basis. Several methods are available to check for peroxides. The two most common are the use of peroxide test strips or the potassium iodide test.

<table>
<thead>
<tr>
<th>Isopropyl ether</th>
<th>Potassium amide</th>
<th>Divinyl ether</th>
</tr>
</thead>
<tbody>
<tr>
<td>Divinyl acetylene</td>
<td>Vinylidene chloride</td>
<td></td>
</tr>
<tr>
<td>Sodium amide</td>
<td>Potassium metal</td>
<td></td>
</tr>
</tbody>
</table>
**Class 2**
This group of chemicals will readily form peroxides when they become concentrated (i.e. evaporation or distillation). The concentration process will defeat the action of most auto-oxidation inhibitors. These chemicals should be disposed of within 12 months of receiving.

- Diethylether
- Tetrahydrofuran
- Dioxane
- Acetal
- Methylacetylene
- Cyclopentene
- Methyl isobutyl ketone
- Ethylene glycol dimethyl ether
- Dicyclopentadiene
- Diacetylene
- Tetrahydronaphthalene
- Vinyl ethers
- Cyclohexene
- Cumene
- Furan
- Vinyl ethers
- Acetal
- Cumene
- Tetrahydronaphthalene

**Class 3**
This group of chemicals form peroxides due to initiation of polymerization. When stored in a liquid state, the peroxide forming potential dramatically increases. These chemicals should be disposed of if they become degraded or are no longer needed.

- Butadiene
- Styrene
- Tetrafluoroethylene
- Vinyl acetylene
- Vinyl acetate
- Vinyl pyridine
- Vinyl chloride
- Chlorobutadiene
- Chlorotrifluoroethylene
- Acrylic acid
- Methyl methacrylate
- Vinylidene chloride
- Acrylonitrile

Procedures for handling and storage of Peroxide Forming Materials

1. Minimize the quantity of peroxide forming chemicals stored in the lab.

2. Try to avoid over ordering (bulk purchases) of PFCs (peroxide forming chemicals) that will not be used within the allotted time.

3. Carefully review all cautionary material supplied by the manufacturer prior to use.

4. Segregate these compounds from other classes of chemicals that could create a serious hazard to life or property should an accident occur (i.e. acids, bases, oxidizers and etc.).

5. Date all containers of peroxide forming chemicals when they first arrive to the lab.

6. Never return unused quantities back to the container (contamination).

7. Clean up all spills immediately.

8. Avoid evaporation or distillation, since distillation defeats the stabilizer added to the solvents.

9. Ensure containers are tightly sealed to avoid evaporation.
10. Ensure containers are free of exterior contamination or crystallization.

11. Routinely test for the formation of peroxides using one of the approved methods.

12. Dispose of ethyl ether, and other volatile peroxide forming compounds, within 12 months.

13. If old containers of peroxide forming chemicals are discovered in the lab, (greater than two years past the expiration date or if the date of the container is unknown) do not handle the container. If crystallization is present in or on the exterior of a container, do not handle the container, secure it and contact EH&S.

14. Complete hazardous waste tags for expired, degraded, or unwanted peroxide forming chemicals and take them to the next designated hazardous waste pick-up.
Fire Diamond Information

Department: _____________________________
Building: _____________________________  ___Lab (with chem)
Room Number: _________________________  ___Classroom (no chem)
Room Type: _____________________________  ___Office (no chem)
Numbers of signs requested: ______

Regular room occupants (List up to 4 names):
1. ________________________________
2. ________________________________
3. ________________________________
4. ________________________________

Lab phone number: ______________________

In case of an emergency, please notify:
Name: _____________________________
Phone: _____________________________

Special Hazards:
_____________________________________
_____________________________________
_____________________________________
_____________________________________

All information on this sheet will be posted on the door. Please designate an emergency contact that is willing to have this information included on the door.

