

BROWARD COLLEGE

CHEMICAL HYGIENE
PLAN

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CHEMICAL HYGIENE PLAN

GENERAL:

The U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Office has ruled that laboratory safety is a legal responsibility. Federal Regulation 29 CFR Part 1910.1450 is OSHA's final standard which applies to all laboratories that use hazardous chemicals in accordance with the definition of Laboratory used in the Standard.

The following Chemical Hygiene Plan (CHP) has been formulated in response to OSHA's requirement. The CHP includes the necessary work practices and procedures to ensure that employees are protected from all potentially hazardous chemicals in use in the College Science Laboratories.

STATEMENT OF INTENT:

It is the intent of Broward College to prevent or control situations/circumstances that may cause personal injury or property loss. Broward College is committed to providing a safe learning environment for students and a safe working environment for staff. It is the responsibility of all faculty, staff and students to follow rules and regulations and to adhere to the guidelines of the CHP.

OTHER APPLICABLE STANDARDS AND REGULATIONS:

New standards and regulations for the safe use, storage and disposal of hazardous materials are constantly evolving. Federal, State and Local regulations may all apply to the college. It is the responsibility of all employees to keep themselves and their departments informed.

Two regulations that apply specifically to BC laboratories are 1) FAC Chapter 6A-2, Rules of Florida State Board of Education; and 2) FS Chapter 442, Florida Right-To-Know Law.

FAC Chapter 6A-2 is the primary standard concerning the design, construction, maintenance and operation of any school or college in Florida. All standards found in 6A-2, or included by reference, must be maintained.

The Florida Right-To-Know Law became effective in 1985 and gives employees the right to obtain information about hazardous substances in their place of employment, including the college and its laboratories. This law creates a list of hazardous substances, and establishes specific rights and duties for both employers and employees who have contact with these listed substances in the work place.

Whenever two or more standards are found to be in conflict, the most stringent standard shall be used.

The following documents referred to in the Chemical Hygiene Plan are available for reference in the Safety Library located in the Science Department on each campus:

REFERENCES:

BC EMERGENCY PROCEDURE A6Hx2-7.01

BC COMPREHENSIVE SAFETY PLAN

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910 Occupational Safety and Health Administration (OSHA), Department of Labor.

40 CFR 261 RCRA HAZARDOUS WASTES

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA MANUAL 30, "Flammable and Combustible Liquids Code"

NFPA MANUAL 45, "Fire Protection for Laboratories Using Chemicals"

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z87.1, "Occupational and Educational Eye and Face Protection"

ANSI Z358.1, "Emergency Eyewash and Shower Equipment"

CHEMICAL INVENTORY

An inventory of all chemicals present in the laboratory shall be maintained and updated at least once a year. One copy shall be kept in an accessible place in the laboratory, one copy shall be sent to the local fire department, and one copy shall be sent to the College Director of Health and Safety. The inventory shall include the following information:

Common name and chemical name
CAS number
Location of Chemical
Maximum amount on hand
Lot number

I. STANDARD OPERATING PROCEDURES:

General Rules

1. Wear appropriate eye protection when working with chemicals.
2. When working with flammable chemicals, be certain that there are no sources of ignition near enough to cause a fire or explosion in the event of vapor release or liquid spill.
3. Maintain professional behavior at all times. Avoid behaviors which might confuse, startle, or distract another worker.
4. Maintain professional behavior at all times. Avoid behaviors which might confuse, startle, or distract another worker.
5. For the chemicals they are working with, all employees should know and constantly be aware of:

- a. The chemicals' hazards, as determined from the MSDS and other appropriate references.
- b. Appropriate safeguards for using that chemical, including personal protective equipment.
- c. The location and proper use of emergency equipment.
- d. How and where to properly store the chemical when it is not in use.
- e. The proper methods of transporting chemicals within the facility.
- f. Appropriate procedures for emergencies, including evacuation routes, spill cleanup procedures and proper waste disposal.

Personal Safety

1. Wash promptly whenever a hazardous chemical has contacted the skin and remove contaminated clothing.
2. Do not directly inhale chemicals to identify them
3. Do not use mouth suction to pipet anything; use suction bulbs.
4. Wash hands well with soap and water before leaving the laboratory; do not wash with organic solvents.
5. Avoid eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present.
6. Avoid bringing food, beverage, tobacco, or cosmetic products into chemical storage or use areas.
7. Do not store food and chemicals in the same refrigerator.
8. Confine long hair, dangling jewelry and loose clothing when appropriate.
9. Avoid use of contact lenses in the laboratory unless necessary and check with your ophthalmologist to determine whether special precautions should be taken. Inform your supervisor.
10. Always wear low-heeled shoes with fully covered "uppers" when working in the laboratory; do not wear shoes with open toes or with uppers constructed of woven material.

