

# CHEMICAL HYGIENE PLAN

Mt San Jacinto Community College District

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# Designations

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## Foreword

The California Occupational Safety and Health Administration (Cal/OSHA) has set forth the standards entitled Occupational Exposure to Hazardous Chemicals in Laboratories, 8 CCR §5191 and applies to any laboratory that use hazardous chemicals. The document mandates that a written chemical hygiene plan must be developed and implemented to include safe work policies, procedures and practices with the intent that all employees are protected from hazardous chemicals while working in laboratory areas.

The Chemical Hygiene Plan (CHP) has been prepared for use by each dean, laboratory supervisor, department chair, instructor, instructional aide and student for the purposes of the safe handling of chemicals in laboratory settings. In addition, this plan specifies that each laboratory is responsible for developing Standard Operating Procedures (SOP), which outlines the safety concerns specific to each type of laboratory. SOP are posted and made available to students, faculty, administrators and any other outside regulatory agency upon request.

It is essential that all laboratory personnel receive training on the CHP and SOP and follow the procedures outlined in these plans. The CHP and SOP are reviewed annually unless mandated by new regulations or emergent hazards that would necessitate more immediate attention.

## Introduction

Mt San Jacinto College (MSJC) is committed to providing a safe working environment in our academic laboratories. The CHP is established in conjunction with the Hazard Communication Program and is applicable to every staff member who is involved with the use of hazardous chemicals.

The CHP is readily available to all MSJC employees who are in contact with and in use of hazardous substances. The Plan is also readily available for any authorized staff of the California Division of Occupational Safety and Health (Cal/OSHA). Copies of the CHP are distributed to all employees working in the Biological, Physical, Chemical and Environmental Science laboratories.

The goals and the objectives of the CHP include the following:

- Clearly meet the compliance requirements of local, state and federal regulations related to hazardous substances  
Ensure the safety of all faculty, staff, students and visitors of MSJC
- Provide appropriate safety guidelines for working with chemicals in the laboratory
- Encourage faculty, staff and students to report hazards
- Afford MSJC employees, students and visitors' necessary general information regarding the hazards related to chemical exposure

## Chemical Hygiene Plan Designations

### Vice President of Instruction

The Vice President of Instruction or applicable Dean ensures that departments/units under their authority that are engaged in the laboratory use of hazardous chemicals comply with the Chemical Hygiene Plan (CHP) for each department.

## **Chemical Hygiene Officer**

The Chemical Hygiene Officer (CHO) is responsible for staying abreast of any new regulations related to chemical safety and reviews the CHP annually to update the plan in concert with those regulatory changes in consultation with the Safety Committee and other appropriate shared governance committees. Additionally, the CHO is responsible for the establishment of technical guidance for personnel at all levels of responsibility on matters pertaining to laboratory safety and ergonomics.

The duties of the CHO are:

- Perform hazard assessment of operations to determine the appropriate safety control requirements which include laboratory practices, PPE, engineering controls and training
- Review and approve Standard Operating Procedures (SOP)
- Provide chemical hygiene monitoring for chemical exposure and/or equipment contamination
- Establish and maintain medical surveillance requirements of personnel
- Maintain employee exposure monitoring and medical surveillance records
- Review chemical inventories from laboratories and facilities that house and/or store hazardous substances
- Arrange for professional ergonomics services to recommend equipment, work practices and ergonomic training
- Review plans for new laboratory construction, renovation or installation of engineering controls
- Provide technical assistance on storage, classification, compatibility and hazards of chemicals
- Evaluate SOP and overall laboratory programs to assess compliance on local, state and federal levels
- Ensure that fume hood surveys are done at least annually by an outside vendor
- Review and evaluate the Chemical Hygiene Plan annually

## **Department chairs, Instructors and Instructional Aides**

The Department chairs, Instructors and Instructional Aides (IAs) for the sciences are responsible for disseminating and practicing the measures outlined in the CHP and SOP.

The following is a list of duties for Instructors and Instructional Aides:

- Ensure students know and follow the chemical hygiene rules; that protective equipment is available and in working order; and that appropriate safety training has been provided prior to working with hazardous substances
- Maintain current chemical inventory and Safety Data Sheets (SDS) documentation
- Prepare for spontaneous and regular chemical hygiene and lab space inspections including eyewash stations and deluge showers
- Maintain currency in safety regulations
- Ensure that facilities, PPE and safety training is appropriate and up to date
- Reporting unsafe conditions to immediate supervisor and the CHO

## **Laboratory Employees and Student Workers**

Laboratory employees and student workers are responsible for planning and conducting operations in accordance with the chemical hygiene guidelines. Additionally, the personnel are responsible for developing good personal chemical hygiene habits and submit recommendations to the instructor and/or instructional aides for continued improvements to safe practices.

## Administrative, Maintenance and Custodial Personnel

For buildings where laboratory activities involving hazardous substances are conducted, administrative, maintenance and custodial personnel are responsible for the following:

- Attend Hazard Communication training
- Submit an SOP or SOP updates for laboratory construction, renovation or installation of engineering controls
- Comply with applicable local, state and federal regulations regarding the CHP and SOP
- Establish the independent verification of engineering controls and equipment
- Report unsafe conditions to immediate supervisor

## Standard Operating Procedures (Laboratory Guidelines)

MSJC, working with the CHO, department chairs, laboratory instructors, instructional aides and facility managers are responsible for providing written standard operating procedures (SOP) for all laboratory activities involving hazardous substances. For each individual department, an SOP shall supplement the CHP and undergo an annual review.

### General Guidelines

1. When possible, individuals should not work alone in the laboratory when working with hazardous substances or materials.
2. All chemical storage containers including secondary containers must be properly labeled to identify contents and hazards. This does not include temporary containers which will be used in the course of a single laboratory session under direct supervision of the user.
3. Hazardous waste held in containers in the Laboratory Satellite Accumulation Site (LSAS) must also be labeled including contents, date accumulation began, and amount of each compound in waste.
4. Hypodermic needles and syringes must be disposed of in a "Sharps" receptacle.
5. Eating, drinking, gum chewing, smoking or the application of cosmetics and contact lens is not permitted in the laboratory or laboratory preparation area.
6. Individuals should not handle chemicals that exceed the Cal/OSHA Permissible Exposure Limits (PEL) or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV).

### Hygiene and Conduct

1. Long hair needs to be tied back or tucked into the collar.
2. Hands are washed before and after lab or as frequently needed with soap and water to reduce chemical exposure.
3. Pipetting by mouth is prohibited.
4. Loose clothing or jewelry is avoided.
5. A lab coat is worn when school clothes do not provide adequate coverage.
6. Closed toed and closed heel shoes are required in the laboratory.
7. PPE is made available for use (approved eyewear, gloves and other PPE as appropriate to the hazard).
8. Individuals are to always work in a professional manner.
9. Any accidents are reported immediately to laboratory staff, CHO or in emergency situations – **Call 911 (Dial 8-911 from a District Phone).**



## Laboratory Environment

1. Work areas are kept clean and uncluttered.
2. Equipment and supplies are returned to their appropriate area after the lab session/class has finished.
3. Floors need to be kept clean and dry to prevent slips and falls.
4. Aisles, walking areas and pathways to emergency eyewash and shower stations need to remain clear of any obstacles.
5. Hazardous waste containers are labeled and follow the established procedures for waste reduction, control and removal.

## Laboratory Equipment

1. Equipment is only used for its intended purpose.
2. All staff and faculty receive training for the proper use of laboratory equipment prior to the experiment.
3. Damaged equipment is not used and labeled as decommissioned until repairs are completed or removed from the laboratory.
4. Emergency equipment is inspected periodically.
5. Broken glassware is immediately disposed of in a specified labeled broken glass waste bin.
6. Shelves storing chemicals or other lab equipment have lips, wires or other seismic restraints to prevent items from falling.
7. Heavy equipment greater than five feet tall is secured to prevent tipping over.
8. Equipment is periodically cleaned, and preventative maintenance is scheduled based on manufacturer or current regulatory recommendations.
9. All compressed gas cylinders are secured to a cylinder rack or chained to a wall/bench and capped if not in use.

