

CHEMICAL HYGIENE PLAN

HARVEY MUDD COLLEGE

Prepared with the cooperation and assistance of:

The Office of Environmental Health and Safety
Claremont University Consortium

and: The Facilities and Maintenance Department
Harvey Mudd College

Revised 2011

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Foreword

Harvey Mudd College is committed to providing a safe working environment in our academic research laboratories. All employees who either direct the operations of and/or perform work in any laboratory where chemicals are used must become familiar with the requirements of the Chemical Hygiene Plan. This plan is required by the State of California pursuant to Title 8, Section 5191 of the California Code of Regulations and is enforced by CAL-OSHA.

Every laboratory employee is responsible for his/her own safety and is required to minimize the risks of potential over-exposure and the uncontrolled release of hazardous materials while working in the laboratory. **Employees should report unsafe conditions to their supervisor.**

Notify Campus Safety if emergency medical or fire assistance is needed:

Ex. 72000

Report any uncontrolled release to laboratory supervisor and Chemical Hygiene Officer immediately.

An uncontrolled release is an unexpected release of a hazardous material that due to its configuration, nature, or volume poses a threat to human health or the environment.

College Administrative Officer	Robert J. Cave
Chemical Hygiene Officer	Penny Manisco
Effective Date: July 1, 2010	

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Standard Operating Procedures

Basic First Aid – Chemical Exposure

- Eye contact: Promptly flush eyes with normal saline or tap water for a minimum of 15 minutes for acids, 30 minutes for alkalis. Seek immediate medical attention.
- Ingestion: Call Campus Safety (security) and request emergency medical assistance. Do not induce vomiting. If unconscious, turn head to side to avoid choking hazard in vomiting occurs.
- Skin Contact: Promptly flush the affected area with water and remove any contaminated clothing; use a safety shower if drenching is necessary. Rinse for a minimum of 15 minutes. Seek medical attention.
- Inhalation: Move to fresh air. Seek medical attention.
- **EMERGENCIES: DIAL EXTENSION 7-2000**

Uncontrolled Releases

Gases:

Shut down the supply system, exit the lab, and allow the fume hood ventilation system to exhaust the material. If the release is large and/or toxic and cannot be contained by the fume hood system, building evacuation may be necessary. Pull fire alarm to evacuate building. Contact F & M to shut down ventilation system in the event of a toxic release. **Do not place yourself at risk trying to shut down the leak.** Flammable gases in enclosed areas create a threat of flash fire or explosion. Extinguish open flames. Do not touch electrical switches as arcing may trigger an explosion. For minor leaks of a non toxic, non flammable cylinder, remove the cylinder to a well ventilated area and call vendor for pick up. **Notify your supervisor, Chemical Hygiene Officer, and Campus Safety Officer (Appendix A).**

Liquids:

Do not attempt to clean a spill of 1 liter or larger. Do not attempt to clean a spill of a material you are unfamiliar with. Consult MSDS for disposal information or special precautions. Contain spill if possible using diking materials or booms. Evacuate the lab and alert others in the area to do the same. Notify your supervisor, Chemical Hygiene Officer, and the Campus Safety Officer. (Appendix A). For small spills follow MSDS information to contain the material. Dike spill or plug drains to prevent spills from entering the sanitary sewer system. Neutralization may be used in some circumstances to reduce the potential for injury in some clean-up efforts. Do not use paper towels to absorb flammable liquids. This increases vapor concentration. Dispose of absorbent materials as hazardous waste. Rinse cleaned area and any non disposable implements with detergent and water.

Solids:

Do not attempt to clean a spill of 1 kg. or larger. For smaller spills, consult the MSDS for cleanup and disposal information.

Dry sweep small spills, using anti static broom, and place them in an appropriate waste container. If dust presents a respiratory hazard, wet the material unless contraindicated by the label or MSDS. **WARNING;** if material is shock sensitive, do not dry sweep. **Consult Laboratory Supervisor and Chemical Hygiene Officer for assistance.**

Report any uncontrolled release¹ to the Lab Supervisor, Chemical Hygiene Officer, and the Office of Environmental Health & Safety (EH&S) immediately (See Appendix A). **Notify Campus Safety (Security) EXTENSION 72000 if emergency medical or fire assistance is needed, or if an evacuation is necessary.** Uncontrolled releases that exit the property may require special notification procedures. Contact EH&S for directions on this issue. Do not dispose of any chemical waste in the sanitary sewer or in conventional refuse. (See Hazardous Waste section for more details)

Refer to general SOPs for Flammables (Appendix K), Corrosives (Appendix L), and Particularly Hazardous Chemicals (Appendix M) for specific spill information on these hazard classes.

General Methods

- Every chemical storage container including temporary containers (e.g. beakers, flasks) must be properly labeled to identify its contents and

hazards. The chemical name should be written out. Chemical formulas should not be used on labels. This does not apply to temporary containers which will be used in the course of a single work period.

- Novel chemicals must be labeled with the name of the producing chemist.
- Unknowns used in teaching laboratories must have an identification key stored with them. A hazardous materials label must describe the most toxic of the unknowns.
- If the hazards of a chemical are unknown, the container should have a label indicating that it is “undergoing evaluation.”
- Hazardous wastes held in containers in Laboratory Satellite Accumulation Areas (LSAA) must also include the date accumulation began, and the approximate amount of each compound of the waste.
- Waste Containers must be capped when not in use and at the end of the work period.
- Return flammables and other hazardous chemicals to their proper storage at the end of each work day.
- Provide appropriate warnings about experiments in process and restrict laboratory entry to authorized personnel only.
- The Laboratory Supervisor should provide notice and guidelines for any unattended, overnight, or weekend process. A response procedure should be established prior to beginning the work. Signage should include the name and phone number of the person(s) conducting the unattended procedure.
- An employee engaging in work with hazardous, caustic, flammable, or pyrophilic reagents or solutions should ensure that a second person is present within hailing distance (same floor).
- Consult the necessary reference materials (including MSDSs) about potential chemical hazards. Pre-plan appropriate protective procedures, equipment usage and process design before beginning any new operation. Leave the laboratory lights on and provide for containment of toxic substances in the event of a failure of a utility service (such as cooling water) in an unattended operation.
- Dispose of broken glass or contaminated glass in appropriate containers.
- Containers for broken glass should be labeled “Glass Only”.
- Keep the work area neat and uncluttered. Clean up the work area after the completion of an experiment or procedure, or at the end of the day if feasible.
- Use care when handling and working with glassware to avoid breakage. Do not use damaged glassware. Specialized components (such as Dewar flask) or vacuum glassware may require extra care when handled. Shield or wrap evacuated glassware, where feasible, to protect against injury from implosion.
- Validate the integrity of partial containers of ether and other peroxide formers for peroxide contamination prior to use (See appendix B). Make a

record of the date for any storage container of a peroxide former when it is received and when it is first opened.