Protective Clothing and Equipment:

1. Carefully inspect all protective equipment before using. Do not use defective protective equipment.
2. Eye protection worn when working with chemicals should meet the requirements of the American National Standards Institute (ANSI) Z87.1 Wear goggles such as type G, H, or I at all times (see Appendix B). When using a quantity of corrosive chemical, eye protection should be worn appropriate to the chemical and its quantity. This may include a face shield in addition to goggles.

3. When working with corrosive, allergenic, sensitizing, or toxic liquids, wear gloves known to be impervious to that chemical.
4. Wear clothing and protective equipment as appropriate which minimizes skin exposure.
5. Whenever exposure by inhalation is likely to exceed the threshold limits described in MSDS's, use a hood. Consult with your supervisor before doing any such work.

Housekeeping

1. Access to emergency equipment, showers, eyewashes, and exits should never be blocked by anything, not even a temporarily parked chemical cart.
2. All chemical containers must be labeled with at least the identity of the contents and the hazards those contents present to users.
3. Keep all work areas, especially laboratory benches, clear of clutter. For example, students should store backpacks, etc. in designated areas.
4. Keep all aisles, hallways, and stairs clear of all chemicals.
5. All chemicals should be placed in their assigned storage areas at the end of each workday.
6. Wastes should be properly labeled and kept in their proper containers. Waste disposal shall follow the guidelines given on the MSDS.
7. Promptly clean up all spills; properly dispose of the spilled chemical and cleanup materials.
8. All working surfaces and floors should be cleaned regularly.

Prior Approval

Employees must adhere to accepted safety practices before proceeding with a laboratory task. Consult with the department head/chemical hygiene officer whenever:

1. A new laboratory procedure or test is to be carried out.
2. It is likely that toxic limit concentrations could be exceeded.
3. There is a change in a procedure or test such as a change of 10% or greater in the amount of chemicals used, or substitution of chemicals used.
4. Failure of equipment such as fume hoods.
5. Unexpected results occur.

6. Any employee experiences symptoms from exposure to hazardous chemicals.

Spills and Accidents

Spills of toxic substances or accidents involving any hazardous chemical should be resolved immediately according to the BC emergency procedure plan (A6Hx2-7.010). See Appendix C: Chemical Spill Plan and Appendix D: Evacuation Plans.

II. PROCEDURE-SPECIFIC SAFETY PROCEDURES

All laboratory procedures must contain a written description of specific safety practices incorporating the applicable precautions described in this section. Employees should read and understand these practices before commencing a procedure.

Procedures for Toxic Chemicals

The MSDS's for many of the chemicals used in the laboratory will state recommended limits or OSHA-mandated limits, or both, as guidelines for exposure. Typical limits are threshold limit values (TLV), permissible exposure limits (PEL), and action levels. When such limits are stated, they will be used to assist the chemical hygiene officer in determining the safety precaution, control measures, and safety apparel that apply when working with toxic chemicals. It is the practice in BC laboratories to limit the use of toxic chemicals by substituting a non-toxic chemical when possible. If this is not possible, the amount used will be kept to quantities which would not exceed the PEL, TLV, or action level.

Procedures for Flammable Chemicals

1. OSHA standards and the National Fire Protection Association (NFPA) guidelines as to when a chemical is considered flammable apply to the use of flammable chemicals in the laboratory. In all work with fire-hazard chemicals, the requirements of 29 CFR, subparts H and L; NFPA Manual 30, "Flammable and Combustible Liquids Code"; and NFPA Manual 45, "Fire Protection for Laboratories Using Chemicals" are followed.
2. Fire-hazard chemicals should be stored in a flammable-solvent storage area or in storage cabinets designed for flammable materials.
3. When using fire-hazard chemicals, remove ignition sources and follow safety precautions such as use of vented hoods as appropriate.

Procedures for Reactive Chemicals

Reactive chemicals are handled with all proper safety precautions, including segregation in storage and prohibition on mixing even small quantities with other chemicals without adhering to accepted safety practices and consulting with the Associate Dean/chemical hygiene officer.

Procedures for Corrosive Chemicals and Contact-Hazard Chemicals

Corrosive chemicals are handled with all proper safety precautions, including wearing both safety goggles and face shield, gloves known to be resistant to permeation or penetration, and a laboratory apron or laboratory coat as appropriate.