## Inspections

MSJC has implemented the following inspections based on regulatory requirements:

- Emergency eyewash and deluge shower testing are performed monthly to ensure proper operation
- PPE are inspected based on manufactures recommendations
- Fume hood ventilation rate surveys are conducted annually by an external fume hood service provider
- General laboratory area safety inspections are performed annually
- An inspection checklist is provided in Appendix B

## Recordkeeping

Recordkeeping will include the following items:

- Annual synopsis of the changes to the CHP
- Annual general laboratory inspections
- Annual fume hood surveys
- Annual and monthly training attendance forms and related workshop information
- Monthly testing of emergency eyewashes and deluge showers
- Health and safety training for staff working in the laboratory and/or with or around hazardous substances
- Records are kept for a minimum of 5 years by Risk Management and within appropriate labs

# Chemical Storage

Chemicals are stored in designated facilities with ample routes of access, plenty of space for storage and have chemicals segregated based on their compatibilities listed below:

## Flammable Liquids

- Flammable liquids are stored in a well ventilated area away from oxidizers and other sources of heat and ignition
- Store in covered, flameproof containers with self-closing doors
- Never use air pressure to remove liquids from a drum or tank
- Provide spill containment equipment and material near storage areas
- All flammable liquid storing areas are identified with signs and symbols and clearly marked "No Smoking or Open Flame"
- Flammable liquids are not dispensed from containers greater than 4 liters
- Use only approved safety cans or media bottles to dispense flammable liquids
- Fire extinguishers are available within 50 feet of flammable storage areas

## Corrosive Liquids

- Corrosives are stored in a dedicated cabinet within a well ventilated area
- Spill containment barriers are in place for storing bulk corrosives
- Acids are segregated from substances they are reactive with metals, oxides, cyanates, fluorides, hydroxides, amines, carbonate and sulfides
- Oxidizing acids are segregated from organic acids and flammable substances
- Nitric acid is segregated from other acids and bases
- Splash proof goggles and appropriate gloves are always worn when handling corrosives
- Corrosives are not stored at or above eye level

## Oxidizers

- Oxidizers are stored in a well ventilated area
- Are kept away from combustibles, organic matter, reducing agents, and sources of heat or ignition
- Oxygen canisters are free of oil, grease, dirt, or other contaminants

## Toxics

- Toxics are stored in containers marked "Poison"
- Dedicated cabinets specific for toxic material are kept locked
- Toxics are used in a well-ventilated area
- Toxics are separated from acids
- Poison Control phone numbers are posted in the designated room/area for poisons
- Highly toxic substances are only used under strict supervision from the instructor/staff members

## Reactives

- Reactives are stored in a cool, dry and well ventilated area
- Kept away from sources of heat and ignition
- Water reactive material should not be stored in a room with an automatic water sprinkler system unless it is certain the material will remain dry
- Pyrophoric materials such as reactive metals are segregated from halogenated hydrocarbons, oxidizers and moisture

## **Organic Peroxides**

- Peroxides and peroxide formers are clearly labeled with pertinent information including the date opened
- Quantities are limited to the minimum required
- Unused peroxides are not returned to the container
- Spills are cleaned up immediately
- Metal utensils are not used to handle peroxides
- Smoking, open flames, friction or other heat sources and impact sources are avoided while using peroxides
- Organic peroxides are stored at the lowest possible and appropriate storage temperature
- Solvents
- Solvents are stored and used in well ventilated areas
- Kept away from flames or excessive heat
- Spill kits are available and capable of handling accidental releases

## **Compressed Gases**

- Compressed gases are stored away from external heat sources and away from falling objects that may cause damage
- Stored upright and secured to a wall or post with valve protection caps
- Oxygen cylinders are segregated from flammable gas cylinders by at least 20 feet by a non-combustible wall of 5 feet high
- Oxygen storage areas are clearly marked "Oxidizer"
- Flammable gas cylinder storage areas are clearly marked "Flammable Gas" and "No Smoking" or "Open Flame"
- Gas cylinders are marked with "Full" or "Empty" tags
- Gas cylinders are clearly marked with the chemical or trade name
- Empty cylinders are refilled only by dedicated suppliers
- All connecting hoses, couplings and regulators are regularly inspected
- Check valves and traps are installed in the discharge line to prevent back flow into the cylinder
- Aerosols are not in areas where temperatures may exceed 120° F

## **Cryogenics**

- Cryogenic chemicals are stored (e.g. liquid nitrogen) per manufacturer recommendations
- Appropriate PPE is used when dispensing, such as a face shield with goggles, chemical splash apron and cryogenic protective gloves
- If accidental exposure occurs, immediately rinse the skin with warm water for 15 minutes and then seek medical attention

# **Chemical Use and Management**

## **Hazard Recognition (Safety Data Sheets)**

The CHO and department chair working in conjunction with the faculty and Instructional Aides are jointly responsible for the recognition of hazards related to the use, storage and disposal of laboratory chemicals. The primary source of hazard recognition is located on the Safety Data Sheet (SDS) provided by the manufacturer. SDS must be contained in a dedicated chemical inventory binder and posted in a conspicuous location. All SDS documents for hazardous substances that are no longer used are filed for at least thirty years for future reference with the Safety Committee archives.

SDS documentation contains the following information:

*Section 1 Identification:* identifies the chemical on the SDS, contact information of supplier and recommended use of the chemical

*Section 2 Hazard(s) Identification:* identifies the hazards of the chemical with appropriate warnings including hazard classification, signal word, statement, GHS pictograms and descriptions (see Figure 1)

*Section 3 Composition/Information on Ingredients:* identifies the ingredients contained in the product including impurities and stabilizers

*Section 4 First Aid Measures:* describes the initial care that are be given by trained responders

*Section 5 Fire Fighting Measures:* provides recommendations for fighting a fire caused by the chemical

*Section 6 Accidental Release Measures:* provides recommendations on the appropriate response to spills, leaks or releases including containment and cleanup practices to prevent or minimize exposure

*Section 7 Handling and Storage:* provides guidance on the safe handling practices and conditions for safe storage of chemicals

*Section 8 Exposure Controls/Personal Protection:* indicates the exposure limits, engineering controls and personal protective measures that can be used to minimize worker exposure

*Section 9 Physical and Chemical Properties:* identifies physical and chemical properties associated with the substance or mixture

*Section 10 Stability and Reactivity:* describes the reactivity hazards of the chemical and the chemical stability information

*Section 11 Toxicological Information:* identifies toxicological and health information or indicates that such data are not available

*Section 12 Ecological Information:* provides information to evaluate the environmental impact of the chemical(s) if released to the environment

*Section 13 Disposal Considerations:* provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container and safe handling practices

*Section 14 Transport Information:* provides guidance on classification information for shipping and transporting of hazardous chemical(s) by road, air, rail or sea

*Section 15 Regulatory Information:* identifies the safety, health and environmental regulations specific for the product that is not indicated anywhere else on the SDS

*Section 16 Other Information:* indicates when the SDS was prepared or when the last known revision was made









GHS - Hazard Pictograms and Related Hazard Classes		
		
<b>Explosion Bomb</b> <ul style="list-style-type: none"> <li>• Explosive</li> <li>• Self-reactives</li> <li>• Organic Peroxides</li> </ul>	<b>Corrosion</b> <ul style="list-style-type: none"> <li>• Skin corrosion/burns</li> <li>• Eye damage</li> <li>• Corrosive to metals</li> </ul>	<b>Flame Over Circle</b> <ul style="list-style-type: none"> <li>• Oxidizing gases</li> <li>• Oxidizing liquids</li> <li>• Oxidizing solids</li> </ul>
		
<b>Gas Cylinder</b> <ul style="list-style-type: none"> <li>• Gases under pressure</li> </ul>	<b>Environment</b> <ul style="list-style-type: none"> <li>• Aquatic toxicity</li> </ul>	<b>Skull &amp; Crossbones</b> <ul style="list-style-type: none"> <li>• Acute toxicity (fatal or toxic)</li> </ul>
		
<b>Exclamation Mark</b> <ul style="list-style-type: none"> <li>• Irritant (eye &amp; skin)</li> <li>• Skin sensitizer</li> <li>• Acute toxicity</li> <li>• Narcotic effects</li> <li>• Respiratory tract irritant</li> <li>• Hazardous to ozone layer (non-mandatory)</li> </ul>	<b>Health Hazard</b> <ul style="list-style-type: none"> <li>• Carcinogen</li> <li>• Mutagenicity</li> <li>• Reproductive toxicity</li> <li>• Respiratory sensitizer</li> <li>• Target organ toxicity</li> <li>• Aspiration toxicity</li> </ul>	<b>Flame</b> <ul style="list-style-type: none"> <li>• Flammables</li> <li>• Pyrophorics</li> <li>• Self-heating</li> <li>• Emits flammable gas</li> <li>• Self-reactives</li> <li>• Organic peroxides</li> </ul>

Figure.1. GHS Hazard Symbols for chemical properties

## Labeling

All chemicals received by MSJC must have the following identifiers:

- Product identifier
- Signal word
- Hazard statement(s)
- Pictogram(s)
- Precautionary statement(s)
- Name, address and telephone number of the manufacturer, importer or other responsible party
- Labels must be legible, permanently displayed and written in English. Labels are not to be removed or defaced, and if the chemicals are transferred to portable containers, they must be affixed with workplace labels. If the District or any facility receives a chemical without these markings, the chemical will not be used, and the substance is to be sent back to the supplier

Hazardous substances transferred from the original containers to secondary containers are to be labeled with the chemical name, applicable health and physical hazard warnings, and a common name (not required).

Any chemicals that are produced in the laboratory require special consideration:

- If the composition of the chemical substance which is produced exclusively for the laboratory's own use, the instructor and/or IAs with assistance from the CHO will determine if it is hazardous
- If the chemical is produced as a by-product whose composition is not known are assumed to be hazardous

## **Spills, Accidents, and Emergencies**

Laboratory specific spills and accidents SOP may be created by each department and included in the departmental SOP guide. The following serves as standard procedures for handling a spill and/or release of hazardous substances.