- When chemicals are hand carried from the stockroom to the laboratory, they should be placed in a secondary container or bucket.
- Use secondary containment, such as a pyrex or rubber tray for procedures involving particularly hazardous materials.
- Inspect glassware for cleanliness prior to use to prevent cross contamination and/or mixture of incompatibles.

Personal Exposure Minimization

- Do not smell or waft chemical containers.
- Avoid eating, drinking, smoking, chewing gum, or applying cosmetics or lip balm in areas where laboratory chemicals are present. Decontaminate by washing your hands, and then exit the lab before conducting these activities.
- Consumption of food or beverages in the laboratory, preparation rooms, or chemical storage areas is prohibited. Laboratory refrigerators designated for chemicals and raw materials storage, glassware, and utensils are not to be used to hold or store food or beverages.
- Skin contact should be avoided as a general rule. Avoid underestimation of risk.

- Wash areas of exposed skin thoroughly before leaving the laboratory, even when gloves have been worn.
- Avoid practical jokes or other behavior that might confuse, startle, or distract another worker.
- Do not pipette or start a siphon by mouth.
- Confine long hair and loose clothing.
- Footwear must be worn while in the laboratory. Sandals, open-toed, and perforated shoes are prohibited.
- Appropriate attire must be worn in the laboratory. Shirt must cover abdomen. Halter tops and tank tops are not allowed. Shorts and skirts must cover the thigh.
- Wear appropriate eye protection (goggles, safety glasses, face shields, etc.) when working in settings where chemical hazards exist.
- OSHA and the American National Standards Institute (ANSI) agree; “wearers of contact lenses shall be required to wear appropriate eye covering and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may

represent an additional hazard to contact lens wearers.” Employees who wear contact lenses should be provided a pair of non-ventilated chemical splash goggles.

- Routinely inspect the laboratory for incompatible storage situations. (See Appendix C)
- Chemicals should not be stored in the fume hoods. Excessive storage of materials in the hood may impede air flow.
- Fume hood sash must be kept at the lowest level at which procedure can be performed.
- Work in fume hood should be conducted at least six inches from the front.

Personal Protective Equipment

All personal protective equipment (PPE) must be approved for use by the National Institute for Occupational Safety and Health (NIOSH), and meet the applicable American National Standards Institute (ANSI) requirements regarding exposure limits. The need for PPE must be reviewed and specified prior to beginning any chemical handling procedure. Also, PPE must be used where engineering controls are unable to provide the required level of safety.

CAUTION: The compatibility of the PPE materials with the chemical hazards to be encountered must be evaluated prior to selecting the protective equipment. Refer to the PPE manufacturers’ specifications and the material safety data sheet for the chemical to verify proper use application.

- Any employee who must use either a negative air respirator or a powered air-purifying respirator (PAPR), alone or in conjunction with engineering controls, to comply with OSHA established permissible exposure limits (PELs) is required to have an annual pulmonary function test, be fit tested, and otherwise comply with the requirements of the Claremont Colleges’ Respiratory Protection Program.
- Employees are required to wear gloves when there is the potential for direct skin contact with hazardous chemicals, blood, or infectious materials. (See Appendix D for glove material compatibility information)
- Lab coats are to be worn only in laboratory areas and should be buttoned to protect the employees’ clothing from contamination. Lab coats are provided and maintained by the employer.
- All personal protective equipment and contaminated lab wear must be removed immediately upon leaving the laboratory areas and placed in

designated control areas to minimize the potential for cross contamination or personal exposure.

- Do not wear lab coats or gloves into “clean” areas such as restrooms or where food is consumed.

Engineering Controls

- Chemical fume hoods are to be used where feasible to minimize exposure of employees to emissions from chemical processes. Each fume hood is to be inspected annually for proper face velocity and the hood’s doorframe marked at maximum opening for the required face velocity. In process use is to be verified by an in-place gauge, calibrated in lineal feet per minute (lfm) that can be easily read by the operator/scientist during the use of the fume hood.

For Example:

Standard fume hood velocity = minimum 100 lfm

Carcinogen fume hood velocity = minimum 150 lfm

Actual face velocities for any hazardous material must be verified by reviewing State and Federal safety regulations, if any, for that material.

- Laboratory fume hoods shall be labeled as to their lfm rating, date of last inspection, and any special use approvals (e.g. perchloric acid, carcinogens, or radioisotopes).
- Perchloric acid fume hoods shall comply with section 6-12 of the National Fire Protection Association Code, No 45. (See appendix E)

Warning: Where perchloric acid is heated above ambient temperature, process vapors should be scrubbed or trapped prior to exhausting to the hood. Uncaptured perchloric acid vapors can condense in fume hoods and duct work to form explosive perchlorates.

- Perchloric acid hoods should be washed down after each use and the final rinsate inspected using a 0.4% (v/v) solution of methylene blue in water. (A violet precipitate will form in the presence of perchlorates. See Appendix F)
- Evacuated systems capable of imploding and resulting in significant quantities of glass fragments or other flying debris must be protected using a cage, a shield, or other appropriate solid barrier. Smaller systems may be wrapped in tape/foil.

- Centralized vacuum systems must be inspected annually and should be protected from contamination using appropriate process equipment.
- Environmental rooms have re-circulated atmospheres. Precautions must be taken to prevent the release of toxic substances into the air in these areas.

Chemicals

Chemical Inventory

An inventory should be maintained (hard copy or PC based) listing all chemicals in the laboratory and storerooms. Chemicals should be listed alphabetically by location according to the most commonly used name. The inventory records should also include the average quantity on hand, the physical state (e.g. solid, liquid, gas) of the material, the NFPA classification, if known, and the manufacturer's name and complete address. (See Appendix G for more information on HMC Chemical Inventories)

Laboratory Hazard Designations

Hazard Designations of laboratories are intended to enhance the management and control of each lab. This Chemical Hygiene Plan addresses, where necessary, specific hazard concerns in the higher risk labs. The general designations are as follows:

- | | |
|-----------------------------|--|
| Low Risk (HD-1) | Minimal or no known risk to employees, the general public, or the environment. Ability to work safely with all necessary materials on open benches. No special protection or enclosures are needed for the equipment or operations. |
| Moderate Risk (HD-2) | Involves materials, practices, or equipment such that improper use could pose some danger to employees, the general public, or the environment. Materials generally have an NFPA 704 rating of 2 or less in all categories. Work in chemical hoods with small quantities (2 liters or less) of higher rated materials possible; however, most operations (>75%) could be carried out on open work benches without unusual precautions. Carcinogens prohibited. |

Substantial Risk (HD-3) Use of highly toxic, highly reactive, highly flammable or carcinogenic materials is likely. Continuous air monitoring devices with alarms may be necessary to evaluate engineering controls and environmental conditions during operations when using toxic or explosive gases. Monitoring/Alarm levels, if needed, must be set no higher than 50% of the level representing either the PEL or the lower explosion limit (LEL) of the most hazardous material in use.