Control Measures and Equipment

Chemical safety is achieved by continual awareness of chemical hazards and by keeping the chemical under control by using precautions, including engineering safeguards such as hoods.

Laboratory personnel should be familiar with the precautions to be taken, including the use of engineering and other safeguards. Laboratory supervisors should be alert to detect the malfunction of engineering and other safeguards. All engineering safeguards and controls must be properly maintained, inspected on a regular basis, and never overloaded beyond their design limits.

Ventilation

1. Laboratory ventilation should be not less than eight air changes per hour (calculated). This flow is not necessarily sufficient to prevent accumulation of chemical vapors. Work with toxic chemicals that have low air concentration limits, or that have high vapor pressures, should always be done in a hood.
2. Fume hoods should provide 70 to 90 linear feet per minute of air flow.
3. Laboratory employees should understand and comply with:
 - a. A fume hood is a safety backup for condensers, traps, or other devices that collect vapors and fumes. It is *not* used to "dispose" of chemicals by evaporation unless the vapors are trapped and recovered for proper waste disposal.
 - b. The apparatus inside the hood should be placed on the floor of the hood at least six inches away from the front edge.
 - c. Fume hood windows should be lowered (closed) at all times except when necessary to raise (open) them to adjust the apparatus that is inside the hood.
 - d. The hood fan should be kept "on" whenever a chemical is inside the hood, whether or not any work is being done in the hood.
 - e. Personnel should be aware of the steps to be taken in the event of power failure or other hood failure.
 - f. Fume hoods, emergency exhaust fans, and vent ducts must be inspected at least once a year to be sure they are both clean and clear of obstruction. Clear and clean obstructions as necessary.
 - g. Calibrate fume hoods to manufacturer's specification once/year.

- h. Hoods are never to be used as permanent storage areas for chemicals, apparatus, or other materials.

Flammable-Liquid Storage

1. Fire-hazard chemicals are kept in original containers or in metal safety cans designed for such storage. The cans are used only as recommended by the manufacturer, including the following safety practices:
 - a. Never disable the spring-loaded closure.
 - b. Always keep the flame-arrestor screen in place; replace if punctured or damaged.
 - c. Such cans must be properly labeled to identify their contents and properly grounded.
2. Cabinets designed for the storage of flammable materials are properly used and maintained. The manufacturer's information is followed as well as the following safety practices:
 - a. Store only compatible materials inside a cabinet.
 - b. Do not store paper or cardboard or other combustible packaging material in a flammable-liquid storage cabinet.
 - c. The manufacturer establishes quantity limits for various sizes of flammable-liquid storage cabinets; do not over-load a cabinet.
 - d. Refer to 6A-2.078 for handling, storage and quantity restrictions.

Eyewash Fountains and Safety Showers

1. All laboratories where chemicals are used shall be equipped with eyewashes and safety showers. These are located so they can be reached from any point in the laboratory, as specified in ANSI Z358.1 and 6A-2.097.
2. The functioning of eyewash fountains and safety showers and measurement of water flow shall be checked periodically. Any facility that does not meet the water flow requirements of ANSI Z358.1 will be promptly repaired.
3. Access to eyewash fountains and safety showers will not be restricted or blocked by temporary storage of objects or in any other way.

Vapor Detection

Odor will not be used as the primary means of determining that inhalation exposure limits are not being exceeded. If there is reason to suspect that a toxic chemical inhalation limit might be exceeded, whether or not a suspicious odor is noticed, the supervisor will be notified, the area evacuated, and the fire department called.

Procedure for Carcinogens, Reproductive Toxins, Substances that Have a High Degree of Acute Toxicity, and Chemicals of Unknown Toxicity

It is the policy of the BC Science Department to restrict the use of any carcinogens reproductive toxins, and substances that have a high degree of toxicity to an amount less than 10 mg.

III. PERSONNEL RESPONSIBILITIES

The following personnel are responsible for implementation of the Chemical Hygiene Plan:

ORGANIZATION

LEVEL 1

THE PRESIDENT

- a) Oversees all levels.
- b) Receives reports and recommendations from Safety Committee.

LEVEL 2

THE PRESIDENT'S STAFF

- a) Provides the campuses with necessary funding for Levels 3 and 4.
- b) Coordinates college-wide safety meetings that are not unique to a particular campus – i.e. procedures for disposal of hazardous wastes, operation of fire extinguishers, etc.