A spill is the release of a hazardous material to an undesired location resulting in increased hazard or potential hazards to people, property and the environment. When a spill occurs, or is discovered, appropriate action for the circumstances must be initiated.

The cleanup of a chemical spill must only be done by knowledgeable and experienced personnel. A minor chemical spill is one that the lab staff is capable of handling safely without the use of a full protective suit and respirators and when the material is contained with a small area of the lab or hallway. All other chemical spills are considered major and should be handled accordingly by the guidelines described below.

### **Spill Plans**

Every department must have a spill plan in place to handle the accidental release or spill of chemicals in the laboratory.

Follow the following guidelines for preparing a spill kit:

- Review your chemical list to identify hazards of chemicals used and stored in your area
- Purchase or assemble a spill kit appropriate for your chemicals
- Consider special needs for air and water reactions and poisons
- Post emergency contact information or call lists at the entrance to the area
- Post a hazardous materials spill guide at an easily accessible location in the work area
- Train lab occupants on area spill procedures

### **Spill Kit Supplies**

Basic spill kits are available from a variety of science vendors. A basic spill kit should include the following:

- Chemical resistance container
- Universal absorbents
- Goggles
- Nitrile gloves
- Disposable coverall or apron
- Shoe covers
- Dust pan and whisk broom for solids
- Hazardous waste labels
- Specialty items dependent on chemical inventory
- Personal protective equipment such as face shields, aprons, boots
- General neutralizing agents for acids, bases, solvents and formaldehyde

- Mercury collection sponges
- Specialized supplies for air or water reactive chemicals

## Spill Training

Spill training should include the following criteria:

- Recognition (sight, smell, alarms, etc.)
- Fire aid for chemical injuries that may occur in your area
- Handling emergencies (notification, action)
- Prevention/Containment (secondary containment, spill limitation)
- Clean-up (personal protection, use of equipment, preventing damage, etc.)
- Packaging and handling of residue

## Minimizing Spills

All personnel working with hazardous substances must use best work practices to minimize the risk of spills.

Use the following criteria as a guideline:

- Store hazardous liquid containers in a pan or tray big enough to hold the contents if the container breaks or leaks
- Buy liquids in plastic coated bottles
- Use bottle carriers for protection and containment
- Put pans under experiments
- Use traps on vacuum lines
- Use carts designed to prevent materials from sliding off the cart
- Have sink stoppers and drain covers handy to prevent material from entering drains

## Clean Up Procedures

Follow the following criteria for addressing clean ups in the laboratory setting:

- Alert people in the immediate area of a spill
- Wear protective equipment, including safety goggles, gloves and long-sleeved lab coat
- Avoid breathing vapors from spill
- Ventilate the area (turn on fume hood and shut hood sash if chemical is spilled in hood)
- Contain the spill; gently apply absorbent from the outer edge of the spill
- For solids gently brush particles into a container or dustpan. If spill is not a water reactive material, then wet wipe the area
- Use appropriate kit to neutralize and absorb inorganic acids and bases
- For other chemicals use the appropriate kit or absorb spill with vermiculite, dry sand or diatomaceous earth
- Collect the residue and place in an appropriate container and properly dispose as chemical waste
- If the debris may “off gas”, place the container in a chemical fume hood and open the lid slightly to avoid pressure buildup or container rupture
- Complete hazardous waste label and request container pickup
- Report spill to CHO
- All spills should be cleaned up with non-reactive materials such as dry sand, paper towels or sponges

### Acid/Base Spills

- Use sodium bicarbonate or soda ash for acids
- Use citric acid or sodium bisulfate for bases
- Vermiculite, spill pillows or other absorbing material can be used to contain the spill
- Use pH paper to test the solution
- Use appropriate PPE such as goggles, nitrile or neoprene gloves and disposable shoe covers

### Mercury Spills

- For small spills such as a thermometer, use an aspirator bulb, suction device or mercury sponge
- Place the debris in a sealed rigid container and not a plastic bag
- If vapor inhalation is a potential problem as what happens when in contact with heat or acid, contact CHO for assistance after immediately evacuating the building

### Acid Chloride Spills

- Avoid water and sodium bicarbonate
- Use dry sand, Oil-Dri® or an equivalent product

### Alkali Metal Spills

- Do not use water
- Smother in dry sand and place debris in a hood

### Highly Hazardous or Toxic Material Spills

- Select substances or extremely poisonous substances and may necessitate having special clean up supplies or antidotes in the work area.
- Follow guidelines outlined in the SDS

### In Case of Emergency or Spill

- Any emergency: **Call 911 (Dial 8-911 from a District phone)** (Fire, Explosion, Police, Ambulance, Rescue, Evacuation) and Campus Safety at **951-639-5188**
- Major spill: **Call 911 (Dial 8-911 from a District phone)** A major spill is one that is spreading rapidly, presents inhalation or fire hazards, has entered the environment or exceeds the capability of the user to respond
- If a minor spill/non-emergency situation occurs, contact Risk Management, CHO and Campus Safety

Releases (spills) or threatened releases require notification to the following:

Riverside County Certified Unified Program Agency (**CUPA**) **951-782-2968**  
California Office of Emergency Services (**Cal OES**) **(800)-852-7550**

### Personal Injury

In the event of a personal injury of an employee or student, please adhere to the following guidelines.

- Warn others and render assistance to individuals involved
- If further exposure is life threatening, then remove the injured from the affected area
- If chemicals are involved, consult SDS and wash the individual under the safety shower as follows:



- Flush body and/or eyes with water for at least 15 minutes
- Remove contaminated clothing while under body shower
- Wash skin with mild soap and water
- Do not use neutralizing agents, creams, lotions or salve on the skin
- If the injured individual needs immediate medical attention;
  - If alone, yell out loud for help
  - Initiate lifesaving measures (CPR/first aid)
  - Do not move injured individual unless there is danger of further harm
  - Send an individual knowledgeable of the incident for help
  - Notify campus security and provide location, type of injury and number of individuals injured
- Complete an Accident Report after injured individual has been tended to

### Medical Treatment Needs

- Emergencies: Report to local emergency room
- Vehicle Transport Assistance: If needed, call campus security
- Non-emergency work related needs: During normal business hours, call or check with Risk Management

### Fire and Explosion General Response Actions

Immediate response actions:

- Alert other personnel in the laboratory
- Contact campus security
- Determine if means are available to extinguish fire. If none are available, then vacate the area and activate the nearest building fire alarm
- If the fire is small, attack the fire immediately using the laboratory fire extinguisher appropriate for the following types of fire.
  - Class A: ordinary combustible solids such as paper, wood, coal, rubber and textiles
  - Class B: petroleum hydrocarbons (diesel fuel, motor oil and grease) and volatile flammable solvents
  - Class C: electrical equipment
  - Class D: combustible or reactive metals (e.g. sodium and potassium, sodium, metal hydrides or organometallics)

Special notes on fires:

- Small fires (no larger than a fire in a wastepaper basket can be extinguished without evacuation)
- If a small fire cannot be controlled, activate the nearest fire alarm to initiate evacuation
- Fire extinguishers should be used only by personnel trained in the extinguisher operation
- Never enter a room that is smoke-filled or if the door is warm to touch

***Do not attempt rescue***

### Small fire

- Extinguish fire with correct type of fire extinguisher if you are trained to do so
- Aim fire extinguisher at base of fire. Apply agent on flame using a side-to-side sweeping motion
- Always maintain an accessible exit
- Ventilate the area after the fire has been extinguished

- Avoid smoke or fumes
- Call security and report incident

## Large fire

- Activate the nearest fire alarm and alert people to evacuate
- Close doors to confine fire
- Evacuate the building immediately; do not use elevators
- Call security from outside of the emergency area
- Meet emergency personnel outside with an individual knowledgeable of the incident to relay information
- Only re-enter an area that has been deemed safe by the fire department and the CHO

## Evacuations

- Rescue or evacuation: **Call 911** then CHO
- Non-emergency evacuation: Call the CHO and the Riverside Sherriff department
- Non-emergency technical assistance: Call CHO
- Radioactive Materials Notification: Notify the CHO of all radioactive material spills and instances of personal contamination as soon as possible
- Environmental Release and oil spill notifications
- For suspect or known spills to the environment (air, water, lands, drains), notify the CHO during normal business hours.
- After hours, call campus security for non-emergencies or 911 for emergencies.
  - Notifications must be made to regulatory agencies immediately and not later than six hours for actual or suspected environmental releases.

## Power Outages

- Contact campus security
- Place lids on open containers of volatile chemicals
- Lower the sash on chemical fume hoods
- Turn off ignition sources
- Shut down equipment except on cooling water
- Secure or isolate reactions that are underway such as boiling liquids or distillations

## Hazardous Waste

### Hazardous Waste Accumulation Site

The Resource Conservation & Recovery Act (RCRA) enacted in 1976 states that generators of hazardous waste are responsible for their waste from the time of generation to the final destructions. Since colleges are considered generators of hazardous waste, campus facilities must comply with all government mandated guidelines outlined within the RCRA and any other relevant federal, state, or local regulations that dictate how to safely store and manage waste.