High Risk (HD-4) Operations that pose an immediate and substantial danger to the occupant, the general public, or the environment if containment or engineering controls fail. Geographic/physical isolation of the lab/facility is generally a requirement. **At this time there are no HD-4 laboratories located on the campuses of the Designated Claremont Colleges.**

Designated Area: When working with particularly hazardous chemicals, a designated area shall be established where entry is controlled. This may be a lab bench, fume hood, or an entire lab.

Material Safety Data Sheets

MSDSs for chemicals on hand must be available in each laboratory stockroom. MSDSs should be kept in alphabetical order along with the chemical inventory of the department. The laboratories rely on the chemical manufacturers' information to ascertain whether or not the chemical is hazardous.

Chemical Storage

Proper storage of chemicals and the avoidance of incompatible mixtures present an ongoing safety issue. Quantities of chemicals should be kept as small as practical. Long term storage of chemicals on working bench tops or in fume hoods may increase the risk of fires or spills and should be discouraged. In addition, long-term routine storage of chemicals in fume hoods should not be permitted as the presence of non-process containers can disrupt the airflow in portions of the hood, which could compromise the performance of the engineering control. Appropriate laboratory cabinets and special laboratory

refrigerators are to be used for chemicals storage where feasible. Flammable liquids may be stored in flammable storage cabinets or rooms equipped with appropriate ventilation; safety cans with flame-arrested spring loaded spouts, or specially designed refrigerators. Safety cans should be used for transporting flammable liquids in bulk.

Toxic chemicals (including but not limited to carcinogens, teratogens, mutagens or poisons) should be stored in access-controlled areas. Whenever possible these materials should be held in break resistant, chemically resistant secondary containers. All chemical storage containers must be appropriately labeled as to their content and hazards.

Gas Cylinder Handling

Cylinders of compressed gases, whether empty or full, are required to be stored upright and tightly strapped or chained to a wall or bench top by a noncombustible, two-point system, with one strap at the upper and one at the lower third of the cylinder. The valve stem must be capped when not in use so as to assure stability of the cylinder and prevent accidental damage to the tank and valve assembly. Cylinders must be strapped onto cylinder carts for transporting.

Labeling

All chemical containers that are stored or shipped must be properly labeled. Labels must not be removed or defaced. An MSDS attached to a container (e.g. a carboy) is acceptable in lieu of an actual label. For the purposes of storage, “properly labeled” means the label states:

- The identity of the chemical.
- Appropriate hazard warnings (flammable, toxic, corrosive, etc.)
- The name and address off the chemical manufacturer.

An example label is shown below:

ACETIC ACID, Glacial	
Health Hazard:	Toxic
Physical Hazard:	Corrosive; Protect skin and eyes from contact. Do not breath vapors.
Acme Scientific	
Any Street	
City, State, Zip	

Carcinogens, Reproductive Hazards, and Acute Toxins

(Particularly Hazardous Chemicals)

Management programs for carcinogens, reproductive hazards, and acute toxins are specific to the material(s) being used.

In general, environmental and personal monitoring shall be conducted to determine in process and use base line levels for carcinogens and toxics. Carcinogens are materials known or suspected to cause cancer in humans. Refer to Appendix M for the complete definition. Reproductive hazards include teratogens, mutagens, and materials that can, through biochemical means, cause harm to a developing fetus. Toxins can induce sickness in, or cause the death of, living organisms. Situations where the process, experiment, or research can be expected to result in exposures below the Action Level, which is calculated as an eight hour time weighted average (TWA), will not require additional monitoring unless there are material changes in the laboratory protocols. Records should be maintained which describe the amount and context of use.

The need for a written Engineering and Work Practices Controls Program (EWPCP) for a particular material process is evaluated on a case-by-case basis. For example: When using cadmium, if an employee/scientist is exposed above the permissible exposure limit (PEL) of 30 or more days during a calendar year, an EWPCP is required. This may be encountered during a research project but is generally unlikely in the course of laboratory instruction of students. Where EWPCPs are required, medical/biological surveillance shall be governed by the appropriate current regulations.

MSDSs or current Cal-OSHA tables can provide action level, PEL, and TWA data as required, Consultation with the CHO or the CUC Office of Environmental Health and Safety is recommended to ensure appropriate regulatory compliance.

Cal-OSHA Regulated Carcinogens

Harvey Mudd College is exempt from 8 CCR 5209 (Carcinogens) except for Section 5209(c)(6) - Laboratory Activities by Section 5191(a)(2). Therefore, this section of the Plan does not address any other sections of 5209.

There are additional requirements that shall be observed for laboratories that handle Cal-OSHA Regulated Chemical Carcinogens. Note that Cal-OSHA allows exceptions to the carcinogen standard if the compound is used at or below the exempt carcinogen levels (i.e., the compound may be diluted to below the exempt concentration as measured by weight or volume, as indicated in the table below).

Cal-OSHA Regulated Chemical Carcinogens

	CARN	Not Regulated If Less Than (%)
2-Acetylaminofluorene	53963	1.0
4-Aminodiphenyl	92671	0.1
Benzidine (and its salts)	92875	0.1
3,3'-Dichlorobenzidine(and its salts)	91941	1.0
4-Dimethylaminoazobenzene	60117	1.0
alpha-Naphthylamine	134327	1.0
beta-Naphthylamine	91598	0.1
4-Nitrobiphenyl	92933	0.1
N-Nitrosodimethylamine	62759	1.0
beta-Propiolactone	57578	1.0
bis-Chloromethyl ether	542881	0.1
Methyl chloromethyl ether	107302	0.1
Ethyleneimine	151564	1.0

It is the policy of the college not to stock, order, or use any of the above mentioned Cal-OSHA Regulated Carcinogens. If you believe that you will need to use one or more of these chemicals, please see the Chemical Hygiene Officer well in advance of your anticipated use. For a complete listing of Cal-OSHA Regulated Carcinogens, refer to Appendix I.