Please fax or mail a chemical inventory sheet along with this form to x57076 or MC: 160508 once it has been completed.
Please fill out the form completely. Print a copy and insert into your Laboratory Safety Manual and Chemical Hygiene Plan. Refer to instructions for assistance.

Department: __________________________  Date: __________________________

Principal Investigator: ______________________________________________________

Chemical Hygiene Officer: ___________________________________________________

Laboratory Phone: _______________  Office Phone: ___________________________

Emergency Contact: _________________________________________________________
   (Name and Phone Number)

Location(s) covered by this SOP: _____________________________________________
   (Building/Room Number)

1. Type of SOP (check one)
   □ Process  □ Hazardous Chemical  □ Hazard Class

2. Describe Process, Hazardous Chemical or Class:

3. Potential Hazards:

4. Circumstances Requiring Prior Approval:

5. Personal Protective Equipment (PPE):

6. Engineering Controls:
7. Special Handling & Storage Requirements:

8. Spill & Accident Procedures:

9. Decontamination Procedures:

10. Waste Disposal Procedures:

11. Designated Area:

12. Material Safety Data Sheet (MSDS) Location:

13. Protocol(s):
Instructions for Completing
Standard Operating Procedures

To be in compliance with the Cal/OSHA Laboratory Standard, laboratory-specific Standard Operating Procedures (SOPs) are required to be included in your Chemical Hygiene Plan. This manual does not provide specific SOPs for the hazardous chemical or hazardous substance use operations or procedures in your particular laboratory. If your laboratory research involves use of hazardous substances or chemicals, you will need to develop laboratory-specific SOPs to supplement the information found in the EH&S publication—“Laboratory Safety Manual and Chemical Hygiene Plan”. Below are instructions for completing the laboratory-specific SOPs using the template provided. Please contact your designated Laboratory Safety Officer with any questions or comments you may have while completing your SOPs.

1. Type of SOP—check one box

   Process: the SOP will be for a process such as distillation, synthesis, etc.
   Hazardous chemical: the SOP will be for an individual chemical such as arsenic, formaldehyde, nitric acid, etc.
   Hazard class: the SOP will be for a hazard class of chemicals such as oxidizer, flammable, corrosive, etc.

2. Describe the Process, Hazardous chemical or Hazard class

   Process: Briefly describe the process and name all the hazardous chemicals or substances used in the process.
   Hazardous chemical: Provide the name of the chemical. Include the full name, common name, and any abbreviations used for the chemical.
   Hazard class: Name the hazard class and list the name of the chemicals in this hazard class used or stored in your laboratory.

3. Potential Hazards

   Describe all the potential hazards for each process, hazardous chemical, or hazard class. Describe potential for both physical and health hazards. Health hazards include carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes. State the potential for chronic and/or acute health hazard effects of the chemical(s).

   Physical hazards include radioactivity, cryogen, high temperature, electrical, compressed gas or other pressure systems, UV light, laser, flammable or combustible, corrosive, water-reactive, unstable, oxidizer, pyrophoric, explosive, or peroxide formers.
4. **Circumstances Requiring Prior Approval**

Discuss the circumstances under which this particular process, hazardous chemical or hazard class will require prior approval (if any) from the principal investigator, laboratory supervisor or chemical hygiene officer. The circumstances may be based on such criteria as: the inherent hazards of the material(s) used, the hazards of the experimental process, the experience level of the worker, the scale of the reaction, etc. Some examples of circumstances that may require prior approval include unattended or overnight operations, use of highly toxic gas in any amount, use of large quantities of toxic or corrosive gases or use of carcinogens.

5. **Personal Protective Equipment (PPE)**

Identify the required PPE for the process, hazardous chemical, or hazard class. PPE includes but is not limited to: gloves, aprons, lab coats, safety glasses, goggles, masks, respirators, or faceshields.

6. **Engineering Controls**

Describe or list engineering controls that will be used to prevent or reduce employee exposure to hazards. Examples of engineering controls are fumehoods, glove boxes, interlocks on equipment, shielding of various kinds, etc.