Some requirements of waste storage include the following:

- Hazardous waste must be disposed of no later than 90 days of the accumulation start date

- Accumulation time may be up to 180 days depending on category of large or small quantity generator
- Hazardous waste containers must be stored within a secondary container that must be kept closed and sealed
- Damaged containers must be reported to CHO
- Hazardous waste are inspected weekly for signs of deterioration or leaks
- Fume hoods should not be used to evaporate chemicals
- Hazardous waste must contain only compatible compounds
- Acids must be segregated from bases
- Oxidizers must be segregated from organic compounds
- Cyanides must be segregated from acids

### **Hazardous Waste Accumulation Labeling**

The following items are necessary on a hazardous waste accumulation label:

- Name and address of waste accumulator
- Accumulation date
- Transfer to laboratory date
- Chemical name and concentration
- Physical state (solid, liquid, gas)
- Hazard classification (reactive, corrosive, toxic, ignitable)
- Words “hazardous waste”

### **Hazardous Waste Disposal**

Disposing of hazardous waste appropriately is just as important as the laboratory use of the chemical and needs the same approach to protecting personnel, waste handlers and the environment. Hazardous waste is defined as a substance (chemicals) or material that poses a hazard to human health or the environment when handled improperly. Types of hazardous waste include abandoned chemicals, unused chemicals, chemicals stored in deteriorating/shoddy containers, unlabeled chemicals and containers with different types of labels.

The districts CHO will coordinate pick-ups for each semester, or more frequently on an as needed basis. All hazardous waste must be labeled upon the start of accumulation. All labels must be as accurate as possible prior to a pick-up from the hazardous waste accumulation site.

The following are characteristics of hazardous substances:

- Corrosives
- Acids or bases with a pH  $\leq 2$  or  $\geq 12.5$  that are capable of corroding metal containers or human skin
  - Example: battery acid
- Ignitables
- Waste that can create fires under certain conditions, spontaneously combustible, or have a flash point less than 60° C
  - Example: waste oils and used solvents, especially when in contact with oxygen and in an enclosed container
- A chemical or chemical waste is considered reactive if the chemical or waste is unstable under “normal” conditions. Highly reactive chemicals can lead to reactions which involve the release of energy (heat) in relatively high quantities or at a rapid rate.
- Cause explosions, release toxic fumes, gases, or vapors when heated, compressed or mixed with water
  - Example: lithium-sulfur batteries and explosives

- Substances that pose a hazard to human or environmental health because of its carcinogenicity, toxicity or accumulative properties
- Harmful or fatal when ingested or absorbed
  - Example: lead, mercury

## Guidelines for Working with Chemicals

The Occupational Safety and Health Act of 1970 was enacted “To assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health.”

### Prior Approval

The responsibility for approval of the acquisition and use of particularly hazardous chemicals as defined in Appendix C rests with the laboratory supervisor. Researchers are encouraged to select less hazardous chemicals whenever possible. All needed approval must be obtained before experiments are performed. Chemicals classified as acute toxins, reproductive toxins and those with NFPA health rating of 4 must be kept under controlled access.

### Training

Laboratory personnel will be trained to ensure that they are aware and know the hazards of the chemicals with which they work. General chemical hygiene training is available through the CHO and annual training will be conducted by an outside agency as needed. Although laboratory specific training is the responsibility of the CHO, they can delegate the actual training to other parties.

Training will be provided at the following times:

- Initial assignment to a work area where a hazardous substance is present
- Introduction of new hazards into the work area
- As mandated by regulatory agencies upon hire and annual refreshers
- On a regular basis during normal operations

The content of the training will include the following:

- Contents of the regulation
- Location, availability and applicable details of the Chemical Hygiene Plan
- Relevant exposure limits of hazardous substances
- Signs/symptoms associated with exposure to hazardous substances used in the laboratory
- Locations and access to SDS, safe laboratory practices, chemical handling, chemical storage and emergency procedure documents
- Methods and observations to detect the presence or release of a hazardous chemical
- Physical, chemical and health hazards of the chemicals in the work area
- Protective measures employees can take to protect themselves from hazards

Annual training records shall be maintained by the CHO for at least one year.

## Routes of Exposure

The most common routes of exposure of hazardous substances into the body are:

- Inhalation: Chemicals in the form of gases, vapors, mists, fumes, and dusts can enter through the nose or mouth and be absorbed through the mucous membranes of the nose, trachea, bronchi, and lungs.
- Ingestion: Chemicals can enter the body through the mouth and be swallowed. They may be absorbed into the bloodstream anywhere along the length of the gastrointestinal tracts.
- Dermal: Although the skin is a good barrier to many substances, some chemicals can be absorbed through the skin, enter the bloodstream, and be carried throughout the body.
- Injection: While uncommon in most workplaces, exposure to a chemical can occur when a sharp object (e.g., a needle or broken glass) punctures the skin and injects a chemical directly into the bloodstream.

## Exposure Limits

The exposure limit is the established concentration of a chemical that most people exposed to in a typical day without experiencing adverse effects.

The various types of exposure limits are:

- Permissible Exposure Limit (PEL): Specifies the maximum amount or concentration of a chemical to which a worker may be exposed. It can be established in two ways:
  - a. Ceiling Values: at no time should this exposure limit be exceeded
  - b. 8-hr Time Weight Average (TWA): an average of exposure over the course of an 8-hr work shift
- Threshold Limit Value (TLV): Denotes the level of exposure that nearly all workers can experience without an unreasonable risk of disease or injury
- Immediate Danger to Life or Health (IDLH): Specifies a level of exposure that is immediately dangerous to life and/or health.

The harmful effects of exposure to hazardous substances can be reduced if the following precautions are taken:

- Assigned work schedules should be followed unless a deviation is authorized by the laboratory supervisor
- Unauthorized experiments should not be performed
- Plan safety procedures before beginning any operation
- Follow standard operating procedures at all times
- Always read the SDS and label before using a chemical
- Wear appropriate PPE at all times
- Always wear long pants and closed-toed shoes to protect your skin from splashes, spills and drips
- Use appropriate ventilation when working with hazardous chemicals
- Pipetting should never be done by mouth
- Hands should be washed with soap and water immediately after working with any laboratory chemicals, even if gloves have been worn
- Eating, drinking, smoking, gum chewing, applying cosmetics and taking medicine in laboratories where hazardous chemicals are used or stored is strictly prohibited
- Food, beverages, cups and other drinking and eating utensils should not be stored in areas where hazardous chemicals are handled or stored
- Laboratory refrigerators, ice chests, cold rooms and ovens should not be used for food storage or preparation
- Contact the laboratory supervisor or CHO with all safety questions or concerns
- Know the location and proper use of safety equipment

- Maintain situational awareness - for example:
- Make others aware of special hazards associated with your work
- Notify supervisors of chemical sensitivities or allergies
- Report all injuries, accidents, incidents and near misses
- Unauthorized persons should not be allowed in the laboratory
- Report unsafe conditions to the laboratory supervisor or CHO
- Properly dispose of chemical wastes

## **Hazard Exposure Reduction Methods**

Engineering and administrative controls are important and effective methods for limiting personnel exposure to chemicals. The most effective way to prevent adverse health effects from chemical exposure is the substitution of less hazardous chemicals. In those cases where this is not practical or feasible in laboratory operations the following controls can be implemented to reduce risk.

### **Engineering and Administrative Controls**

Engineering controls are considered very reliable for protecting employees and the environment.

The following engineering controls are in place:

- Chemical fume hoods
- Glove boxes
- Closed systems
- Air contaminant removal devices (HEPA filters, cold traps)
- Negative air pressure in the workplace
- Non-permeable work surfaces
- Secondary containers
- Biosafety, Flammable and Corrosive cabinets
- Chemical segregation

Administrative controls for minimizing employee exposure to hazardous substances include the following:

- Following SOPs for laboratory work involving hazardous substances and general laboratory health and safety procedures
- Review of plans for new and renovated laboratory equipment and work areas prior to construction
- Substitution of less hazardous equipment
- Scaling down the size of the experiment
- Prior approval for laboratory activities involving particularly hazardous substances or procedures

### **Ventilation**

General lab ventilation provides airflow into the laboratory from non-laboratory areas and out to the exterior of the building. Laboratory doors should remain closed except for egress and entrance. Area or localized exhaust ventilation equipment is a commonly used engineering control in the lab. This type of ventilation can be a chemical fume hood, ventilated bench top cabinets, spot exhaust devices, downdraft dissection tables and filtered cabinets for using hazardous solids.