Nanoparticles

Because effects of nanoparticles are still being reviewed, scientists working with nanoparticles must assume that the particles are toxic on a cellular level. Fume hoods, glove boxes, or biosafety cabinets should be used. Gloves resistant to the solvents being used should be worn. Work surfaces should be wet wiped at the end of each work day. Waste materials, including contaminated gloves, wipes, and lab coats should be double bagged and labeled as “nanoscale.”

Safety Devices

- Eyewash fountains and safety showers must be activated monthly to flush line and verify proper operation.
- Safety showers and eyewashes are inspected, tested and flushed annually.
- Fire Extinguishers are inspected monthly and tested annually.

- All chemical stockrooms/storerooms are adequate and well ventilated.
- Environmental rooms must have provisions for escape in the event of an emergency or electrical failure.
- Airflow through the laboratory should be relatively uniform and be exhausted to the exterior of the building. Quality and quantity of ventilation are to be monitored and verified annually.
- Chemical Hygiene related equipment shall be recommended by the CHO and/or the CUC Office of Environmental Health and Safety, in conjunction with faculty needs.

Hazardous Waste: Storage & Disposal

Laboratory Waste Accumulation Area (LWAA)

Laboratories may accumulate hazardous wastes in a similar manor as satellite accumulation is performed in an industrial setting provided the following criteria are met:

- Cannot accumulate more than fifty-five gallons of a hazardous waste or more than one quart of any single extremely or acutely hazardous waste.
- College operational maximum accumulation time even if quantity limits are not reached is nine months. Wastes must then be staged or lab packed and removed from the site within ninety days.
- The waste accumulation area is managed and under the direct control of “one or more designated personnel who have received training commensurate with their responsibilities and authority for managing laboratory hazardous wastes...” (California Health & Safety Code, section 25200.3.1) This training is also required for unsupervised access to the hazardous waste area within a lab.
- Establish protocols to prevent the accidental mixing of incompatible chemical wastes. (See mixing for treatment exception California Health & Safety Code 25200.3.1 (c))
- Storage space is adequate for the quantities and types of wastes present.
- Waste containers are appropriately labeled. (See California Department of Toxic Substances Control Accumulation Fact Sheet – January, 2002) If a mixture of compatibles, each container must also have a method for recording each material as it is introduced, its associated hazard(s), and the approximate quantity.

IMPORTANT: When stock chemicals are no longer needed and are “designated” a waste, removal must occur within ninety days, as laboratory/satellite accumulation rules do not apply. Laboratories are

encouraged to inquire whether or not a raw material may have value within another laboratory area on campus prior to designating the unneeded material a hazardous waste.

Waste Stream Analysis

Processes that create waste streams that are potentially hazardous must be evaluated by process knowledge and/or laboratory analysis. In general chemicals may **NOT** be disposed of via the sanitary sewer systems or as ordinary unregulated waste unless it is verified (pursuant to regulatory requirements) that the material being discharged is not a hazardous waste. Evaluation parameters are:

- Ignitable
- Corrosive
- Toxic (by aquatic bioassay)
- Reactive

More “Safe for Sanitary Sewer Disposal” information is provided in Appendix H.

Disposal

All disposal of hazardous, regulated, and bio-hazardous waste is to be handled by commercial haulers and Treatment, Storage, and Disposal Facilities (TSDFs) licensed by the State of California and/or other appropriate regulatory agency.

Administrative Controls

Personal Monitoring & Environmental Surveillance

Laboratory Supervisors are responsible for safety within their areas. Potentially hazardous chemical processes and/or procedures should be reviewed by the Chemical Hygiene Officer, the department chairperson, or the CUC Office of Environmental Health & Safety prior to implementation.

Personal monitoring is conducted to determine exposure levels or for the need for medical consultation, examination and/or surveillance.

The college shall measure 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 (1) chemicals are not used in a fume hood and/or (2) personnel develop signs or symptoms associated with **exposure to** hazardous chemicals.

- If the action level or exposure limit is exceeded during the initial monitoring, personal monitoring will be repeated per 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 time requirements of the relevant regulation or within 15 days of the Chemical Hygiene Officer's receipt of monitoring results.
- Where exposure monitoring reveals an exposure above the action level (or in the absence of an action level, the permissible exposure limit (PEL) for a Cal-OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance will be established as prescribed therein.

Medical Surveillance & Overexposure

All staff and faculty working with hazardous chemicals will be provided with the opportunity to have a medical examination, and a follow-up examination, if necessary, under any of the following circumstances:

- Development of signs or symptoms of overexposure associated with the chemicals to which they have been exposed in the laboratory.
- For specific substances regulated by Cal-OSHA (e.g. carcinogens) where environmental monitoring demonstrates routine exposure above the Action level, or PEL if no action level is given.
- In the event of an uncontrolled release of a hazardous material where there is a likelihood that the individual may have been overexposed to that hazardous material.

The employer shall provide the following information to the physician in the event of a possible exposure:

- The identity of the hazardous chemical(s) to which the employee may have been exposed.
- A description of the conditions under which the exposure occurred including, if available, quantitative exposure data.

- A description of the signs and symptoms of exposure.
- A copy of the MSDS for the chemical(s) involved.

The physician will provide a written opinion that will not reveal specific findings or diagnosis unrelated to the exposure, but will include:

- Any recommendation for further medical follow-up.
- Results of the medical examination and any associated tests.
- Any medical conditions that may be revealed in the course of the examination that may place the employee at increased risk as a result of exposure to a hazardous chemical found in the workplace.
- A statement by the physician that the employee has been informed of the consultation/examination results and any medical condition that may require further examination or treatment

Chemical Hygiene Plan – Designations

Chemical Hygiene Officer

Chemical Hygiene responsibilities rest with the Chemical Hygiene Officer. The CHO:

- Works with faculty and staff to develop and implement appropriate chemical hygiene policies and practices.
- Calibrates and uses specific chemical surveillance devices.
- Reviews the storage, use, and disposal of laboratory chemicals.
- Conducts industrial hygiene audits of laboratories.
- Provides technical and regulatory guidance to faculty and staff.
- Assists in the annual review and revision of the Chemical Hygiene Plan.

Laboratory Supervisor

The instructor of record shall be acting supervisor in his or her laboratory, and must ensure that individuals in his or her lab have received proper safety training in that laboratory's specific procedures. This training must be documented.

The Laboratory Supervisor has direct day-to-day responsibility for:

- Implementation of the Chemical Hygiene Plan in their lab(s).
- Develop laboratory specific standard operating procedures.
- Training of other laboratory personnel in the standard operating procedures and maintaining records of that training.