LEVEL 3

DIRECTOR OF HEALTH AND SAFETY

- a) Implement recommendations from the College-wide Health and Safety Committee.
- b) Coordinate safety training and provide up to date safety resources for all campuses.
- c) Implement actions to insure compliance with the Chemical hygiene Plan, and other health and safety related college documents.

LEVEL 4

CAMPUS SAFETY MANAGER – ACADEMIC DEAN

- a) Provides necessary funding
- b) Provides safety seminars that are general but unique to the campus.
- c) Provide safety seminars that are unique to a particular discipline.
- d) Report needs and status of safety program to Level 2.

LEVEL 5

ASSOCIATE DEANS – CHEMICAL HYGIENE OFFICER* - FACULTY TEACHING
LABORATORY COURSES - LABORATORY MANAGERS

- a) Visible management of equipment and area.
- b) Make suggestions to Safety Committee.
- c) Determine the need for trained experts to regulate, modify, and adjust equipment.
- d) Follow Standard Operating Procedures.
- e) Respond to all reports of unsafe acts, conditions, and equipment to maintain safe operation of the laboratory.
- f) Review and approve all standard operating procedures.
- g) Perform Exposure Assessment in case of suspected exposure to toxic substances.

*Note: The department head or their designee will serve as chemical hygiene officer as defined by the laboratory standard.

LEVEL 6

LAB TECHNICIANS – LAB ASSISTANTS

- a) Report all unsafe acts, conditions, and equipment to Level 5.
- b) Follow Standard Operating Procedures.

IV RECORDS AND RECORD KEEPING

Records shall be kept of the following:

- 1. Safety training sessions (material covered and those in attendance).
- 2. Inspections by outside agencies
- 3. Safety inspections done annually in-house.
- 4. Records of air concentration monitoring results, exposure assessments, medical consultations, and examinations will be maintained for at least 30 years and they will be accessible to employees or their representatives.
- 5. Specific records will be kept in the event of lost work time resulting from an exposure or accident on the job.
- 6. Security reports and exposure assessments related to any hazardous chemical exposure incident.

V. INFORMATION AND TRAINING

A. All employees who work in the laboratories shall be trained concerning:

- 1. Hazards of chemicals in BC laboratories.
 - a. Methods and observations that may be used to detect the presence or release of a hazardous chemical.
 - b. Measures employees can use to protect themselves from these hazards, including procedures such as appropriate work practices and personal protective equipment.
 - c. The PEL's action levels, and other recommended exposure limits for hazardous chemicals used in BC labs.

- d. Signs and symptoms associated with exposures to hazardous chemicals used in the laboratories.
 - e. Locations and availability of MSDS's and Safety Library.
2. Content, locations, and availability of BC's Chemical Hygiene Plan.
 3. Content and requirements of OSHA Laboratory Standard.

B. Training shall occur when the employee is initially assigned to the laboratory, prior to assignments, involving new hazardous chemicals and/or new laboratory work procedures, and periodically as needed to update on current standards.

VI. MEDICAL CONSULTATIONS AND EXAMINATIONS

Medical consultations and medical examinations in accordance with this Standard shall be provided as follows:

A. HAZARDOUS CHEMICAL EXPOSURE

Any incident involving exposure of a college laboratory employee to a hazardous chemical in the work place shall be reported and processed under Fla. Worker's Compensation. An exposure incident shall be deemed to have occurred:

1. Whenever an employee has ingested or had direct skin or eye contact with a hazardous chemical.
2. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which they may have been exposed in the laboratory.
3. Whenever exposure monitoring, if used, reveals an exposure level routinely above the OSHA action level or permissible exposure limit (PEL), NIOSH recommended exposure limits (REL), ACGIH threshold limit values (TLV), or other established time weighted average concentration standards.
4. Whenever an event takes place in an employee's work area such as a spill, leak, explosion, or other occurrence involving a hazardous chemical and resulting in the likelihood of a hazardous exposure.

B. INCIDENT REPORTS

If the exposure is deemed to be an emergency or life threatening, 911 should be called immediately and emergency treatment given as per the College Emergency Procedures A6Hx2-7.01.

All exposure incidents shall be reported to Security and the correct forms completed. In addition to all other information requested, the report shall include:

1. The identity of the hazardous chemical (or chemicals) involved or suspected in the exposure.
2. A description of the condition under which the exposure occurred.

3.A description of any signs or symptoms the employee is experiencing .

4.The employee's supervisor or department head shall notify the Director of Health and Safety, and the Human Resources Department at the Ft. Lauderdale Center that an exposure has taken place.