7. **Special Handling and Storage Requirements**

Describe storage requirements for hazardous substances including special containment devices, special temperature requirements, special storage areas or cabinets, chemical compatibility storage requirements, etc. State the policy regarding access to substance(s). Provide exact storage location in laboratory. Describe special procedures such as dating peroxide forming chemicals on receipt and opening and disposal or testing after an appropriate amount of time has passed. Describe safe methods of transport such as in a secondary container or/and on a low, stable cart, or using two hands to carry the chemical container.

8. **Spill and Accident Procedures**

Describe special procedures for spills, releases or exposures (e.g., neutralizing agents, use of fluorescence to detect materials, etc.). Indicate how spills, accidental releases and exposures will be handled. List location of the following emergency equipment: chemical spill clean-up kit, first-aid kit, emergency shower, eyewash, and fire extinguisher.

9. **Decontamination Procedures**

Describe specific decontamination procedures for equipment, glassware or work areas.
10. **Waste Disposal Procedures**

Describe how waste will be collected and disposed.

11. **Designated Area**

Indicate the designated area established for experiments using “particularly hazardous substances”. A portion of a laboratory bench, a piece of equipment, the fume hood or the entire laboratory may be considered as a designated area for experiments using “particularly hazardous substances”.

12. **Material Safety Data Sheet (MSDS) Location**

State where the MSDSs are kept for the chemicals or hazardous substances used. Indicate the location of other pertinent safety information (e.g., references, equipment manuals, etc.).

13. **Protocols**

Insert a copy of your specific laboratory procedures for the process, hazardous chemical or hazard class.
Definitions

**Chemical Hygiene Officer** is an employee in the laboratory 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.

**Chemical Hygiene Plan** is a written program developed and implemented by the employer whom sets forth procedures, equipment, personal protective equipment (PPE), 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 this Cal/OSHA standard for a Chemical Hygiene Plan.

**Designated Area** is an area that 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 the laboratory, or a device such as a laboratory fume hood.

**Hazardous Chemical** is defined in the “Laboratory Standard” as a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term “Health Hazard” includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin eyes, or mucous membranes.

Appendices A and B of the Cal/OSHA Standard “Hazardous Communication” (California Title 8, Section 5194) provide further guidance in defining the scope of health hazards and determining whether or not a chemical is to be considered hazardous.

**Hazard Class** is used to classify hazardous materials according to their hazardous properties. It is the category of a hazardous material according to 49 CFR 173 and is illustrated as follows:

1) Class 1 = Explosives
2) Class 2 = Gases
3) Class 3 = Flammable liquids
4) Class 4 = Flammable solids
5) Class 5 = Oxidizer or organic peroxides
6) Class 6 = Poisonous or etiological (infectious) materials
7) Class 7 = Radioactive
8) Class 8 = Corrosives
9) Class 9 = Miscellaneous hazardous materials
**Particularly Hazardous Substances** are chemicals that can be fatal or cause damage to target organs as a result of a single exposure or exposures of short duration. Examples include hydrogen cyanide, hydrogen sulfide, and nitrogen dioxide.

**Reproductive toxicants** are chemicals that affect the reproductive system including chromosomal damage (mutagenesis) and effects on the fetuses (teratogenesis). Information on reproductive effects can be found on Material Safety Data Sheets.

**Select Carcinogens** are any substances meeting the following criteria.

10) It is regulated by Cal/OSHA as a carcinogen
11) It is listed under the category “known to be carcinogens” in the annual report by the National Toxicology Program (NTP).
12) It is listed under Group 1 – “carcinogenic to humans” – by the International Agency for Research on Cancer (IARC)
13) It is listed in either Group 2A or Group 2B by the IARC or under the category “reasonably anticipated to be carcinogens” by the NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
   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.

**Physical hazard** is a type of hazard of a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.
CHEMICAL SEGREGATION & STORAGE

“It is not that we don’t know! It is that we don’t look!”