- Providing regular oversight of proper chemical hygiene and housekeeping practices
- Inspection of safety equipment such as eye wash stations and safety showers. Eyewash stations should be run and inspected monthly for functionality. Inspections must be documented. (8CCR5162(e))
- Knowledge of current legal requirements concerning regulated substances used in their labs.
- Directing the use of the required levels of protective apparel and equipment.
- Establishing a designated area when appropriate.

Laboratory Employee

The laboratory employee is responsible for:

- Under the direction of the Laboratory Supervisor or Lead Scientist, planning and conducting each operation in accordance with the Chemical Hygiene Plan.
- Becoming knowledgeable about the hazard potential of each raw material used in the laboratory and the safe handling thereof

Laboratory Safety & Chemical Hygiene Committee

This committee is to be comprised of members whose laboratories are directly affected by the Chemical Hygiene Plan and is scheduled to meet once per semester to discuss safety and chemical hygiene issues.

The Claremont University Consortium's Office of Environmental Health & Safety is an ex-officio member of this committee and participates as needed to assist with program and regulatory issues.

Prior Approval

The responsibility for approval of the acquisition and use of toxic chemical agents rests with the laboratory supervisor. All needed approval must be obtained before experiments are performed

Training

Training is a necessary and important part of the Chemical Hygiene Plan. All employees receive Hazard Communication training at the time of initial

assignment to work areas where hazardous chemicals are present and before assignment involving new exposure situations. Refresher information and in-service training sessions are also held annually. The Laboratory Supervisor, the Chemical Hygiene Officer, or the CUC Office of Environmental Health & Safety may conduct training. All training must be documented according to attendance, date provided, subject matter and name of the person providing the training.

A general training outline is provided in Appendix J.

Housekeeping

Floors are to be cleaned regularly by housekeeping. All affected employees of the housekeeping department must be formally introduced to and trained in the risks associated with cleaning laboratory areas.

The housekeeping supervisor will conduct a quarterly inspection of the lab areas to assess whether:

1. Stairwell and hallways are free of obstruction.
2. Waste is deposited in appropriate receptacles and properly removed from the laboratory.
3. Chemical spills are reported and addressed according to established protocols.
4. Proper storage of housekeeping materials is accomplished to minimize clutter.

Record Keeping

- Accurate records regarding personal monitoring, environmental monitoring, and medical surveillance shall be maintained according to the CCR, Title 8. These records are to be maintained by the Environmental Health & Safety Office.
- The department supervisor and/or the Environmental Health & Safety Office conduct accident investigations.
- Issues regarding Worker's Compensation should be directed to the HMC Worker's Compensation Administrator in Human Resources, Kingston Hall.
- Questions regarding high-risk substances (presently there are no high risk laboratories, HD-4, on the campuses of the Claremont

Colleges) should be directed to the Environmental Health & Safety Office.

- Training attendance records shall be maintained in each department.
- All medical surveillance records are kept, transferred, and made available in accordance with 8 CCR 3204.

Appendix A: Call List

Report any uncontrolled release to the laboratory Supervisor and the Chemical Hygiene Officer immediately (see names, locations, extensions below). **Notify Campus Safety (security) at extension 72000** if emergency medical or fire assistance is needed. Uncontrolled releases that exit the property may require special notification procedures. Contact EH&S for directions on this issue. Do not dispose of any chemical waste in the sanitary sewer or in conventional trash receptacles.

Note: An uncontrolled release is an unexpected release of a hazardous material that due to its configuration, nature, or volume poses a threat to human health or the environment.

Chemical Hygiene Officer: Penny Manisco
Office: Jacobs Rm 2314
Extension: 74217
Home Phone: (909) 982-3673

Biology Laboratory Manager: Elaine Guerra
Olin, Rm 2343
x74143

Chemistry Laboratory Manager: Lillian McCollum
Jacobs, Rm 2310
x72957

Engineering Laboratory Manager Sam Abdelmuati
Parsons, B174
X73530

Physics Laboratory Manager: Annie Atiyeh
Jacobs, Rm, B122
73940

Claremont University Consortium
Office of Environmental Health and Safety
Jay Brakensiek/Manager EH&S, Extension: 18538

Harvey Mudd College
Melonee Cruse/Emergency Preparedness and Safety Coordinator, Ext: 70403
Facilities and Maintenance, Platt, cell phone: (909) 969-3794.

Appendix B: Peroxides Formers

The following is a list of chemicals known to form explosive peroxides, either upon concentration during laboratory activities, evaporation, or polymerization. These chemicals should be dated upon arrival in the laboratory, and again when initially opened. Bottles should be visually inspected for crystallization, discoloration, or liquid stratification before each opening. A flash light should be used to inspect amber bottles. Bottles with obvious crystal formation should not be opened. These should be labeled and disposed of as hazardous waste. There should never be an attempt to force open a stuck cap. Bottles in use should be periodically tested for peroxides using test strips. Only bottles of which the age and identity is known should be opened and tested. Order chemicals with inhibitors whenever possible. Ethers should be purchased in iron containers. Never dispose of peroxide formers down the drain!

Peroxide Formers Upon Concentration (Test or dispose within 12 months)

Acetal
Acetaldehyde
2-Butanol
Cyclohexene
Cumene
Decahydronaphthalene
Dicyclopentadiene
Diethyl Ether
Dioxane
Ethylene Glycol, Diethyl Ether
Methyl Isobutyl Ketone
Methyl Cyclopentane
2-Propanol
Tetrahydrofuran
Tetrahydronaphthalene

Auto Polymerization due to Peroxide Formation (Test or dispose within 24 hours if not inhibited, 12 months if inhibited)

Acrylic Acid
Styrene

Forms Explosive Polymerization Without Concentration (Dispose of within 3months)

Potassium Metal

This list is not exhaustive. Investigators should check the MSDS on any chemical used for information on chemical stability and peroxide formation

Appendix C: Chemical Incompatibility

Certain chemicals may react with each other and create a hazard. Separate storage areas **must** be provided for incompatible chemicals.

The following is provided as an example only.

Chemical	Keep out of contact with:
Acetic Acid	chromic acid, nitric acid, ethylene glycol, peroxides, permanganates
Ammonium Nitrate	acids, metals powders, flammable liquids, chlorates, nitrates, sulfur
Chlorine	ammonia, acetylene, butadiene, butane, methane, propane

Oxford University UK has a website with a more extensive list of incompatible chemicals.

- To access their website type in `physchem.ox.ac.uk` under search and click on find.
- Double click on Other Safety Information from the Physical Chemistry Laboratory.
- Choose incompatible chemicals from the list and double click.

Appendix D: Protective Gloves/Chemical Compatibility

The following is a guide to chemical protective gloves from the Oxford University, UK, website.