C. EXPOSURE ASSESSMENT

All incidents involving employee exposures to hazardous chemicals shall be completely investigated and documented by means of an exposure assessment prepared by the Chemical Hygiene Officer or Department Head as follows:

1. Interview the exposed employee. Interview all other complainants, witnesses, or employees from the area.
2. List the following essential information about the circumstances of the incident:
 - a) The specific location where the incident took place.
 - b) The time and date the incident occurred.
 - c) The name of the victim and any other employees or witnesses in the area at the time of the incident.
 - d) The specific activity the employee was involved in at the time of the incident.
 - e) The chemical or chemicals under suspicion.
 - f) Other chemicals used by the victim.
 - g) Other chemicals being used by others in the same area.
 - h) Other chemical stored in the same area.
 - i) What control measures such as personal protective devices or hoods were in use at the time of the incident?
 - j) Were any air sampling or monitoring devices in use, or were samples taken after the incident? If so, what measurements were found and are they consistent with other information?
 - k) List symptoms exhibited or claimed by the victim.
 - l) How do these symptoms compare to symptoms stated on the materials safety data sheets, labels, or other pertinent sources for each of the identified chemicals?
 - m) Name and title of the person performing the assessment.
 - n) Date the assessment performed.
 - o) All memos, notes, and reports related to the incident must be maintained as part of the record.

NOTE: It is not the purpose of an exposure assessment to determine the cause of an exposure or to place blame. The purpose of an exposure assessment is to determine that there was, or was not, an exposure that might have caused harm to one or more employees and, if so, to identify the hazardous chemical or chemicals involved. Exposure assessments are to determine facts; they do not make recommendations.

The Chemical Hygiene Officer or department head should use information from the assessments, with other findings, to evaluate the adequacy of

present control measures and safety procedures, and if necessary to develop recommendations that will prevent or mitigate any future exposures.

D. PHYSICIAN NOTIFICATION

A copy of the security report, exposure assessment, and air sampling or monitoring results shall be provided to the physician when available.

E. PHYSICIAN'S REPORT

The Human Resources Department will follow up with the physician to obtain the required written opinion and report to the Director of Health and Safety. The physician's written opinion shall include:

1. Any recommendation for further medical for further medical follow-up.
2. The results of the examination and any associated tests.
3. Any medical condition which may be revealed in the examination which may place the employee at increased risk as a result of exposure to a hazardous chemical found in the work place.
4. A statement that the employee has been informed by the physician of the results the consultation or medical examination of any medical condition that may require further examination or treatment.
5. No specific findings of diagnoses unrelated to occupational exposure.

F. RECORD MAINTENANCE

The Human Resources Department and the Director of Health and Safety shall maintain a copy of the physician's written opinion and all materials relating to the exposure as required by local, state and federal regulation.

G. EMPLOYEE NOTIFICATION

Employees shall be notified by the Director of Health and Safety of the results of any medical consultation or examination with regard to any medical condition that exists or might exist as a result of overexposure to a hazardous chemical.

Within 15 working days of receipt of the results of any monitoring, the employee will be notified of those results.

VIII. APPENDIX A: DEFINITIONS

Contact-hazard Chemical – Is so identified or described in the MSDS or on the label; is so identified or described in the medical or industrial hygiene literature; or is known or found to be an allergen or sensitizer.

Corrosive Chemical – Fits the OSHA definition of corrosive in Appendix A of 29 CDR 1910.1200; fits the EPA definition of corrosive (has a pH greater than 12 or less than 2.f; or is known or found to be corrosive to living tissue.

Flammable Chemical – In general, the flammability of a chemical is determined by its flash point, the lowest temperature at which an ignition

source can cause the chemical to ignite momentarily under certain controlled conditions. Chemicals with a flash point below 200°F (93.3 °C) will be considered "fire-hazard chemicals."

Hazardous Chemical – Substance for which there is statistically significant evidence, based on at least one scientific study, showing that acute or chronic harm may result from exposure to that chemical.

MSDS – Materials safety data sheets.

Reactive Chemical – Is described as such in Handbook of Reactive Chemical Hazards by Bretherick or on the MSDS; is ranked by the NFPA as 3 Or 4 for reactivity, is identified by the DOT as an oxidizer, organic peroxide, or explosive, Class A, B, or C; fits the EPA definition of reactive in 40 CFR 1910.1450; or is known or found to be reactive with other substances.

Reproductive Toxin – Any substance described as such in the applicable MSDS.

Select Carcinogen – Any substance defined as such in 29 CFR 1910.1450 and any other substance described as such in the applicable MSDS.