ACIDS

Storage and Handling Precautions

- Store large bottles of acids on low shelf or in acid cabinets.
- Segregate oxidizing and mineral acids from organic acids, flammable and combustible materials (such as paper, wood, cardboard, Styrofoam, plastics, etc.). *(Note: There are two main groups of acids, organic and mineral acids. Some of the mineral acids are oxidizing).*
- Segregate acids from bases and active metals such as sodium, potassium, magnesium, etc.
- Segregate acids from chemicals which could generate toxic gases upon contact, such as sodium cyanide, iron sulfide, etc.
- Use secondary containment such as nalgene tray/tub to store acids.
- Use bottle carriers for transporting acid bottles.
- Have spill control pillows or acid neutralizers available in case of acid spills.

<table>
<thead>
<tr>
<th>Organic Acids</th>
<th>Mineral &amp; Oxidizing Acids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic Acid</td>
<td>* Chromic Acid</td>
</tr>
<tr>
<td>Benzoic Acid</td>
<td>* Hydrobromic Acid</td>
</tr>
<tr>
<td>Chloroacetic Acid</td>
<td>Hydrobromous Acid</td>
</tr>
<tr>
<td>Phenol</td>
<td>Hydrochloric Acid</td>
</tr>
<tr>
<td>** Picric Acid</td>
<td>Hydrochlorous Acid</td>
</tr>
<tr>
<td>Propionic Acid</td>
<td>* Iodic Acid</td>
</tr>
<tr>
<td>Sulfamic Acid</td>
<td>Muriatic Acid</td>
</tr>
<tr>
<td>Sulfanilic Acid</td>
<td>* Nitric Acid</td>
</tr>
</tbody>
</table>

** Picric Acid is reactive with metals or metal salts and explosive when dry. Picric Acid must contain at least 10% water to inhibit explosion.

* Indicates strong oxidizing acids.

** Note: The chemicals in bold are the most common ones found in the labs.

BASES

Storage and Handling Precautions

- Segregate bases from acids.
- Store solutions of inorganic hydroxides in polyethylene containers.
- Have spill control pillows/absorbent pads or caustic neutralizers available for caustic spills.
Ammonium
Hydroxide  Calcium Hydroxide
Bicarbonates, Salts of
1  Potassium Hydroxide
Carbonates, Salts of 2  Sodium Hydroxide
1 Potassium bicarbonate, sodium bicarbonate, etc.
2 Calcium carbonate, sodium carbonate, etc.
Note: The chemicals in bold are the most common ones found in the labs.

FLAMMABLES

Storage and Handling Precautions

- Store in approved safety cans or cabinets.
- Segregate from oxidizing acids and oxidizers.
- Keep away from any source of ignition: Flames, localized heat or sparks.
- Safety cans or drums containing flammable liquids should be grounded and bonded when being used.
- Keep fire-fighting equipment readily available.
- Have spill cleanup materials handy.
- Store highly volatile flammable liquids in a specially equipped refrigerator.
- Whenever 10 gallons or more of flammable materials are stored in the lab, they should be kept in an approved flammable storage cabinet.
- When transferring the flammable chemicals, see to it that it is always transferred from glass container to glassware or glass container/glassware to PVC/plastic. (Note: Transferring from PVC/plastic containers to PVC/plastic containers might lead to a fire hazard due to static developed).

Solids
Benzoyl Peroxide  Yellow Phosphorous
Calcium Carbide  Picric Acid

Gases
Acetylene  Ethane  Formaldehyde  Propane
Ammonium  Ethyl Chloride  Hydrogen  Propylene
Butane  Ethylene  Hydrogen Sulfide
Carbon Monoxide  Ethylene Oxide  Methane