Ventilation is an engineering control that is an important consideration in controlling exposures to hazardous materials. The ventilation requirements are detailed on the SDS and may also be listed on the container label. All employees are instructed to adhere to manufacturer's guidelines regarding the use of hazardous materials and the ventilation required for safe use. If engineering controls are not feasible, or do not reduce exposure to an appropriate level, then exposures are reduced by limiting the amount of time exposure (both frequency and duration) or by requiring the use of PPE.

## **Chemical Fume Hood**

A fume hood is a local exhaust device whose primary purpose is to protect laboratory workers from hazards of airborne chemical contaminants. The secondary purpose is to protect people and property against small fires and explosions. The fume hood must be used properly to allow it to function properly and remove contaminants from the breathing area of the user.

In addition, operators of fume hoods must:

- Use chemicals in the hood that may generate contaminants near or above exposure limits
- Not have sources of ignition inside the hood when flammable liquids or gases are present
- Visually inspect the device (and flow monitor) daily or before each use
- Keep all items 6 inches back from the front edge of the hood to avoid blocking the airflow path
- Keep slot openings at the back of the hood free from blockage with large objects or numerous containers
- Elevate large objects 2 inches off the floor of the hood so air can pass under the object and out the back slots in the hood
- Close the sash when the hood is not in use
- During hood use, lower the sash to the sash arrow sticker, below the chin or more if possible
- Lower and use the sash as a safety shield when working with reactive materials or materials that may splatter
- Not store chemicals in hoods and keep the interior surfaces clean

The Safety Committee utilizes third party providers to inspect fume hoods annually to check that the airflow into the hood is not compromised, the hood has a uniform inward pattern and the average velocity of air moving into the hood is within an acceptable range under a variety of conditions. Guidelines and results are noted on the hood sticker placed on the front of the hood. If results are not acceptable a notice will be placed on the hood sash and a repair request is sent to Facilities. Repair must be completed before the hood can be used.

A yellow sash arrow sticker indicates maximum sash height at which acceptable airflow performance results were checked. The sash sticker indicates the maximum sash opening for hood use. Contact CHO in the event a hood lacks a hood or sash sticker or the test date is older than one year. Equipment failures or problems should be reported to CHO and the sash should be lowered all the way down until the fume hood is serviced.

## **Biosafety, Flammable and Corrosive Storage Cabinets**

A Biological Safety Cabinet (BSC) is another example of engineering controls in the laboratory. The BSC is used as a containment and protective device when working with biohazardous and infectious microorganisms. The BSC is also used when utilizing aseptic techniques for culturing because it creates a near-sterile environment by using a High Efficiency Particular Air (HEPA) filter.

There are two different classifications of BSCs dependent on the nature of the work and microorganisms involving:

- Class I is a ventilated cabinet for personnel and environmental protection with non-recirculated inward airflow away from the user. The cabinet air is HEPA filtered before it is released into the atmosphere. Class I cabinets are used for low to moderate risk biological agents.
- Class II is a ventilated cabinet which contains an open front with inward airflow for user protection, downward HEPA-filtered laminar airflow for product protection and HEPA-filtered exhausted air for environmental protection. Class II cabinets are mainly used for low to moderate risk biological agents.

Flammable cabinets are used only for storage of flammable-type chemicals.

The following are requirements when purchasing and using flammable cabinets:

- Cabinets must comply with California NFPA standards
- Cabinets must have self-latching door (s) with red lettering stating “Flammable Keep Fire Away”
- Two doors are required on all cabinets except 10-20 gallon sizes where one door is sufficient. Where two doors are required, they are bi-folding or hinged on each side
- Cabinets must be of approved metal construction and meet minimum construction requirements:
- Bottom, top, sides, and door(s) of cabinet are at least 18 gauge sheet metal and double walled with a 1 ½ inch air space
- Joints must be riveted, welded or made liquid tight by an equally effective means
- Door(s) must be provided with three-point latch arrangement and the doorsill are raised at least two inches above the bottom of the cabinet to retain spilled liquid

Corrosive storage cabinets are made of polyethylene to prevent hazardous leakage of corrosive acids and/or bases. More in-depth information regarding the storage and handling of corrosives is found within Standard Operating Procedures: Chemical Storage.

## **Refrigerators**

Individuals and/or departments purchasing refrigerators for laboratory use are in accordance with requirements of NFPA 45. If flammable solvents need to be refrigerated, an explosion-safe refrigerator is used. Domestic refrigerators located in labs are labeled “Do Not Store Flammables in this Refrigerator” .

## **Emergency Eyewash and Showers**

Eyewash stations and showers are installed in or near laboratories, chemical preparation areas and chemical storage areas. Safety showers and eyewash stations are tested periodically (monthly) for use and effectiveness. Additionally, all laboratory personnel are trained in the proper use of the shower and eyewash stations.

Laboratory personnel also ensure that access routes to showers and eyewash stations are free of obstructions and obstacles. Water flow should be high enough so that the two streams meet together. If problems are noted with water flow, Maintenance and Operations and the CHO should be contacted.

## **Electrical Extension Cords**

The National Electric Code (NFPA 70) prohibits the use of extension cords as a substitute for permanent wiring. Multiple plug outlet adapters are also prohibited. The department may request to have additional outlets installed if additional electrical outlets are needed in a work area.



## Gas Hose Connectors

Per NFPA 54: National Fuel Gas Code, gas hose connectors (i.e. hoses connecting a gas source to an appliance or equipment), are allowed to be used for laboratory equipment, for example Bunsen burners, providing that all of the following conditions are met:

- The hose lengths do not exceed 6 feet
- A shut off valve is in direct contact with the hose connection and not pass through a wall, ceiling or floor
- Only UL listed hose connectors are used ergo the use of latex is prohibited

## Performance Verification of Engineering Controls and Equipment

Engineering controls and equipment must function properly at all times in order to protect the health and safety of laboratory personnel. The following equipment must be tested according to the following schedule.

<b>EQUIPMENT</b>	<b>TESTING FREQUENCY</b>	<b>RESPONSIBLE PARTY</b>	<b>STANDARD/MEASURE</b>
Eyewash	Weekly	Laboratory employee	ANSI Z358.1-2004
	Monthly	Maintenance & Operations	
Safety Shower	Monthly	Maintenance & Operations	
Fume Hoods	Annually	HVAC subcontractor	8CCR§5154.1, ANSI/AHA Z9.51992, ANSI/ASHRAE
HVAC System	Annually	Maintenance & Operations/HVAC subcontractor	Per design specs
Fire Extinguishers	Monthly (visual)	Maintenance & Operations	CHSC, Title 19, Chap. 3, Article 5, § 574.1
	Annually	Maintenance & Operations /Subcontractor	CHSC, Title 19, Chap. 3, Article 5, § 575.1

## Personal Protective Equipment

Employees are trained on the proper use and care of Personal Protective Equipment (PPE). Personnel should consult with the established SOP documents, Instructional Assistant /Laboratory Instructor/Department Chair and CHO department prior to attempting a laboratory procedure where hazardous materials are in use.

General types of PPE include:

- Eye and Face Protection
  - Eye protection is worn any time hazardous chemicals are used
  - Safety glasses with side shields and goggles which protect the user from chemical splashes and provides impact resistance

- Face shields: protect the user's face and neck from chemicals or particles
- Hearing Protection
  - Earplugs and earmuffs help protect the user from outside noise that can damage hearing
- Respiratory Protection
  - No respiratory protection program in place
- Skin Protection
  - Protective apparel can safeguard the user from hazardous materials absorbing or causing damage to the skin
  - Laboratory coats, closed-toed shoes, long-sleeved shirts, long-legged trousers and chemical splash aprons offer large areas of skin protection
  - Gloves are worn whenever it is necessary to handle corrosive material, sharp-edged objects, very hot or very cold materials or toxic chemicals. The following criteria are considered when using gloves
  - Gloves are selected depending on the type of activity
  - Gloves are inspected for discoloration, punctures and rips
  - Information is obtained from manufacturers to determine safe limits
  - Hazard Communication Program is consulted for glove-type usage

## Signs and Labels

To ensure safety and reduce exposure in the laboratory, appropriate warnings are provided to all staff and personnel.

Signs and labels should include the following:

- Emergency information
  - Important telephone numbers
- Locations
  - Eyewash areas
  - Shower areas
  - First aid equipment
  - Fire extinguishers
  - Exits
  - AED units
- Warnings for hazards
  - Flammable storage
  - Oxidizer storage
  - Corrosives storage
  - Toxic storage
  - Radioactive
  - Biohazardous waste
  - Extremely hot/cold equipment
- Miscellaneous
  - SDS symbol meaning
  - Laboratory attire
  - Laboratory behavior
  - Eye protection required
  - No food or beverage consumption
  - No smoking

- Containers
  - Labels on incoming containers are not to be removed
  - Chemical containers are labeled at minimum with the chemical identity or contents, hazard warnings and the date when the chemical was received or prepared
  - Carcinogens must be clearly labeled
  - Hazardous waste containers must be labeled “Hazardous Waste” with the waste type identified and accumulation date on the container

## Chemical Exposure Monitoring and Medical Surveillance

### Chemical Exposure Monitoring

The handling, use, and storage of highly hazardous chemicals, such as highly toxic chemicals, carcinogens and reproductive toxins may require that laboratory personnel be monitored for exposure. The personnel shall also be examined by a physician for medical symptoms and signs and possibly enter a medical surveillance program.

