

Chemical Hygiene Plan

I. PURPOSE

This policy sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting laboratory employees from the health hazards presented by hazardous chemicals used in the Crime Laboratory Division or at crime scenes.

A. Chemical Procurement

1. The decision to procure a chemical shall be a commitment to handle and use the chemical properly from initial receipt to ultimate disposal.
2. Determine the amount of chemical needed for use during a period of time not to exceed the expected expiration date of the chemical.
3. Order the grade (histological, technical, reagent, etc.) needed for the expected procedure.
4. Requests for procurement of new chemicals shall be submitted to the supervisor of the section for approval. A new chemical is defined as any chemical not currently used within the laboratory. Prior to the use of the chemical involved personnel should be informed regarding proper handling, storage and disposal. Chemicals utilized in the laboratory shall be those which are appropriate for the ventilation system.
5. Personnel who receive chemical shipments shall be knowledgeable of the proper procedures for receipt. Chemical containers received shall be properly labeled and dated when received.
6. MSDS sheets will be available for all chemicals used in the laboratory and filed alphabetically in the sections MSDS Notebook.
7. The MSDS Notebook will have an index page.
8. Reagents prepared in the laboratory should be outlined in the in the sections Reagent Notebook. The outline on the reagent used should contain all chemicals in the mixture and the hazards associated with the reagent. These outlines will be filed alphabetically.

B. Chemical Storage

1. Received chemicals shall be immediately moved to the designated storage area.
2. Glass containers over 1000ml shall be placed in a plastic carrying container during transportation.
3. Chemicals that are received into the laboratory must be stored in the appropriate container.
4. The storage area shall be well illuminated, with all chemical storage maintained below eye level. Large containers shall be stored as close to the ground as possible.
5. Chemicals shall be organized by compatibility in a well-identified area with adequate ventilation.
6. Bulk quantities of flammable and/or combustible materials (1 gal or larger) should be stored in a safety can and/or a flammable storage cabinet.
7. Acid-resistant trays shall be placed under bottles of mineral acids.
8. Acid-sensitive materials such as cyanides and sulfides shall be separated from acids or protected from contact with acids.
9. Storage of chemicals at the laboratory bench or other work areas shall be limited to amounts

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- as small as practical. Stored chemicals shall not be exposed to excessive sunlight or heat.
10. The Section Supervisor should ensure that chemicals outside the chemical storage area are kept to a minimum.
 11. The Section Supervisor should ensure that chemicals are not stored past their expiration date and that all containers are not cracked, corroded or otherwise damaged in any way.

C. Chemical Handling

Each laboratory employee with the training, education and resources provided by the Section Supervisor shall develop and implement work habits consistent with this CHP to minimize personal and coworker exposure to the chemicals in the laboratory. Based on the realization that all chemicals inherently present hazards in certain conditions, exposure to all chemicals shall be minimized. Reasonable evaluations of potential risk, job requirements, safety regulations and scientific necessity of analysis and or evaluation are the principle concerns. Precautions that should be considered for the handling and use of all chemicals include:

1. Skin contact with hazardous chemicals shall be minimized.
2. Regular hand washing is a recommended safety practice.
3. Tasting, mouth pipetting or starting a siphon with hazardous chemicals is prohibited.
4. Eating, drinking, smoking, gum chewing, storage of food or application of cosmetics in areas where laboratory chemicals are present is prohibited. Hands shall be thoroughly washed prior to performing these activities.
5. Risk determinations shall be reasonable and conservative in nature. Specific precautions based on the exposure potential of individual chemicals shall be implemented as deemed necessary by the Section Supervisor and/or S&CHO.
6. Laboratory employees should be familiar with the common hazards associated with the chemicals being used and should take precautions necessary to prevent exposure.
7. In normal laboratory processes, neither the Permissible Exposure Limits (PELs) of OSHA nor the Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH) shall knowingly be exceeded.
8. The engineering controls and safety equipment used by laboratory personnel shall be inspected semiannually by the laboratory S&CHO.
9. Any waste, outdated and/or unnecessary chemicals should be disposed of using procedures outlined by the MSDS information or other proper methods.

D. Laboratory Equipment and Glassware

Each employee shall keep the work area clean and uncluttered. All chemicals and equipment shall be properly labeled. Laboratory work areas and equipment shall be cleaned on a regular basis. In addition, the following procedures shall apply to the use of laboratory equipment:

1. All laboratory equipment shall be used only for its intended purpose.
2. All glassware will be handled and stored with care to minimize breakage; all broken glassware will be properly disposed of.
3. All evacuated glass apparatus shall be shielded to contain chemicals and glass fragments should implosion occur.
4. Glass and biohazard receptacles shall be identified as such.
5. All laboratory equipment shall be maintained by the key operator and replaced or repaired as necessary.