Liquids
Acetaldehyde  Gasoline  Propylene Oxide
Acetone  Heptane  Pyridine
Acetyl Chloride  Hexane  Styrene
Allyl Alcohol  Hydrazine  Tertrahydrofuran
Allyl Chloride  Isobutyl Alcohol  Toluene
N-Amyl Acetate  Isopropyl Acetate  Turpentine
N-Amyl Alcohol  Isopropyl Alcohol  Vinyl Acetate
**Benzene**  Isopropyl Ether  Xylene
N-Butyl Acetate  Mesityl Oxide
N-Butyl Alcohol  **Methanol**
N-Butylamine  Methyl Acetate
Carbon Disulfide  Methyl Acrylate
Chlorobenzene  Methylal
Cyclohexane  Methyl Butyl Ketone
**Diethylamine**  **Methyl Ethyl Ketone**
Diethyl Carbonate  Methyl Formate  Methyl Isobutyl
p-Dioxane  Ketone
**Ethanol**  Methyl Methacrylate
Ethyl Acetate  Methyl Propyl Ketone
Ethyl Acrylate  Morpholine
Ethylamine  Naptha
Ethyl Benzene  * Nitromethane
**Ethylene Dichloride**  **Octane**
**Ethyl Ether**  Piperidine
Ethyl Formate  **Propanol**
Furan  Propyl Acetate

* Most nitrohydrocarbons are flammable

**Note:** The chemicals in bold are the most common ones found in the labs.

**OXIDIZERS**

**Storage and Handling Precautions**

- Store in a cool, dry place.
- Keep away from flammable and combustible materials (such as paper, wood, cardboard, Styrofoam, plastics, etc.)
- Keep away from reducing agents such as zinc, alkaline metals, and formic acid.

**Solids**

<table>
<thead>
<tr>
<th>Ammonium</th>
<th>Nitrates, Salts of 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichromate</td>
<td>Periodic Acid</td>
</tr>
<tr>
<td>Ammonium Perchlorate</td>
<td>Permanag Acid</td>
</tr>
<tr>
<td>Ammonium Peroxides, Salts of 5</td>
<td></td>
</tr>
<tr>
<td>Persulfate</td>
<td>Potassium</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Benzoyl Peroxide</td>
<td>Dichromate</td>
</tr>
<tr>
<td>Bromates, Salts of 1</td>
<td>Ferricyanide</td>
</tr>
<tr>
<td>Calcium Hypochlorite</td>
<td>Permanganate</td>
</tr>
<tr>
<td>Ceric Sulfate</td>
<td>Potassium Persulfate</td>
</tr>
<tr>
<td>Chlorates, Salts of 2</td>
<td>Sodium Bismuthate</td>
</tr>
<tr>
<td>Chromium Trioxide</td>
<td>Sodium Chlorite</td>
</tr>
<tr>
<td><strong>Ferric Chloride</strong></td>
<td>Sodium Chlorite</td>
</tr>
<tr>
<td>Ferric Trioxide</td>
<td>Sodium Nitrite</td>
</tr>
<tr>
<td>Iodates, Salts of 3</td>
<td>Sodium Perborate</td>
</tr>
<tr>
<td><strong>Iodine</strong></td>
<td><strong>Sulfates, Salts of 6</strong></td>
</tr>
<tr>
<td>Magnesium</td>
<td></td>
</tr>
<tr>
<td>Perchlorate</td>
<td></td>
</tr>
<tr>
<td><strong>Manganese Dioxide</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
1 Potassium bromate, sodium bromate, etc.
2 Potassium chlorate, etc.
3 Sodium iodate, etc.
4 Ammonium nitrate, ferric nitrate, etc.
5 Lithium peroxide, sodium peroxide, etc.
6 Ferric sulfate, potassium peroxide, etc.

**Liquids**
<table>
<thead>
<tr>
<th>Bromine</th>
<th>Nitric Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromic Acid</td>
<td>Perchloric Acid</td>
</tr>
<tr>
<td>Hydrogen Peroxide</td>
<td>Sulfuric Acid</td>
</tr>
</tbody>
</table>

**Gases**
<table>
<thead>
<tr>
<th>Chlorine</th>
<th>Nitrogen Oxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine dioxide</td>
<td>Oxygen</td>
</tr>
<tr>
<td>Fluorine</td>
<td>Ozone</td>
</tr>
<tr>
<td><strong>Nitrogen Dioxide</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The chemicals in bold are the most common ones found in the labs.