Based on a hazard assessment and/or a workplace evaluation, the CHO may conduct the following types of personnel monitoring to assess potential chemical exposures:

- Personal
- General area or process
- Surface

Medical consultations, examinations and testing are provided to personnel who may have been exposed to hazardous substances. Medical surveillance is provided to personnel who work with certain chemicals or are at risk for exposure to chemical concentrations that may be above regulatory and/or consensus standards.

Personal monitoring is conducted to determine exposure levels or for the need for medical consultation examination and/or surveillance. The CHO shall oversee the measuring personnel exposure to any chemical regulated by a standard which requires monitoring or if there is reason to believe that exposure levels for that substance may exceed the action level or exposure limit. Examples where personal monitoring may be conducted include when chemicals are not used in a fume hood and/or personnel develop signs or symptoms associated with hazardous chemicals.

If the action level or exposure limit is exceeded during the initial monitoring, personal monitoring will be repeated in accordance with the relevant regulatory standards or consensus guidelines:

- Monitoring may be terminated in accordance with relevant regulatory standards or consensus guidelines
- Monitoring results will be provided to personnel per the timeline requirements of the relevant regulation or within 15 days of the CHO’s receipt of monitoring results
- Where exposure monitoring reveals an exposure above the action level (or in the absence of an action level, the exposure limit) for a Cal/OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance will be established as prescribed
- General area or process monitoring is conducted to augment personal monitoring and to aid in the assessment of the effectiveness of engineering controls
- Surface monitoring is conducted to augment personal, area and processing monitoring

- Additionally, it is used to evaluate contamination control and the effectiveness of decontamination processes

Risk Management and Human Resources will maintain records of personnel exposure monitoring for the duration of employment plus an additional 30 years per 8 CCR § 3204. Furthermore, employees will have access to exposure records within 15 days of requesting them from Risk Management.

### **Guidance on Medical Surveillance**

The purpose of a medical surveillance program is to monitor the health of employees who may be exposed to certain categories of hazardous substances or activities.

Employees who work with hazardous chemicals in the laboratory shall be provided the opportunity to receive medical attention when the following occur:

- Exposure monitoring reveals an overexposure
- Signs and symptoms of chemical exposure develop
- A spill, leak, explosion or other occurrence results in a hazardous exposure

Routine medical surveillance involves contacting the CHO or Risk Management for an assessment/evaluation of the chemical exposure. If an employee has been exposed to a hazardous chemical, MSJC covers the cost of occupationally related medical treatment and surveillance for employees. The monitoring of the exposure is performed by licensed physicians designated by MSJC and medical records are maintained by the service provider.

To schedule a medical exam, the CHO evaluation needs to reveal the need for medical surveillance initially. The employee or student may work with Risk Management to schedule an appointment with the designated college clinics. An established medical protocol for the medical exam will be followed.

In case of emergencies (e.g. employee's skin or eye contact with a hazardous substance), appropriate emergency treatment should be followed:

- Flushing skin/eyes in eyewash safety shower, remove contaminated clothing and calling 911 - *Dial 8-911 from a District phone*
- The CHO should then be contacted immediately after 911 (*Dial 8-911 from a District phone*) for assistance on management of the case
- The California Poison Control System (CPCS) is available via phone at 1-800-222-1222

### **Medical Consultation and Examination**

Personnel who work with hazardous chemicals will be provided the opportunity to receive medical attention when the following occur:

- Symptoms or signs of chemical poisoning develop
- Exposure monitoring reveals an overexposure
- A spill, leak, explosion or other occurrence results in a hazardous exposure or overexposure
- There is a need or regulatory standard requiring medical surveillance

Medical examinations will be conducted by a licensed physician and will be provided at a reasonable time and place at no cost.

Risk Management will provide the following information to the physician:

- Identity of hazardous chemicals
- Conditions of exposure including exposure data findings
- Signs and symptoms of exposure

Risk Management will obtain a written report from the physician which includes the following:

- Examination and test results
- Any medical condition which may place an employee at increased risk from workplace hazardous chemicals
- A statement that the employee has been informed of the results and the written report shall not reveal specific findings of diagnoses unrelated to occupational exposure

Employees are also responsible for informing the Instructor or Instructional Assistant of any work modifications ordered by the physician as a result of an exposure. Medical records will be maintained by Risk Management and Human Resources for the duration of the employee's employment plus an additional 30 years. Furthermore, employees shall have access to medical records within 15 days of requesting them from the CHO.

## **Control Measures for Extremely Hazardous Substances**

Additional control measures outside of general chemical hygiene are important to protect the user from extremely hazardous chemicals or carcinogens.

The following precautions/procedures should be used when handling the following types of chemicals:

- Chemicals of Moderate Chronic or High Acute Toxicity
  - Follow all general rules and procedures mentioned in the CHP
  - Review all SDS documents for the substances used
  - Maintain strict records of the amounts used and personnel involved
  - Conduct preparations and experiments in fume hoods with chemicals that can create aerosols
  - Prepare to contain accidental spills
  - Other personnel are notified when the chemical is in use
  - If cyanides are used, a posting should be in plain sight on the doors or chemical hoods
  - Chemical waste in this category are placed in closed and impenetrable containers
  - The aforementioned containers should be labeled with the contents, type of hazards, name of the individual using the substance and the accumulation start date
  - Only individuals with appropriate PPE should contain spills
  - Two personnel are present when handling hazardous substances that fall under this category
- Chemicals of High Chronic Toxicity
  - Any experimental work should be preapproved by the laboratory instructor or Instructional Assistant
  - Consult with the Facilities department before working with chemicals with this designation
  - Chemical containers shall be labeled with large warning signs stating,
    - “Warning! Or High Chronic Toxicity” or “Warning! Cancer Suspect Agent”
  - All work with material of this category are performed in a fume hood designed to handle these types of substances
  - Controlled areas are marked with signs indicating “Warning! Toxic Substance/Cancer Suspect in USE “Authorized Personnel Only”
  - Wear appropriate PPE when handling or transporting these types of substances

- Personnel should remove PPE when leaving the controlled area and thoroughly wash hands, forearms face and neck
- Be sure the controlled area is decontaminated prior to use with the extremely hazardous substance
- Animal Work with Chemicals of High Chronic Toxicity
  - Follow guidelines listed above for chemicals of High Chronic Toxicity
- Cal/OSHA or Federal OSHA carcinogens
  - Written approval from the department chair and CHO must be obtained before use
  - Use only in a designated area with suitable warning signs for others
  - Wear PPE and use appropriate fume hoods/engineering controls
  - Store chemicals in a chemically resistant container in a well-ventilated area
  - Decontaminate the area and all equipment in the fume hood before removing them
  - Use a vacuum with a HEPA filter vented into the hood when cleaning up dry material
  - Waste must be stored in a closed, labeled and impenetrable container that is labeled with the contents, concentration, accumulation date, name of user and a sign that states “Cancer-Suspect Agent”

## **Extremely Hazardous Substances Responsibilities**

### **Risk Management and CHO**

- Register with the Division of Occupational Safety and Health when regulated carcinogens are used at MSJC
- Maintain a current inventory of Cal/OSHA regulated chemical carcinogens
- Report incidents to Cal/OSHA which result in the release of a carcinogen where employees may be potentially exposed within 24 hours
- Investigate all reported accidents which result in the exposure of personnel or the environment to a Cal/OSHA Regulated Chemical Carcinogen and recommend corrective action
- The report includes facts about the occurrence and any medical treatment administered
- Within 15 days, CHO shall issue a written report including the following:
  - Specification of the amount of material released, amount of time involved and an explanation of the procedure used in determining the figure
  - Description of the area involved and the extent of known and possible personnel exposure and area contamination
  - Report of any medical treatment of affected personnel and any medical surveillance program implemented
  - Analysis of the circumstances of the incident and measures taken to avoid similar releases

### **Instructors and Instructional Assistants**

- Assign duties involving Cal/OSHA Regulated Chemical Carcinogens to Carcinogen Users and ensuring they are trained in the hazards of the operation prior to the assignment
- Prepare SOPs for specific Cal/OSHA Regulated Chemical Carcinogens or processes using Cal/OSHA Regulated Chemical Carcinogens and submitting them to CHO for review and approval
- Consult CHO to conduct personal exposure monitoring if area concentrations are suspected to exceed Cal/OSHA action levels
- Ensure Cal/OSHA Regulated Chemical Carcinogen Users, who work in designated areas, know and follow the requirements for the carcinogen used, including the contents of the SOP
- Select work practices, personal protective equipment and engineering controls for handling Cal- OSHA Regulated Chemical Carcinogens
- Ensure engineering controls are installed and used
- Arrange for immediate medical attention and reporting to the LSP and CHO any accident that results in exposure to Cal/OSHA Regulated Chemical Carcinogens