E. Personal Protective Equipment (PPE)

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1. Face protection such as shields and glasses, appropriate to protect against injury, should be worn wherever projectile or splash hazards exist.
2. Respirator masks may be used voluntarily by laboratory personnel to help protect against nuisance aerosols, dusts or odors. However, the Section Supervisor and S&CHO must be consulted before using a respirator for protection against hazardous chemicals or materials where the exposure is suspected to be above the recommended PEL.
3. Shoes, which provide adequate protection from spill or other foot hazards, shall be worn.
4. Laboratory coats are provided and should be worn in the laboratory when handling potentially hazardous materials and left in the analysis area upon leaving. Laboratory coats shall be removed immediately upon discovery of significant contamination.
5. Laboratory coats will be laundered as needed.
6. Coveralls and other additional protective apparel are provided for crime scenes and should be worn when the possibility of contamination exists. This protective equipment should be properly laundered or disposed of after use.
7. Appropriate chemical-resistant gloves shall be worn at all times when handling potentially hazardous materials. Used gloves shall be inspected and washed prior to re-use. Damaged or deteriorated gloves will be immediately replaced.
8. Thermal-resistant gloves shall be worn for operations involving the handling of heated materials and exothermic reaction vessels as well as extremely cold materials such as liquid nitrogen. Thermal-resistant gloves shall be non-asbestos and shall be replaced when damaged or deteriorated.

F. Personal Work Practices

1. Laboratory supervision shall ensure that each employee knows and follows the rules and procedures established in this plan.
2. All employees shall remain vigilant to unsafe practices and conditions in the laboratory and shall immediately report such practices and/or conditions to the Section Supervisor. The supervisor must correct unsafe practices and or conditions promptly.
3. Seek information and advice from knowledgeable persons, standards and codes about the hazards present in the laboratory. Plan operations, equipment and protective measures accordingly.
4. Inspect personal protective equipment prior to use, and wear appropriate protective equipment as procedures dictate and when necessary to avoid exposure.

G. Labeling

1. All chemical and reagent containers used by laboratory personnel shall be labeled. This includes chemical containers and biohazard waste containers. The label shall be informative and durable, and at a minimum, will identify the contents.
2. Reagents and other chemical mixtures made for laboratory use shall be labeled by the preparing individual.
3. Exemptions for labeling requirements shall be made for chemical transfers from a labeled container into a container that is intended only for the immediate use of the employee who performed the transfer.
4. The labeling program shall be inspected semiannually during the safety inspection to ensure labels are present and correct.

II. CHEMICAL SPILLS, RELEASES AND ACCIDENTS

- A. All spills should be evaluated to determine hazard potential (flammability, toxicity, volume, etc...) If the spill is considered to be significant and not on a person then the laboratory personnel must

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do as follows:

1. Immediately alert fellow workers and supervisor.
2. Acids and other acid materials - Pour sodium bicarbonate around the outer edge of the spill. Then add the same material to the spill to neutralize the acid. Continue to add the dry neutralizing material until neutralization is complete, approximately 10 – 15 minutes. Use rubber or latex gloves and eye protection during the process. When neutralization is complete, use spill pillows to pick up as much of the resulting "mud" as practical. Use paper or cloth towels to wipe up the remaining residue. A wet mop or wet towels maybe used to wash the surfaces. All towels or mops should be well rinsed before being discarded in the waste basket or hung to dry.
3. Alkalies – follow the same procedure used for acid spills using citric acid instead of sodium bicarbonate as the neutralizer.
4. If a volatile, flammable or toxic material is spilled, immediately warn everyone to extinguish flames and turn off spark-producing equipment such as brush-type motors. Shut down all equipment and vacate the area until it is decontaminated. The supervisor or management will be responsible for designating the extent of evacuation and the proper cleanup procedure (see the Building Manual for Emergency and Evacuation Procedures). Avoid skin contact and, to prevent inhalation, wear appropriate breathing apparatus. Lab coats contaminated by spills or splashes should be immediately removed to prevent skin penetration.
5. Many small liquid spills (<100 ml) can be absorbed with paper towels or cloth rag. However, paper towels can increase the surface area and evaporation, increasing the fire hazard. Most solid spills can be brushed up and disposed of in appropriate solid waste containers, but care must be exercised to avoid reactive combinations. Don't leave paper towels or other materials used to clean up a spill in open trash cans in the work area. Dispose of them properly.
6. Mercury - Because of the high toxicity of mercury vapor, spilled mercury should be immediately and thoroughly cleaned up using an aspirator bulb. Most mercury spills in the crime lab occur from broken thermometers. Mercury spilled into floor cracks can be made nonvolatile by amalgamation with zinc dust. Domestic vacuum cleaners must not be used because they will only disperse mercury aerosols and spread the contamination. Pour the mercury into a suitable closed container and contact the Safety Officer for disposal.