**PYROPHORIC SUBSTANCES**

**Storage and Handling Precautions**

- Store in a cool, dry place.
**Warning!** Pyrophoric substances ignite spontaneously upon contact with air.

- Boron
- * Cadmium
- * Calcium
- * Chromium
- * Cobalt
- Diborane
- Dichloroborane
- * Manganese
- * Nickel
- ** Yellow
- 2-Furaldehyde
- * Iron
- * Lead
- Phosphorous
- * Titanium
- * Zinc

* Finely divided metals form a pyrophoric hazard.
** Phosphorous, Yellow should be stored and cut under water.

**Note:** The chemicals in bold are the most common ones found in the labs.

---

**LIGHT SENSITIVE CHEMICALS**

**Storage and Handling Precautions**

- Avoid exposure to light.
- Store in amber-bottles in a cool, dry place.

- Bromine
- Oleic Acid
- Potassium
- Ethyl Ether
- Ferric Ammonium
- Citrate
- Hydrobromic Acid
- Mercurous Salts 1
- Mercurous Nitrate

1 Mercurous Chloride, Mercuric iodide, etc.
2 Silver acetate, silver chloride, etc.

**Note:** The chemicals in bold are the most common ones found in the labs.

---

**PEROXIDE FORMING CHEMICALS**

**Storage and Handling Precautions**

- Store in airtight containers in a dark, cool, and dry place.
- Label containers with receiving, opening, and disposal dates.
- Disposal of peroxide forming chemicals before expected date of first peroxide formation.
• Test for the presence of peroxides periodically.

**Warning!** Under proper conditions, these chemicals will form explosive peroxides which can be detonated by shock or heat.

- Acetaldehyde
- Acrylaldehyde
- Crotonaldehyde
- Cyclohexane
- p-Dioxane
- Ethyl Ether
- Isopropyl Ether
- * Potassium
- * Potassium peroxide often exists in the crust around a chunk of potassium. When cut with a knife the peroxide rapidly oxidizes the residual kerosene resulting in an explosion.

**Note:** The chemicals in bold are the most common ones found in the labs.

**WATER REACTIVE CHEMICALS**

**Storage and Handling Precautions**

- Store in a cool, dry place.
- In case of fire, keep water away.

**Warning!** These chemicals react with water to yield flammable or toxic gases or other hazardous conditions.

**Solids**

- Aluminum Chloride, anhydrous
- Calcium Carbide
- Calcium Oxide
- Ferrous Sulfide
- * Lithium
- Magnesium
- Maleic Anhydride
- Phosphorus
- Pentachloride
- Phosphorus
- Pentasulfide
- * Potassium
- * Sodium

* Lithium, Potassium, and Sodium should be stored under kerosene or mineral oil.

**Liquids**

- Acetyl Chloride
- Chlorosulfonic Acid
- Phosphorous Trichloride
- Silicon Tetrachloride
- Stannic Chloride
- Sulfur Chloride
- Sulfuryl Chloride
- Thionyl Chloride

**TOXIC COMPOUNDS**
Storage and Handling Precautions

- Store according to hazardous nature of chemical, using appropriate security when necessary.

Warning! These chemicals are dangerous or extremely dangerous to health and life when inhaled, swallowed, or absorbed by skin contact. Take proper precautionary measures to avoid exposure.