- Correct work errors and conditions that may result in the release of Cal/OSHA Regulated Chemical Carcinogens

#### **Laboratory Personnel**

- Report to the Instructor or the Instructional Assistant all facts pertaining to any accident resulting in exposure to Cal/OSHA Regulated Chemical Carcinogens
- Know and follow the requirements for the carcinogen and contents of SOP

#### **Lab Safety Representatives**

- Know of any and have immediate access to Cal/OSHA Regulated Chemical Carcinogens in every MSJC building
- Maintain an inventory and a list of designated workplaces for use
- Inform any building occupants of asbestos (if applicable) via annual notification

#### **Administrative, Maintenance and Operations and Janitorial**

- Check with building manager, department chair, or instructional assistant of the current status of operations involving Cal/OSHA Regulated Chemical Carcinogens

## Appendix A: Definitions

29 CFR § 1910.1450: section of the Code of Federal Regulations Occupational Exposures to Hazardous Chemicals in Laboratories

8 CCR § 5191: section of the California Code of Regulations covering Occupational Exposure to Hazardous Chemicals in Laboratories

8 CCR § 5154.1: section of the California Code of Regulations covering Ventilation Requirements for Laboratory-Type Hood Operations

8 CCR § 5209: Section of the California Code of Regulations covering Carcinogens

ACGIH: American Conference of Governmental Industrial Hygienists is an organization of professional personnel in governmental agencies or educational institutions who are employed in occupational safety and health programs

ANSI: American National Standards Institute

ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers Cal/OSHA Action Level: the exposure level (concentration of the material in air) at which

Cal/OSHA regulations protect employees

Cal/OSHA Regulated Carcinogen: a carcinogen specifically listed in 8 CCR § 5209

Carcinogen: a substance or agent capable of causing or producing cancer in mammals, including humans. A chemical is considered to be a carcinogen if: (1) it has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen, (2) it is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program, or (3) it is regulated by OSHA as a carcinogen.

Chemical Hygiene Plan: a written program that sets forth policy and procedures capable of protecting employees from the health hazards associated with their workplace

CCR- California Code of Regulations, Title 8: Industrial Relations, contains the regulations enforced by Cal/OSHA

CFR: Code of Federal Regulations CHO: Chemical Hygiene Officer

DOSH: Division of Occupational Safety and Health EPA: United States Environmental Protection Agency

Exposure Limits: the concentration in air of a chemical in the workplace that is thought to be acceptable Hazard

Assessment: determination of the potential health hazards associated with an experiment before beginning it

Hazardous Chemical: 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 (including carcinogens, toxic or highly toxic agents, reproductive toxicants, irritants, corrosives, sensitizers, hepatoxins, nephrotoxins, neurotoxins, hematopoietic toxins, and agents which damage the lungs, skin, eyes, or mucous membranes

Hazardous Material: material which includes hazardous chemicals, biohazards, and radioactive materials HCS: Hazard Communication Standard is an OSHA regulation issued under 29 CFR Part 1910.1200

HEPA Filter: high-efficiency particulate air-purifying filter

High Hazard Chemical: a select carcinogen, reproductive toxicant, or substance that has a high degree of acute toxicity (causes severe and immediate health effects from limited exposure)

Highly Toxic: a substance falling within any of the following categories: (1) a substance that has a median lethal dose (LD50) of 50 mg or less per kg of body weight when administered orally to albino rats weighing between 200 and 300 g each, (2) a substance that has a median lethal dose (LD50) of 200 mg or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kg each, or (3) a substance that has a median lethal concentration (LC50) in air of 200 ppm by volume or less of gas/vapor, or 2 mg/L or less of mist, fume, or dust when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 g each.

HVAC: Heating, ventilation air-condition system

Health Hazard: hazards which have properties capable of producing adverse effects on the health and safety of a human

IARC: International Agency for Research on Cancer

Incompatible: materials that could cause dangerous reactions by direct contact with one another

Lab Safety Plan: a written plan for each laboratory including specific information, policies, and procedures needed to implement the Chemical Hygiene Plan. The Lab Safety Plan must be reviewed and updated annually



NIOSH: National Institute of Occupational Safety and Health, US Public Health Service, US Department of Health and Human Services (DHHS), which among other activities includes: (1) testing and certifying respiratory protective devices and air sampling detector tubes, (2) recommending occupational exposure limits for various substances, and (3) assists OSHA and MSHA in occupational safety and health investigations/research

OSHA: Occupational Safety and Health Administration, US Department of Labor. OSHA is sometimes referred to as Fed OSHA or Federal OSHA to distinguish it from Cal/OSHA

PEL: Permissible Exposure Limit is an exposure limit established via OSHA's regulatory authority. It may be a time weighted average (TWA) limit or a maximum concentration exposure limit

Physical Hazard: chemical properties that are classified as combustible, flammable, compressed gases, explosives, organic peroxides, oxidizers, pyrophorics, reactives, or water-reactive

Plans Review: review of the plans for a new building or remodeled building that includes evaluation of compliance with various regulations and safety standards

PPE: Personal Protective Equipment

Reproductive Toxin: a chemical which affects the reproductive system and may produce chromosomal damage (mutations) and/or adverse effects on the fetus (teratogenesis). Any chemical with a mutagenic or teratogenic quotation in the Registry of Toxic Effects of Chemical Substances (RETECS) shall be considered a reproductive hazard

Respirator: devices that will protect the wearer's respiratory system from overexposure by inhalation to airborne contaminants. Respirators (or other respiratory protection such as SCBAs) are used when a worker must work in an area where he/she might be exposed to a concentration in excess of the allowable exposure limit

SCBA: Self-Contained Breathing Apparatus

SDS: Safety Data Sheets (documents containing various chemical hazards and properties) SOP: Standard Operating Procedure

Title 8: section of the California Code of Regulations containing regulations enforced by Cal/OSHA which include Industrial Relations

TLV: Threshold Limit Value

**Appendix B: Chemical Hygiene Plan Checklist**



**Chemical Hygiene Plan Checklist**

LABORATORY SELF-INSPECTION		
Building:	Room:	Date:
Inspector:		
Y: Satisfactory	N: Needs Improvement	N/A: Not Applicable
GENERAL LAB SAFETY		
Y	N	N/A
<input type="checkbox"/>		
		Written safety and handling instructions for hazardous materials and potentially dangerous procedures conducted in the lab are present
<input type="checkbox"/>		
		Safety training documentation on chemical hazards is available and signed by lab personnel
<input type="checkbox"/>		
		Emergency phone numbers are posted
<input type="checkbox"/>		
		First Aid Kit is present and stocked
<input type="checkbox"/>		
		No blocked/obstructed exits
<input type="checkbox"/>		
		Sprinklers unobstructed/no high storage < 18 inches below a sprinkler or 2 feet from the ceiling
<input type="checkbox"/>		
		No high storage (2 feet from the ceiling)
<input type="checkbox"/>		
		No broken glassware in use/separate sturdy container for discarded glassware
<input type="checkbox"/>		
		Good housekeeping
<input type="checkbox"/>		
		No exposed sharps are lying around
<input type="checkbox"/>		
		No evidence of food or drink consumption
<input type="checkbox"/>		
		No evidence of food or drink storage

☐	Warning signs posted on outside of door
☐	Warning signs posted on outside of refrigerators
☐	Warning signs posted on outside of microwave
☐	Warning signs posted for hazardous areas
☐	All equipment guards in place
☐	Hand washing sink is available
☐	Towels and soap are present
☐	No tripping or slipping hazards
<b>CHEMICAL USE AND STORAGE</b>	
<b>Y N N/A</b>	
☐	Lab Personnel know how to access Safety Data Sheets
☐	No excessive and/or inappropriate storage in the fume hood enclosure
☐	Chemical containers are closed when not in use
☐	Secondary chemical containers are properly labeled
☐	Chemical storage cabinets are properly labeled
☐	Incompatible materials are stored separately
☐	Peroxide forming materials are not expired
☐	No corrosive liquids are stored above eye level
☐	No corroded/compromised containers
☐	Hazardous material storage is available

FIRE SAFETY

Y N N/A

III No more than 5 gallons of flammable liquids are stored outside of approved storage containers

III Appropriate storage for flammable liquids

III Appropriate containers for flammable liquids

III Appropriate storage for corrosive liquids

III Appropriate containers for corrosive liquids

III Flammable/combustible materials not stored in a regular refrigerator

III No excess combustible material is near ignition sources

EMERGENCY AND PROTECTIVE EQUIPMENT

Y N N/A

III Appropriate attire is in use

III Adequate/appropriate gloves are available and in use

III All respirators are approved and in good condition

III Respirator users are trained and fit tested

III Adequate/appropriate eye protection is available

III Adequate/appropriate eye protection is in use

III Lab coats are available for use

III Lab personnel know the location of eyewash/safety shower/signs to show locations

III Shower/eyewash is not obstructed and in good working order

III Shower/eyewash is available within 10 seconds

III Spill cleanup material is available

HAZARDOUS WASTE

Y N N/A

Chemical waste is stored and labeled properly

Sharps containers are available

Sharps containers are in good condition

Sharps containers are not overfilled

Decontamination procedures are in place

Disinfectants against agents in use are available at all times

Autoclave is in good shape and working properly

Autoclave has been serviced at least 4 times/year

Biohazardous waste is placed in appropriate bags and containers

COMMENTS

## Appendix C

### Hazardous Substances Requiring Prior Approval Form

Before using any particularly hazardous substance, please complete this form and have it approved by your supervisor or Chemical Hygiene Officer. See the back of this form for more complete definitions of a particularly hazardous substances and instructions for completing this form.