Substance with a High Degree of Acute Toxicity –Any substance described as "highly toxic chemical" on MSDS.

APPENDIX B: GOGGLE TYPES

GOGGLE TYPES

FACE SHIELD TYPE N

APPENDIX C: CHEMICAL SPILL PLAN

Preparation: An important part of the CHP is to prepare for all possible types of spills ahead of time. It is necessary to be certain that anticipated necessary spill control materials are ready at hand and that all faculty and staff know how to use the spill control kits.

General Procedures:

1. Immediately alert others in the area that a spill has occurred. If the spill is large, notification of Campus Security, the Department Head and the Director of Health and Safety should be done at once. The Director of Health and Safety will determine if City Environmental Services should be notified for clean up and disposal. Consult the MSDS for spill control procedures specific to the spilled substance.

2. The following procedures should be followed for chemicals spilled on the skin:

- A. For chemicals spilled over a large area of the body use the safety shower. Seconds may count and no time should be wasted because of modesty. However, care must be taken not to spread the chemical on the skin especially to the eyes, mouth, or nose. Safety goggles should be kept on until certain that the head area is rinsed. If the eyes are affected, their rinsing should begin immediately. Immediately flood the affected body area with cold or tepid water for a minimum of fifteen minutes. Resume if pain returns. If appropriate, wash off the chemicals with a mild detergent and water. Do not use neutralizing chemicals, ointments, creams, lotions or salves.

Medical attention must be received as soon as possible. Notify Campus Security and Department Head immediately to begin the summoning of medical help. Make certain that the medical personnel understand exactly what chemicals are involved so that they may administer proper treatment. The exact chemical name must be supplied to avoid any confusion.

- B. For chemicals spilled over small areas of the skin, immediately flush with cold or tepid water for no less than fifteen minutes. If there is no visible burn, wash the affected area with a mild soap and water. Remove any jewelry or affected clothing to insure the removal of any residual materials. Call Campus Security to report the incident and seek medical help immediately if any delayed reaction is noted.
- C. For chemicals spilled or splashed into the eyes, irrigation must be started immediately using an eye wash fountain. Flush the eyes with copious amounts of water under gentle pressure, preferably tepid, for a minimum of fifteen minutes. Check for contact lenses, and, if possible, have the wearer remove them at once. However, contact lenses may be difficult to remove, and the essential irrigation must not be delayed.

Forcibly hold the eye lids open to wash thoroughly behind the eyelids. The injured person should be encouraged to rotate the eyeballs as much as possible so that all available surfaces may be washed. Campus Security must be called immediately to insure prompt medical attention, regardless of the severity of the injury.

- D. Two chemicals require particular attention if these are spilled on the skin. These chemicals are bromine and hydrofluoric acid. The emergency treatment for these are detailed below.

For bromine on the skin, flush with cold water as soon as possible. After thorough flushing, apply a compress saturated with a dilute solution of sodium thiosulfate. No other chemicals should be used as a first aid or as a clean up agent on the skin. Campus Security must be notified as soon as possible to report the incident. 911 should be called for immediate medical attention.

Hydrogen fluoride vapor and hydrofluoric acid solution are both toxic posing a very serious hazard. The substance is absorbed readily into the skin and deep into body tissues, causing long-term and excruciating pain and burns that are slow to heal. Prompt removal of contaminated clothing is essential. The flushing should be continued until any whitening of the skin has disappeared. Swath the injured person with soaking wet, iced cloths. Wrap to protect from shock and exposure. Under no circumstances should an ointment be applied. Although immediate pain is felt from the concentrated acid, contact with more dilute solution of the acid may cause no symptoms until hours after the exposure.

In all cases of body contact with hydrogen fluoride or hydrofluoric acid, notify Campus Security and obtain immediate medical help. Simple flushing with water does not remove the substance from deep within body tissue. Additional treatment is required. Unless it is absolutely necessary, the use of hydrogen fluoride or hydrofluoric acid should be avoided.

3. If it appears that the spill is too large to be easily contained and cleaned up, call Campus Security, the Department Head, and the Director of Health and Safety as soon as possible. The Director of Health and Safety will notify City Environmental Service, Inc., who will do the clean up and disposal of the hazardous material. If there is no fire hazard and the material is not particularly volatile or toxic, clean it up as soon as possible. To facilitate cleaning up liquids, use an absorbent material that will neutralize the material.