<table>
<thead>
<tr>
<th>Solids</th>
<th>Fluorides, Salts</th>
<th>Picric Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony Compounds</td>
<td>Iodine</td>
<td></td>
</tr>
<tr>
<td>Arsenic Compounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium Compounds</td>
<td>Lead Compounds</td>
<td></td>
</tr>
<tr>
<td>Beryllium Compounds</td>
<td>Mercuric Compounds</td>
<td></td>
</tr>
<tr>
<td>Cadmium Compounds</td>
<td>Oxalic Acid</td>
<td></td>
</tr>
<tr>
<td>Calcium Oxide</td>
<td>Phenol</td>
<td></td>
</tr>
<tr>
<td>Chromates, Salts of</td>
<td>Yellow Phosphorous</td>
<td></td>
</tr>
<tr>
<td>Cyanides, Salts of</td>
<td>Phosphorous</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pentachloride</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquids</th>
<th>Hydrochloric Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aniline</td>
<td>Hydrofluoric Acid</td>
</tr>
<tr>
<td>Bromine</td>
<td>Hydrogen Peroxide</td>
</tr>
<tr>
<td>Carbon Disulfide</td>
<td></td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>Mercury</td>
</tr>
<tr>
<td>Chloroform</td>
<td>Nitric Acid</td>
</tr>
<tr>
<td>Chromeic Acid</td>
<td>Perchloric Acid</td>
</tr>
<tr>
<td>p-Dioxane</td>
<td>Phosphorous Trichloride</td>
</tr>
<tr>
<td>Ethylene Glycol</td>
<td>Sulfuric Acid</td>
</tr>
<tr>
<td>Formic Acid</td>
<td></td>
</tr>
<tr>
<td>Hydrazine</td>
<td>Tetrachloroethane</td>
</tr>
<tr>
<td>Hydrobromic Acid</td>
<td>Tetrachloroethylene</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gases</th>
<th>Hydrogen Chloride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>Hydrogen Cyanide</td>
</tr>
<tr>
<td>Chlorine</td>
<td></td>
</tr>
<tr>
<td>Cyanogen</td>
<td>Hydrogen Sulfide</td>
</tr>
<tr>
<td>Diborane</td>
<td>Nitrogen Dioxide</td>
</tr>
<tr>
<td>Fluorine</td>
<td>Ozone</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>Sulfur Dioxide</td>
</tr>
<tr>
<td>Hydrogen Bromide</td>
<td></td>
</tr>
</tbody>
</table>

Note: The chemicals in bold are the most common ones found in the labs.
SAFETY ISSUES USING AND STORING LIQUID NITROGEN

The primary risk to laboratory personnel is skin or eye contact with liquid nitrogen or the material stored in the vials. Nitrogen expands 696:1 when changing from a cryogenic liquid to a room temperature gas. The gases usually are not toxic but if too much oxygen is displaced, asphyxiation is a definite possibility. Nitrogen is prone to splashing during expansion. Storage vials containing nitrogen may leak or explode contents when thawing. Follow these necessary precautions:

Know the first aid procedures for frostbite before using, handling or storing a cryogenic liquid.

Avoid storing cryogenic storage vials submerged in the liquid nitrogen. Plastic cryogenic storage vials are designed for vapor phase storage in liquid nitrogen freezers. This means that they are designed to sit in the cloud of extremely cold nitrogen gas that sits just above a small reservoir of liquid nitrogen in the bottom of the freezer. Do not overfill the freezer with liquid nitrogen. Do not store samples in the bottom spaces of the metal racks or aluminum canes.

Wear gloves, a lab coat and face shield that covers the face and neck when removing sample vials from the freezer. Wear closed-toed shoes, pants without cuffs or a long skirt. Do not wear jewelry. Wear gloves with adequate insulation when direct handling is required. Gloves must be loose enough to be tossed off easily in case of a spill. Cover all skin areas that may contact uninsulated vessels. Handle objects that are stored in a liquid nitrogen freezer with tongs, pot-holders or gloves to avoid skin contact. Use both Type G, H or K safety goggles and a Type N face shield.

Thaw the vials inside a biological safety cabinet or other enclosure in case they leak or explode. Vials infrequently explode. If they do explode, they will explode early in the warm-up process. During warming of plastic vials, liquid can spray from the cap/vial interface with potential dissemination of the vial contents.