III. EMERGENCY TREATMENT PROCEDURES

In the event that an individual is a victim of a spill medical attention should be obtained as soon as possible. However, immediate actions by the victim or persons nearby are necessary to prevent or limit potential injury.

A. Chemicals on the Skin

1. For spills covering small amounts of skin, immediately flush with water for no less than fifteen minutes. If there is no visible burn, wash with warm water and soap, removing any jewelry to facilitate removal of any residual materials. Check the MSDS to see if any delayed effects should be expected. If delayed reaction is noted, seek medical attention immediately and explain carefully what chemicals were involved. For larger spills, quickly remove all contaminated clothing, shoes, jewelry, etc., while using the safety shower. Do not attempt to wash chemicals off of clothing. Instead, remove the clothing. Seconds count, and no time should be wasted because of modesty. Be careful not to spread the chemicals on the skin, or especially into the eyes. Unless the eyes are affected, do not remove safety goggles until all chemical is washed from hair and face. Use caution when removing pullover shirts or sweaters to prevent contamination of the eyes. It may be better to cut the garments off.

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Immediately flood the affected body area with water for at least 15 minutes. Resume if pain returns. Do not use creams, lotions, or salves. Get medical attention as soon as possible.

B. Chemicals in the Eye

1. For chemical splashes, at least a 15 minute flush is recommended. Immediately flush the eye with copious amount of water under gentle pressure, checking for and removing contact lenses at once. However, contact lenses may be difficult to remove, and the essential irrigation must not be delayed. Forcibly hold the eye open to wash thoroughly behind the eyelids. Eyeballs should be rotated so that all surfaces are rinsed. In the absence of some type of eyewash device, the injured person should be placed on his or her back and water gently poured into the eye. The injured eye must be held open. After flushing, the victim must be given prompt medical attention, regardless of the severity (or apparent lack of severity of the injury). Keep the eyes immobilized with clean wet, soft, cold pads while transporting the injured to medical attention.

IV. CRITERIA FOR IMPLEMENTATION OF CONTROL MEASURES

A. Air Sampling

1. Upon addition of new chemicals or changes in control procedures, additional air sampling will be considered to determine the exposures. The Section Supervisor shall request air sampling if there is reason to believe exposure levels for regulated substances that require sampling routinely exceed the action level, or in the absence of an action level, the PEL. Air sampling will be conducted according to the current industry standard.
2. The results of air sampling studies performed in the laboratory shall be maintained and recorded by the Laboratory Safety and Chemical Hygiene Officer (S&CHO).

B. Housekeeping

Each laboratory worker is directly responsible for the cleanliness of his or her work space, and jointly responsible for common areas of the laboratory. Laboratory management shall insist on the maintenance of housekeeping standards. The following procedures apply to the housekeeping standards of the laboratory:

1. All spills on laboratory benches or floors shall be immediately cleaned and the waste shall be properly disposed.
2. The laboratory benches shall be kept clear of equipment and chemicals except those necessary for the work currently being performed.
3. The work area shall be kept in an adequately clean state.
4. All apparatus shall be thoroughly cleaned and returned to storage upon completion of usage.
5. All floors, aisles, exits, fire extinguishing equipment, eye washes, showers, electrical disconnects and other emergency equipment shall remain unobstructed.
6. All labels shall face forward.
7. All chemical wastes will be disposed of properly.

C. Safety and Emergency Equipment

1. Telephone numbers of emergency personnel, supervisors and other workers as deemed appropriate shall be posted in a common and accessible area.
2. Prior to the procurement of new chemicals, the Section Supervisor shall verify that existing

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- extinguishers and other emergency equipment are appropriate for such chemicals.
3. All employees who might be exposed to chemical splashes shall be instructed in the location and proper usage of emergency showers and eye wash equipment. The eyewash and emergency shower shall be inspected monthly. Records shall be maintained.
 4. An appropriate first aid kit will be provided in each section.

V. ENGINEERING CONTROLS

A. Intent

The engineering controls installed in the laboratory (hoods, guards, electrical shut offs, etc.) are intended to minimize employee exposure to chemical and physical hazards in the workplace. These controls must be maintained in proper working order for this goal to be realized.