Chemical Spills

1. Caustic Spill Clean Up: the following are instructions for neutralizing, absorbing, and facilitating the proper clean up and disposal of liquid alkali spills:
 - a. Safety
 - i. Wear goggles and gloves
 - ii. Provide proper ventilation
 - iii. Wash thoroughly after handling
 - b. Directions
 - i. Carefully dilute alkali spills of over 50% concentration with an equal volume of water.
 - ii. Open spill Pac1 and carefully sprinkle contents around (diking spilled area) and into diluted alkali spill.
 - iii. Add water as required to control heat evolution.
 - iv. Observe color change from blue to pink when neutralized chemical spill.
 - v. Add additional alkali neutralizer, if required.
 - vi. Open Spill Pac 2 and sprinkle contents over neutralized chemical spill.
 - vii. Mix thoroughly using plastic scoop until all liquid is absorbed.
 - viii. Scoop up neutralized mixture and dispense in hazardous disposal bag. Label bag with the name of the spilled chemical.
 - ix. Use neutral Base spray if caustic spill splashed on cabinets or hard to reach locations. Follow directions on spray bottle to neutralize base.
 - x. Leave lab manager a detailed account of the incident, including what chemical spilled and how the accident occurred.
2. Acid Spill Clean Up: the following are instructions for neutralizing, absorbing, and facilitating the proper clean up and disposal of liquid acid spills.
 - a. Safety
 - i. Wear goggles and gloves
 - ii. Provide proper ventilation
 - iii. Wash thoroughly after handling
 - b. Directions
 - i. Open Spill pac and sprinkle contents around (diking spilled area) and into acid spill area.
 - ii. Mix thoroughly using plastic scoop until the color change from pink to dark blue has developed.
 - iii. Additions of small amounts of water aid in obtaining complete neutralization.
 - iv. Add additional spill pacs, if necessary, to obtain neutralization (dark blue color persists)
 - v. Scoop up neutralized mixture and dispense in hazardous disposal bag. Label bag with the name of the spilled chemical.
 - vi. Use Neutra Acid spray if acid spill splashed on cabinets or hard to reach location. Follow directions on spray bottle to neutralize acid. Note color change for neutralization.

- vii. Leave lab manager a detailed account of the incident, including what chemical spilled and how the accident occurred.

3. If volatile, flammable, or toxic material is spilled, immediately warn everyone to extinguish all flames and to turn off all electrical equipment. All experiments should be discontinued and apparatus shut down. Local evacuation of the area should occur as quickly as possible. In the event of a spill producing flammable or harmful fumes, open all available windows, turn on all fume hoods and exhaust fans. If possible, shut down the air handlers to prevent the fumes from entering other areas. Be certain all possible ignition sources have been eliminated. The area must not be re-occupied until certified safe by City Environmental Services or other approved authority. Campus Security should be notified as soon as possible. The clean up should be undertaken only by trained City Environmental staff wearing appropriate protective clothing such as gloves, goggles, face mask, apron, and if necessary, a breathing apparatus.

4. Many small liquid spills (up to 500 ml depending on the liquid) can be cleaned up using paper towels, a suitable absorbent, or a spill cleanup kit. Remember that paper towels can increase the surface area and evaporation rate of flammable materials, increasing the fire hazard. Do not leave paper towels or other materials used to clean a spill in open trash cans. Dispose of them properly.

5. Most solid spills can be brushed up and disposed of in an appropriate solid waste container. Care must be taken to avoid reactive combinations of solid wastes. When in doubt, consult the MSDS of any spilled solid to be aware of the necessary safety precautions to be taken with the material. Goggles, gloves and an apron should be worn when cleaning up spills.

6. Acid Chlorides – Acid chlorides are potent lachrymators. For such spills, use calcined absorbent or kitty litter. Appropriate safety equipment must be worn when cleaning up these materials. Avoid contact with the skin and inhalation of the vapors.

7. Hydrogen Peroxide, 30% - For spills of less than 500 mL, dilute with water and sponge up the spill; For spills over 500mL, dilute with water and use a spill control pillow according to the dispenser box directions. Wear appropriate safety equipment and clothing. Concentrations of hydrogen peroxide over 30% will not be allowed in the department.

8. Mercury- Because of the high toxicity of mercury vapor, spilled mercury must be immediately and thoroughly cleaned up using a mercury cleanup kit. Mercury spilled into floor cracks and other areas with difficult accessibility can be made non-volatile with zinc dust. Steps must be taken to clean this amalgam up using a Hg vacuum.

Most mercury spills result from broken thermometers containing mercury stems. If at all possible, a non-mercury containing thermometer should be used.