Visually check each cryovial prior to filling it to ensure there are no defects around the rim. Never re-use cryovials.

Glass dewars should be wrapped with strong tape or enclosed in strong mesh material. Avoid pouring a cryogenic liquid on or over the edge of a glass Dewar flask when filling or emptying the flask; the flask may break and implode. If broken, the implosion of the vacuum space can cause broken glass to fly off. If a crack occurs
(especially on the inside) of a dewar, liquid can accumulate in the confined space that was previously evacuated. Metal dewars should have a pressure relief valve built into the vacuum shut off valve. Check any metal dewar that you use to determine whether such a safety feature is in fact present. In a glass dewar, which will not have a pressure relief valve, this kind of crack can lead to a violent explosion.

The boiling point of O₂ is -183°C and that of N₂ is -196°C. Therefore liquid O₂ will condense out of the air into a liquid N₂ bath. This is of particular concern when liquid N₂ is used as a trap on a vacuum system. If the system is opened while the trap is still on, liquid O₂ could condense from the air and could then combine with any organic material in the trap to create an explosive mixture. Therefore, a system with a liquid N₂ trap must not be opened to the atmosphere (even briefly) until the trap has been removed.

If liquid nitrogen can seep into a vial, materials from inside the vial can seep into the liquid nitrogen. Assume that your liquid nitrogen tank is contaminated with whatever you are storing inside. Take appropriate precautions to prevent exposure to stored materials.

The work area where you store liquid nitrogen must be well ventilated. Avoid inhaling air that has been cooled to near-cryogenic temperatures. Do not store liquid nitrogen containers in walk-in cold rooms or other areas where the air from the room is not ventilated. Rooms that contain appreciable amounts of liquid nitrogen should be fitted with oxygen meters and alarms. Do not put a cryogenic liquid into a household Thermos bottle or other insulated container ordinarily used to keep food or drinks cold.

Appropriate signage should always be used for unattended operation.

Action Items for Re-Inspection
<table>
<thead>
<tr>
<th>Action Items</th>
<th>Date Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Complete Standard Operating Procedures (Appendix J of Chemical Hygiene Plan)</td>
<td></td>
</tr>
<tr>
<td>2. Maintain Training Records</td>
<td></td>
</tr>
<tr>
<td>a. Material Safety Data Sheet (MSDS) BOOKMARK WEBSITE <a href="http://www.ucmsds.com">www.ucmsds.com</a></td>
<td></td>
</tr>
<tr>
<td>b. Document that all lab personnel has read and understood the Chemical Hygiene Plan</td>
<td></td>
</tr>
<tr>
<td>c. Attend Hazardous Waste Management Training provided by EH&amp;S</td>
<td></td>
</tr>
<tr>
<td>d. Know the location of Fire Extinguishers and Emergency Eyewash/Shower</td>
<td></td>
</tr>
<tr>
<td>3. Proper Chemical Storage</td>
<td></td>
</tr>
<tr>
<td>a. Separate incompatible chemicals</td>
<td></td>
</tr>
<tr>
<td>b. Use secondary containment</td>
<td></td>
</tr>
<tr>
<td>c. Label all chemicals</td>
<td></td>
</tr>
<tr>
<td>4. Proper handling of chemical waste</td>
<td></td>
</tr>
<tr>
<td>a. Label waste at the first point of generation</td>
<td></td>
</tr>
<tr>
<td>b. Deface waste containers</td>
<td></td>
</tr>
<tr>
<td>c. Bring waste to EH&amp;S pick-up location before 90 days</td>
<td></td>
</tr>
<tr>
<td>5. Obtain Chemical Spill Kit (Appendix B of Chemical Hygiene Plan)</td>
<td></td>
</tr>
<tr>
<td>6. Store combustibles at least 24 inches (rooms without sprinklers) or 18 inches (rooms with sprinklers) from the ceiling</td>
<td></td>
</tr>
</tbody>
</table>