B. Modification

No modification of engineering controls will occur unless testing indicates that worker protection will continue to be adequate.

C. Improper Function

Improper function of engineering controls must be reported to the Section Supervisor immediately. The system shall be taken out of service until proper repairs have been executed.

D. Usage

All employees shall follow proper work practices when using the engineering controls.

1. Local Exhaust Ventilation:

The following procedures shall apply to the use of local exhaust ventilation:

- a. The ventilation system shall provide 6-12 air exchanges per hour in the laboratory.
- b. Prior to a change in chemicals or procedures, the Section Supervisor must first determine that the ventilation system is adequate.

2. Chemical Hoods:

The following work practices and procedures shall apply to the use of the chemical hoods:

- a. Confirm adequate hood ventilation performance prior to opening chemical containers inside the hood. An inward flow of air can be confirmed by holding a piece of paper at the face of the hood and observing the movement of the paper.
- b. When using the hood for evacuation purposes, the sash should be kept no higher than the marked height.
- c. Storage of chemicals and equipment inside the hood shall not preclude adequate usage of the hood.
- d. Minimize interference with the flow of air into the hood.
- e. Leave the hood operating when it is not in active use if hazardous chemicals are contained inside the hood or if it is uncertain whether adequate general laboratory ventilation will be maintained when the hood is non-operational.
- f. After using hoods, operate the fan for an additional five minutes to clear residual

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- contaminants from the ductwork.
- g. The ventilation system shall be inspected annually by Section Supervisor or designee appointed by the Laboratory Director. The hood face velocity shall be maintained between 75 and 125 feet per minute.
- k. Thin Layer Chromatography procedures and chemical extractions with volumes of solvents in excess of 50 ml should be conducted in the chemical hood.
- l. Powder pattern reagent preparation, paper emulsion preparation and residue pattern spraying should be conducted in the chemical hood.
- m. Reagent preparation involving caustics, flammables, poisonous, and/or malodorous chemicals needs to take place in the chemical hood.
- n. Heating and/or evaporating solutions over 1 ml should be conducted in the chemical hood.
- o. Magnesium ribbon smoking techniques should be conducted in the chemical hood.
- p. All laboratory latent print processing using powders and chemicals should be conducted in the chemical hood or using the appropriate equipment.

VI. EMPLOYEE INFORMATION AND TRAINING

A. Hazard Information

All employees will be apprised of the hazards presented by the chemicals in use in the laboratory. Each employee shall receive training at the time of initial assignment to the laboratory, prior to assignments involving new exposure situations, and at a regular frequency as determined by the Section Supervisor and/or S&CHO.

B. Training

This training shall include methods of detecting the presence of hazardous chemicals; physical and health hazards of chemicals in the laboratory; and measures employees can take to protect themselves from these hazards. The training shall present the details of the Chemical Hygiene Plan, and shall include:

1. The location and availability of the Chemical Hygiene Plan and MSDS information for the section.
2. General safety practices.
3. Location and availability of chemical hygiene reference material.
4. The Section Supervisor and/or S&CHO will ensure that the laboratory personnel receive proper training.

VII. MEDICAL CONSULTATIONS AND EXAMINATIONS

A. Opportunity for Medical Attention

An opportunity to receive medical attention is available to all employees who work with hazardous chemicals in the laboratory. The opportunity for medical attention will be made available to employees under the following circumstances:

1. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory.
2. Medical surveillance programs will be established where exposure monitoring reveals an exposure level above the action level for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements.

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3. Whenever an event takes place in the laboratory such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure the employee will be provided an opportunity for medical consultation for the purpose of determining the need for medical examination.
4. On a biannual basis, the employees of the Firearms and Tool Mark Section will have their blood tested to ensure that lead and zinc protoporphyrin levels are normal according to the OSHA reference range.

B. Cost

These medical consultations and examinations shall be provided without cost to the employees, without loss of pay and at a reasonable time and place.

C. Supervision

These medical consultations and examinations shall be administered by or under the direct supervision of a licensed physician. A current list of available physicians is maintained by Administrative Services Bureau. Employees seeking the opportunity of medical consultation should request the listing from the Administrative Services Bureau after informing the Section Supervisor and/or the Laboratory Bureau Director.

VIII. HANDLING POTENTIALLY HAZARDOUS EVIDENCE IN COURTS OF LAW

It is not uncommon for potentially hazardous articles or toxic materials to be removed from their containers and passed around the court by attorneys, police officers, and the scientific experts. To avoid unnecessary handling of potentially hazardous materials, the court should be advised of a possible health hazard and the proper handling procedures. If asked to handle such evidence, you should ask for proper PPE prior to doing so.