Material	Generally suitable for:
Butyl rubber	aldehydes, carboxylic acids, glycols and ethers, hydroxyl compounds and alcohols, peroxides, ethyl acetate
Latex	water soluble/misible substances, weak acids, weak alkalies
Natural Rubber	acetone, alcohols, alkalies and caustics, ammonium fluoride, dimethyl sulphoxide (DMSO), phenol, plating solutions
Neoprene	alcohol, alkalies and caustics, allosolve, degreasing solvents, mineral acids, oils, plating solutions
Nitrile rubber	alcohols, ammonium fluoride, freons, hexane, hydrofluoric and hydrochloric acid, perchloric acid, potassium and sodium hydroxide
Poly vinyl alcohol (PVA)	methylene chloride
Vinyl	General prevention of contamination, medical examination, nuisance materials

For more information access the Oxford University website at:
yschemph.ox.ac.uk

Known suppliers of protective gloves such as Lab Safety Supply provide information in their product catalogs regarding chemical compatibility of various types of protective gloves (see Lab Safety Supply Catalog, 2005, pages 226 and 227).

For most laboratory use, gloves provide a barrier only. Disposable gloves should be discarded immediately after contamination. Extra protection may be provided by double gloving disposables.

Appendix E: Perchloric Acid Fume Hoods

Perchloric Acid Fume Hoods shall comply with section 6 – 12 of the National Fire Protection Association Code, no 45.

For access to NFPA codes and standards go to the National Fire Protection Association's website at www.nfpa.org.

Warning! Where perchloric acid is heated above ambient temperature, process vapors should be scrubbed or trapped prior to exhausting to the hood. Perchloric acid vapors that have not been captured can condense in a fume hood's duct work and form explosive perchlorates.

Perchloric acid should be heated only in hoods where the ducts are clean and free of organic materials and there is no possibility of the contamination of the solution.

Appendix F: Chemical Hood Perchloric Acid Test Procedures

To avoid the possibility of explosive perchlorates forming in fume hood ductwork, perchloric acid hoods should be washed down after each use and the final rinsate inspected using a 0.4 % (v/v) solution of methylene blue in water.

Note: Upon testing the rinsate with the 0.4% solution of methylene blue (if perchlorates are present) a violet precipitate will be formed.

Appendix G: Chemical Inventories

Chemical Inventories are maintained by each Department.

- Biology Department: The Chemical inventory is maintained by Elaine Guerra/Laboratory Manager, Olin, Room 2343.
- Chemistry Department: The Chemical Inventory is maintained by Lillian McCollum/Laboratory Manager, Jacobs, Room 2310.
- Engineering Department: The Chemical Inventory is maintained by Sam Abdelmuati/Department Manager, Parsons, Room B174.
- Physics Department: The Chemical Inventory is maintained by Annie Atiyeh, Laboratory Manager, Jacobs, Room B122.

Appendix H: Chemical Disposal-Sanitary Sewer

CCR Title 22 addresses characterizations of waste streams and looks at four parameters:

Ignitable: A liquid with a flash point lower than 60° C, or if not liquid but capable of causing fire through friction, absorption, or moisture, or spontaneous chemical changes, or is an oxidizer, or an ignitable compressed gas.

Corrosive: Has a pH of less than or equal to 2.0 or greater than or equal to 12.5, or is not aqueous, but when mixed with an equivalent weight of water produces a pH of less than or equal to 2.0 or greater than or equal to 12.5, or corrodes steel at the rate of 6.35 mm (0.250 inch) per year at a test temperature of 55°C.

Reactive: Reacts violently with water or generates toxic gases when mixed with water, or is capable of detonation if subject to strong initiating source or heated under confinement, or is capable of detonation at standard temperature and pressure.

Toxic (as determined by bioaquatic assay)

Wastes are always presumed to be hazardous unless it can be proven otherwise via process knowledge or laboratory evaluation of the waste product.

The Environmental Health and Safety Department at Stanford University has tested a number of chemicals that they have determined to be non-hazardous. A thirty-nine page list of chemicals which Stanford University has determined to be non-hazardous can be accessed by going to their website at www.stanford.edu/dept/ehs.

Note: This information is provided only as an example of how another California Campus deals with the issue of non-hazardous waste streams.

Appendix I: Personal Monitoring

Personal Monitoring is to be performed wherever processes may involve potential exposures at or above the Cal-OSHA established PELs (permissible exposure limits)

Where carcinogens are involved in the process the Cal-OSHA action level (AL) must be evaluated. If the process remains constant each time and does not meet or exceed the AL, no further monitoring is required.

Ordinarily the PEL (permissible exposure limit), the TLV (threshold limit value) and STEL (shorter-term exposure limit) for a particular chemical may be found by referring to the material safety data sheet for that chemical.

Cal-OSHA Regulated Carcinogens Action Levels

Acrylonitrile 1 part per million
Arsenic, Inorganic 0.005 milligrams per cubic meter
Benzene 0.5 ppm
1,3-Butadiene 0.5 part per million where concentrations are 0.1% or more by volume
Cadmium 2.5 micro grams per cubic meter
Chromium (VI) 2.5 micrograms per cubic meter
Coke Oven Emissions
1,2 Dibromo-3-Chloropropane 1.0 parts per billion
Ethylene Oxide 1 part per million
Ethylene Dibromide 15 parts per billion
Formaldehyde 0.75 parts per million
Lead 50 micrograms per cubic meter
Methylene Chloride 12.5 parts per million
4,4 Methylenebis (2 Chloroaniline) urine conc. of 100 micro grams per liter
Methylenedianiline 5 parts per billion
Vinyl chloride 0.5 parts per million

Appendix J: Training Outline/Basic Chemical Hygiene Program Orientation:

1. A general over view of the chemical hygiene program
2. A review of general laboratory safety procedures as outlined in chemical hygiene program
3. Identification of laboratory hazard levels and an explanation of the designations
4. Explanation of material safety data sheets and where to locate them
5. Identifying the Chemical Hygiene Officer by name and title
6. A review of program appendices and specialized information sections
7. Identification of personal protective clothing and PPE requirements.
8. Instructions on the proper use of PPE
9. A review of personal and environmental monitoring requirements

All introductory and in-service training will be documented and the training records for each HMC employee will be maintained by individual departments.

Appendix K

General Standard Operating Procedures Flammable and Combustible Liquids

Application:

This SOP is intended as general guidance for use of flammable or combustible liquids. The MSDS should be consulted for safety information on specific chemicals. **This is not intended as a Laboratory Specific SOP. Laboratory Specific SOPs are the responsibility of the Principal Investigator.** Certain chemicals may be flammable and particularly hazardous so SOPs for both categories of hazards would apply. Benzene is both flammable and carcinogenic.