Name \_\_\_\_\_ Phone \_\_\_\_\_ Building \_\_\_\_\_  
Supervisor \_\_\_\_\_ Lab Group \_\_\_\_\_

#### 1. Substance Information

- A. Chemical name \_\_\_\_\_ CAS number \_\_\_\_\_ B.  Carcinogen  
 Reproductive Toxin  High Acute Toxicity  
C. Estimated Rate of Use (e.g., grams/month) \_\_\_\_\_  
D. SDS reviewed and readily available  Yes  No

#### 2. Hazards

##### Physical Hazards

- A. Flammable  Yes  No  
B. Corrosive  Yes  No  
C. Reactive  Yes  No  
D. Temperature sensitive  Yes  No  
E. Stability (e.g., decomposes, forms peroxides, polymerizes, shelf-life concerns)  Stable  Unstable  
F. Known incompatibilities \_\_\_\_\_

##### Health Hazards

- G. Significant Route(s) of Exposure  
Inhalation Hazard  Yes  No  
Skin Absorption  Yes  No  
H. Sensitizer  Yes  No  
I. Medical Consultation Needed  Yes  No

#### 3. Procedure

- A. Briefly describe how the material will be used  
B. Vacuum system used  Yes  No  
C. If yes, describe method for trapping effluents \_\_\_\_\_

#### 4. Exposure Controls

##### Ventilation/Isolation

- A. Hood required  Yes  No See hood sticker for the following information

If yes, hood currently operates at 95 - 125 feet per minute face velocity  Yes  No

EHS Hood number \_\_\_\_\_

B. Glove box required  Yes  No

C. Vented gas cabinet required  Yes  No

D. Personal Protective Equipment (PPE) (Check all that apply)

Safety glasses  Chemical splash goggles  Face shield  Gloves ( type \_\_\_\_\_ )

Lab coat  Apron  Respirator  SCBA (Respirators and SCBA require EHS approval)

Other, please describe \_\_\_\_\_

### 5. Location/Designated Area

A. Building \_\_\_\_\_

B. Room \_\_\_\_\_

C. Describe below the area where substance(s) will be used and the method of posting as a designated area.

D. Location where substances will be stored \_\_\_\_\_

E. Storage Method/Precautions

refrigerator/freezer  hood  double containment  vented cabinet  flammable liquid storage cabinet

other, describe \_\_\_\_\_

### 6. Spills and Decontamination

A. Spill control materials readily available  Yes  No

B. Special personal protective equipment needed (e.g., SCBA)  Yes  No

Describe \_\_\_\_\_

C. Decontamination method \_\_\_\_\_

### 7. Waste Disposal

A. In-lab neutralization  Yes  No

B. Deactivation  Yes  No

C. Dispose as hazardous waste  Yes  No

### 8. Authorization

This individual has demonstrated an understanding of the hazards of the listed substance and plans to handle the substance in a manner that minimizes risk to health and property. He/she is authorized to use the substance in the manner described.

Principal Investigator/Supervisor Signature \_\_\_\_\_

Chemical Hygiene Officer Signature \_\_\_\_\_

**Note:** Do not use the substance until approval is granted.

## Particularly Hazardous Substances Key to Form

### Using this form

For purposes of this form, a particularly hazardous substance (PHS) includes known or suspected human carcinogens, reproductive toxins, and substances with acute toxicity above certain thresholds. A more complete definition is included in your departmental Chemical Hygiene Plan.

Each individual planning to use a PHS must complete this form and have it approved by their Principal Investigator or supervisor and the departmental Chemical Hygiene Officer prior to their initial use.

Responsibility for determining whether a chemical is a PHS and completing this form rests jointly with the supervisor and the individual seeking use approval.

### 1. Substance Information

A. Enter name and CAS (Chemical Abstract Service) number of the PHS.

B. *Carcinogen*: if on IARC, OSHA or NTP list  
*Reproductive toxin*: mutagens, teratogens, embryotoxins

*High Acute Toxicity*: oral LD50  $\leq$  50 mg/kg, skin LD50  $\leq$  200 mg, air LC50  $\leq$  200 ppm or  $\leq$  2 mg/l.

See Chemical Hygiene Plan for more information.

C. Self-explanatory

D. SDS may be available in hard copy or via the internet.

### 2. Hazards

Refer to Physical Properties section of SDS

A. *Flammable liquid*: flashpoint  $\leq$  100° F  
*Flammable solid*: liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or which can be ignited readily and when ignited burns vigorously

B. *Corrosive*: Causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact.

C. *Reactive*: May become unstable or contact with water produces flammable or toxic gas.

D. *Temperature Sensitive*: Must be kept within a certain temperature range to ensure stability.

E. *Unstable*: substance will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shock, or high or elevated pressure or temperature. Also includes time-sensitive materials, particularly those that produce peroxides over time.

F. List chemicals or materials that might cause instability or adverse conditions if mixed with the particularly hazardous substance(s).

G. *Inhalation*: inhalation of the substance may cause adverse health effects. *Skin exposure*: substance is readily absorbed through the skin or can cause significant damage to skin upon contact.

H. Certain chemicals are known to affect the immune system, causing a person to experience allergic reactions, up to and including anaphylactic shock, upon exposure to the chemical, after the initial sensitization.

I. Some chemicals can accumulate in body tissues and may require initial or periodic medical surveillance.

### 3. Procedure

A. Briefly describe the part of the experimental procedure that involves the substance, with particular attention to how the chemical will be manipulated.

B. Vacuum systems include central vacuum systems and vacuum pumps within the lab.

C. Describe what will be done to ensure that the substance is not accidentally drawn into the vacuum system. Cold traps or filters are some examples of such measures.



#### **4. Exposure Controls**

A. A fume hood should be used for chemicals that may produce vapors, mists, or fumes, or if the procedure may cause generation of aerosols.

The hood must have an average face velocity of between 95 and 125 feet per minute. This measurement is noted on the hood survey sticker. If the hood has not been inspected within the past year, contact

The EHS hood number is noted on the top of the fume hood inspection sticker.

B. A glove box should be used if protection from atmospheric moisture or oxygen is needed or when a fume hood may not provide adequate protection from exposure to the substance; e.g., a protection factor of 10,000 or more is needed.

C. Highly toxic gases must be used and stored in a vented gas cabinet connected to a laboratory exhaust system. Gas feed lines operating above atmospheric pressure must use coaxial tubing.

D.

*Safety glasses* protect from flying particles and minor chemical splashes, for instance, from opening a centrifuge tube. *Chemical splash goggles* should be worn when there is a possibility of a significant chemical splash. Most chemical manipulations, particularly where pressure is involved, warrant chemical splash goggles.

*Face shield*, worn with splash goggles, provides full face protection when working with large volumes of chemicals.

*Gloves* should be worn when working with any particularly hazardous substance. Since not all gloves offer significant protection from every chemical, it is important to choose the glove that offers the best resistance. See the SDS, or glove manufacturer compatibility charts for more information.

*Lab coats* should be worn when working with hazardous substances. The coat should not be worn outside the laboratory and should be laundered separately from other clothing.

*Aprons* offer chemical resistance and protection from splashes and can be used in conjunction with a lab coat.

*Respirators* offer protection from inhalation of substances when engineering controls are not sufficient.

#### **5. Location/Designated Area**

A and B. Building and room number where the substance will be used.

C. Describe where in this room the substance will be used. For example, in a hood, on a specific benchtop, in several areas of the laboratory, etc.

This room or area must be posted with a Designated Area sticker available through your Chemical Hygiene Officer.

D. Describe where the substance will be stored. Be specific, e.g, on a shelf, in a refrigerator, in a hood, etc.

E. Self-explanatory. Double containment means that the container will be placed inside another container that is capable of holding the contents in the event of a leak and provides a protective outer covering in the event of contamination of the primary container.

#### **6. Spills and Decontamination**

A and B. Self-explanatory.

C. Describe how the work area will be decontaminated after use, in the event of a spill, or upon completion of the work and before removal of the designated area signage.

#### **7. Waste Disposal**

A. Some corrosive chemicals may be neutralized before disposal via the drain or the hazardous waste program.

B. Some materials, such as ethidium bromide, can be chemically deactivated before disposal via the drain or the hazardous waste program.

C. Particularly hazardous substances must not be poured down the drain without consulting your CHO.