1. Broken Thermometers – Mercury Clean Up
 - a. CAUTION: Mercury System is to be used on mercury spills only. Do not attempt to reuse spent Hg Absorb. Avoid skin contact.
 - b. Instructions

- i. Small Hg Spills: use Hg Absorb Merc jar to remove small drops of Hg from surfaces.
 - I. Unscrew jar and lift lid with attached sponge.
 - II. Use just enough water (about 2ml) on the surface of the sponge to moisten evenly. Too much water may reduce the ability of the sponge to pick up Hg.
 - III. Spread the water evenly with a gloved finger. After one minute, slowly move the sponge over the surface to be cleaned.
 - IV. When all the mercury is amalgamated to the sponge, screw the sponge attached lid back onto the jar and properly dispose of all contaminated items.
- ii. Large Hg Spills
 - I. Follow detailed instructions and precautions on each bottle within this kit.
 - II. Sprinkle Hg Absorb powder over the surface of Hg.
 - III. Wet the powder with water.
 - IV. Work Hg Absorb powder into Hg with scraper to form an amalgam.
 - V. Scoop up residual amalgam and place in disposal bag.
 - VI. Open Hg Absorb Merc Jar.
 - VII. Place enough water on sponge surface to evenly moisten.
 - VIII. Slowly move the cap, with the activated sponge side down, over the surface to be cleaned.
 - IX. Screw cap back onto Merc jar and place it in the red hazard container.
 - X. Sprinkle Mercury Indicator Powder lightly over spill-area and let stand for awhile. If powder turns brown in color, then there is Hg present.
 - XI. Sprinkle Hg Vapor Absorbent into any cracks or areas inaccessible to physical cleanup, to absorb vapors.
- iii. Disposal:
 - I. Place all broken thermometers, gloves, paper towels, etc., in red hazard container. Be sure to tightly close.
 - II. Return red hazard container and Hg Spill Kit to their proper locations.
 - III. Fill out broken equipment form with description of incident and leave for Lab Manager.

APPENDIX D: EVACUATION PLANS

There shall be two types of Evacuation plans:

1. General – All building occupants must evacuate.
2. Local – Occupants of a particular laboratory or room must evacuate.

The General Evacuation shall occur whenever the general alarm for the building is sounded regardless of the reason, known or unknown. The evacuation routes have been posted at every exit. Every evacuation route depict a final destination at which occupants of a particular area are to assemble. These designated routes should be followed. At no time should an elevator be used during a General Evacuation. This procedure is absolutely necessary to insure the safe evacuation of all persons. Faculty and staff responsible for classroom or laboratory activities must maintain an accurate list of those present for evacuation verification. Occupants will be advised by Campus Security or other authority when it is safe to return to the building. During any evacuation, whenever possible, turn off all equipment, gas, and water.

The Local Evacuation shall not require exit from the building. Occupants of the laboratory or room should gather outside the room's entrance and await further instructions.

In any evacuation, all persons must remain in the designated meeting area and Campus Security must be notified. Faculty and staff must maintain an accurate list of persons present in laboratory or classroom. Any missing person will be assumed in the building.

WHEN TO EVACUATE:

1. Fire – If the fire is of a nature requiring the activation of the fire alarm, the general evacuation of the building must begin immediately. Telephone Campus Security as soon as possible to inform them of the problem.
2. Chemical Spill- Generally small quantities of chemicals are handled in the laboratory, therefore, spills are likely to be relatively small in volume, and may not require evacuation. However, spills of flammable materials that may produce flammable or explosive mixtures, or spills of materials such as fuming acids or lachrymators may require local or general evacuation, depending on the size of the spill. When there is doubt, the general evacuation procedure should be followed.

Re-entry will be allowed when the spill is properly contained and cleaned up. (See Spill Plan section of CHP.) In the event of a spill producing flammable or harmful fumes, open all available windows, turn on all fume hoods and exhaust fans. If possible, shut down the air handlers to prevent the fumes from entering other areas. The doors to the room should remain shut. Be certain all possible ignition sources have been eliminated.

Leaks from gas cylinders and from gas supply lines should be treated as chemical spills. If possible, shut off the main valve to the cylinder. If a rupture should occur in a gas supply line, immediately activate the emergency gas shutoff.

3. Power interruption – If for any reason the fume hoods fail to operate while in use for hazardous materials, proceed with a local evacuation. Before leaving the area make certain the fume hoods are left in the 'on' position, and close all entrance doors after evacuation. Do not re-enter the room until power is restored and notification has been given by Campus Security or other authority that it is safe to return.