Definition:

Flammable liquids have a flash point of less than 100 °F. Combustible liquids have a flash point of between 100 ° and 200 ° F, A flash point is the minimum temperature at which flammable or combustible liquids produce enough vapor to form an ignitable mixture with air. No ignition source is needed to flash.

General Methods:

- Perform work with flammable chemicals in a fume hood.
- Do not work with or pour chemicals near an open heat source.
- Vapors are generally heavier than air and can travel large distances and flash back to heating source.
- Minimize the volume of flammable chemicals on the work bench.
- Use the smallest quantities possible for need.
- Keep containers closed except for transfer.
- Large open mouthed containers should not be used.
- Non-sparking, explosion-proof electrical devices (i.e. stirring devices, motors) should be used.
- Never heat with open flame. Preferred methods of heating include heating mantles, steam baths, oil, salt, or sand baths.
- Store chemicals in flammables cabinet and return to storage when not in use.
- Flammables that require refrigeration should be stored in explosion proof refrigerators built for that purpose.
- When transferring flammable liquids from a bulk container (5 gallon drum or larger) the containers must be electrically bonded and grounded.
- Transfer materials from smaller containers in fume hood.

Engineering Controls:

- Flammables and combustible chemicals should be used in a fume hood or other well ventilated area.
- Some flammable chemicals that are also particularly hazardous or toxic *must* be used in a fume hood.

Personal Protective Equipment:

- Safety glasses must be worn at all times. Goggles that meet ANSI standard 2.87, 1.1989 with side shields are preferred. Safety glasses without side shields do not provide adequate protection from splashes.
- Select gloves that are the most impervious to the chemical being used. Consult glove manufacturers' chart and MSDS. Inspect gloves for tears or holes prior to use.
- Face shield use is appropriate where splash or spray may occur.
- Lab coats must be worn and an apron should also be worn when handling materials that are toxic with skin contact.
- Do not wear loose, dangling sleeves or jewelry.
- Wear closed toed shoes.
- Tie back long hair.

Uncontrolled Release:

- Anticipate spills in advance and have containment materials nearby.
- Turn off possible ignition sources.
- Do not attempt to clean a spill of 1 liter or larger, or of a chemical with which you are not familiar.
- Notify Chemical Hygiene Officer or Campus Safety Officer in the event of a large spill.
- Do not use paper towels to absorb flammable chemicals. This concentrates vapors and increases fire risk.
- Absorb spill with commercial adsorbents or spill pillows. Sand or vermiculite also works well.
- Absorbed material may be dry swept into an appropriately labeled hazardous waste container.
- Spill pillows should be disposed of as hazardous waste.
- Wash area with detergent and water, and wash any tools such as scrapers, brooms and reusable gloves.

First Aid:

- In the case of eye contact, use eyewash to rinse eyes for 15 minutes. Hold eyelids open and move eyes.
- In the case of skin contact, remove contaminated clothing and rinse skin for 15 minutes, using safety drench shower if necessary.
- In the event of burn, cool with cold water and seek medical attention. Provide physician with a copy of

MSDS. In the event of ingestion, do not induce vomiting. Give water and call for immediate medical attention. If victim is vomiting, turn head to side to minimize choking hazard. **Dial Extension 72000 from campus phone for emergency response.**

Appendix L

General Standard Operating Procedures Corrosive Chemicals

Application:

This SOP is intended as general guidance for the use of corrosive chemicals. The MSDS should be consulted for safety information on specific chemicals. **This is not intended as a Laboratory Specific SOP. Laboratory Specific SOPs are the responsibility of the Principal Investigator.** Certain chemicals may be classified in more than one hazard category. In these cases more than one SOP would apply. For example, hydrofluoric acid is both corrosive *and* toxic.

Definition:

Corrosive chemicals cause visible destruction of, or irreversible alterations in living tissue by chemical action at the site of contact, including the respiratory tract when corrosive vapors are inhaled. Corrosives have a pH of less than or equal to 2, or greater than or equal to 12.5, according to the Environmental Protection Agency (EPA) definition.

Examples of corrosives include acids such as hydrochloric, nitric, or sulfuric, bases such as sodium hydroxide or potassium hydroxide, solids such as phenol or phosphorus, or gasses such as chlorine or ammonia. Strong oxidizers such as hydrogen peroxide or bromine are also corrosive.

General Methods:

Corrosives with harmful vapors must be handled in a fume hood.
Only heat resistant glassware should be used.
Slowly add acid to water only. Never add water to acid.
Store acids separately from bases.
Do not store on high shelves or cabinets.
When hand carrying from the stockroom to laboratory, employ secondary containment.

Engineering Controls:

Corrosive chemicals should be handled in a fume hood if they produce harmful vapors.

Personal Protective Equipment:

Safety glasses or goggles must be worn at all times. Eye protection must meet ANSI standard Z87.1-1989. Goggles with side shields are preferred as they afford the most protection from splashes entering the eye area. Face shield use is appropriate where splash or spray may occur. Select gloves that are the most impervious to the chemical being used. Nitrile disposable gloves provide adequate protection for exposure to small amounts of corrosives in laboratory use, but should be changed when they become contaminated. Consult manufacturers' charts and MSDS for the most appropriate gloves. Lab coats should be worn to protect against skin contact. Do not wear clothing with loose or dangling sleeves. Wear closed toed shoes. Tie back long hair.

Uncontrolled Release:

Anticipate spills in advance and have containment materials nearby.
Do not attempt to clean a spill of 1 liter or more or a liquid or 1 kg or more of a solid.
In the event of a large spill, contact the Chemical Hygiene Officer or Campus Safety Officer and your supervisor.
Do not attempt to clean a spill of a chemical with which you are not familiar.
Consult the MSDS for appropriate clean up information.
Acids spills may be neutralized with sodium bicarbonate. Bases may be neutralized with citric acid. Commercial neutralizers are available. Do not attempt to neutralize with water.
Very large volumes of water are needed to neutralize a relatively small amount of corrosive, which will only result in a larger spill, amplifying the hazard.
Neutralized material may be absorbed with pillows or dry swept into an appropriately labeled hazardous waste container.
Tools used in cleanup may be wiped with a laboratory tissue (Kimwipe). Deposit the tissue in the hazardous waste container.
Wash the spill area with detergent and water.
Wash any non disposable brooms or scrapers, and gloves with detergent and water.

First Aid:

In case of eye contact, use eyewash for 15 minutes. Hold eyes open and move eyeballs.
In case of skin contact, remove contaminated clothing and rinse skin for 15 minutes, using safety drench shower if necessary.
In the event of inhalation, move to fresh air and call for medical assistance.

In the event of ingestion, do not induce vomiting. Give water unless MSDS instructs otherwise. If victim is vomiting, turn head so to reduce choking hazard. Immediately call for medical attention. **Dial extension 72000 from campus phone for emergency assistance.**

Appendix M

General Standard Operating Procedures Particularly Hazardous Chemicals

Application:

This SOP is intended as general guidelines for the use of particularly hazardous chemicals. Particularly hazardous chemicals include those that are acutely toxic, carcinogens, or reproductive hazards, including teratogens, mutagens. **This SOP is not intended to be a Laboratory Specific SOP. Laboratory Specific SOPs are the responsibility of the Principal Investigator.**

Definition:

An acutely toxic chemical is one with 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 grams each. Or with a median lethal dose (LD50) of 200 mg. or less per kg 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 a lethal concentration (LC50) in air of 5000 ppm by volume or less of a gas or vapor, or 50 mg per liter or less of mist, fume, or dust when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 gm each.

Cal OSHA defines carcinogen as a chemical that is regulated by CalOSHA as a carcinogen. (Refer to Appendix I). Or, it is categorized as “known to be carcinogens” in the Annual Report on Carcinogens published by the National Toxicology Program (NTP). Or it is listed under Group 1 (“carcinogenic to humans”) by the International Agency for Research on Cancer (IARC). Or it is listed in either Group 2A or 2B by IARC or under the category “reasonably anticipated to be carcinogens” by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria: a) After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m³. b) After repeated skin application of less than 300 mg/kg of body weight per week; or c) after oral dosages of less than 50 mg/kg of body weight per day

Reproductive hazards are defined as chemicals that affect the reproductive capabilities including causing chromosomal damage (mutagen) or adversely affect fetal development (teratogen). A complete list of reproductive toxins may be found at:

www.oehha.ca.gov/prop65/prop65_list/Newlist.html#files.

General Methods:

Conduct sound and thorough planning, including apparatus, layout, waste containment, clean up materials, and first aid.

Use the smallest amount of chemical possible, and substitute less hazardous chemicals if possible.

Avoid powders if possible. Order premade solutions to avoid excess handling. If powders must be used they should be weighed in a fume hood, unless this would pose additional hazard due to turbulent airflow. Surround balance area with wetted paper towels.

Perform work in a fume hood or glove box.

Lay down plastic backed bench paper under apparatus.

Employ secondary containment for apparatus and glassware where possible.

Label all containers with correct chemical name. Formulas and chemical structures are not to be used as labels.

Decontaminate workbench and equipment when work is complete. Wash hands and forearms with soap and water.

Dispose of bench paper and other disposable equipment as hazardous waste

Designated Area:

Designated area with limited access shall be established. This may be an entire lab, a specific workbench, or hood. Designated area should be marked with signs (i.e. Warning! Hydrofluoric Acid Work Area, Highly Toxic Material). Specific lab benches may be demarcated with hazard tape.

Remove personal protective equipment before leaving area and thoroughly wash hands and forearms.

Engineering Controls:

Particularly hazardous chemicals must be used in a fume hood. Ensure that the fume hood is working properly before use. Air flow should be at a face velocity of 100 lfm, averaged over the face of the hood. Sash must be kept at the lowest possible level. Inspect hood before use to make sure that air flow is sufficient. Hoods must be inspected and certified annually.

Personal Protective Equipment:

Safety glasses must be worn at all times. Goggles that meet ANSI Z87.1-1989 with side shields offer more protection from splashes and sprays, and are preferred over those without. Face shields are appropriate where sprays or splashes may occur.

Lab coats should be worn. Lab coats contaminated with a particularly hazardous chemical should be disposed of as hazardous waste. Disposable lab coats are commercially available.

Select gloves that are most impervious to the chemical being used. Consult glove manufacturers' charts and MSDS for information on the most protective glove material. Inspect gloves for holes or tears before use.

Wear long pants and closed toed shoes which are not made of canvas or cloth.

Tie back long hair.

Uncontrolled Release:

Anticipate spills in advance and have containment materials nearby.

Consult MSDS for spill clean up information prior to beginning work.

Do not attempt to clean a spill of 100 ml or more of a particularly hazardous liquid chemical, or 50 g. or more of a solid.

Do not attempt to clean up a material with which you are unfamiliar.

Dike area, if it is safe to do so, using booms to prevent material from entering sanitary sewer via sinks and floor drains.

Evacuate area and restrict access with signs and barriers. Close laboratory doors.

Call Campus Safety (ex 72000), Chemical Hygiene Officer, and Campus Emergency Preparedness Coordinator.

For small, incidental spills, don personal protective equipment including safety goggles, gloves, lab coats, and shoe covers.

Use commercially prepared absorbent materials, such as pillows and towels. Dispose of these as hazardous waste.

Dry sweep any material that has been absorbed with powdered neutralizers into a hazardous waste container.

Label waste container with the appropriate warning. (Particularly Hazardous Material, Carcinogen, Reproductive Hazard, etc.)

Clean spill area with detergent and water. Dispose of any paper towels, etc. as hazardous waste.

Decontaminate any non-disposable personal protective equipment with detergent and water.

First Aid:

In case of eye contact, use eyewash to rinse eyes for 15 minutes. Hold eyelids open and move eyes.

In the case of skin contact, remove contaminated clothing and rinse skin for 15 minutes, using safety shower if necessary.

Any exposure with a particularly hazardous chemical requires medical attention.

Report exposures to Chemical Hygiene Officer and Campus Safety Coordinator.

For emergency medical response dial extension 72000 from a campus phone.

APPENDIX N

Laboratory Specific Standard Operating Procedure Photocopy as needed

Department _____ Room _____

Laboratory Supervisor _____

Experiment Title _____

SOP Type (Check one or both)

Specific Procedure _____ ***Particularly Hazardous Chemical***

1. List chemicals to be used and hazards (corrosive, ignitable, reactive, toxic), potential health hazards (i.e. hepatotoxin, reproductive toxin, hemotoxin, neurotoxin, irritant, sensitizer)

2. Frequency and duration of chemical use:

3. Personal Protective Equipment (goggles, gloves, lab coat, fume hood)
Specify most suitable gloves:

4. Describe any special handling procedures for the above listed
Chemicals (attach extra page if necessary):

5. Process, experiment description (Attach separate page if necessary):

6. Accidental release measures:

7. First aid measures: **Call ex 72000 from campus phone if immediate Medical attention is required.**

Skin exposure:

Eye exposure:

Ingestion:

Inhalation:

Injection:

8. Waste disposal procedures:

STANDARD OPERATING PROCEDURE TRAINING

Printed Name

Signature

Date
