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## 8.4 *Record Maintenance*

### FORMS

- Hepatitis B Vaccine Declination Form
- Hepatitis B Vaccination Record Form
- Laboratory Safety Inspection Checklist
- Decontamination and Magnehelic Log

## 1 PURPOSE

The Occupational Safety and Health Administration (OSHA) does not regulate municipal governmental agencies in Texas. We are under the guidelines established by the Texas Workers' Compensation Commission (TWCC), the Texas Right-to-Know Act, and many of the standards set forth by OSHA have been adopted as a national standard. These include things such as Bloodborne Pathogens, Confined Space Entry, and Hazard Communications to name a few. While OSHA does not regulate our laboratory, the standard is considered "best practices" and the safety measures specified are goals to strive for in laboratory safety.

All Bureau personnel should carefully read and be aware of the guides to safety presented in this document. The principles presented are very adaptable to the Bureau setting.

## 2 GENERAL SAFETY

### 2.1 Responsibilities

- The **Laboratory Director** is responsible for:
  - Ensuring that the safety manual is reviewed annually.
  - Ensuring that the section supervisors are administering and monitoring the safety procedures in their respective sections.
  - Ensuring that the annual safety audit is performed and documented.
  - Appointing the Safety Officer/committee.
- The **Section Supervisors** are responsible for:
  - Ensuring that the safety guidelines established in this safety manual are followed.
- The **Safety Officer/Committee** is responsible for:
  - Conducting annual inspections of the laboratory and report the results in writing to the Laboratory Director. This report will include recommendations for any needed improvements in laboratory and field operations that will provide for enhanced safety.
  - The following items shall be examined during a safety inspection:
    - Fume Hood inspection documents
    - Fire extinguishers and fire blankets
    - Safety showers and eyewash stations records of performance checks
    - Personal Protective Equipment (PPE) – Keep well stocked and replenish supply as needed. Check for proper maintenance and storage of PPE.
    - Spill clean-up kits
    - Gas cylinder-fastening devices
    - Availability of safety glasses, gloves, and lab coats
    - Exit signs in place
    - First aid kits available and stocked
    - Chemicals stored safely
    - Exhaust Fans – firearms and chemical storage buildings.
    - Chemical Storage Building will be inspected for chemical spills or leaks.
    - Hazard Communication Act posted
    - Material Safety Data Sheets available
    - Chemical Hygiene Plan available
    - At least two unobstructed exits from each laboratory area.

- **All Forensic Science Bureau Personnel** are responsible for:
  - o Conducting their work in the laboratory or field in such a manner to insure not only their own safety, but also safety of their fellow workers.
  - o Submitting written recommendations to their section supervisor regarding laboratory and field safety whenever that employee feels a potentially dangerous situation exists.

## 2.2 General SAFETY Principles

- **Methods of Contamination**
  - o Forensic Science Bureau employees are exposed on a routine basis to evidence containing substances that may be toxic, carcinogenic, infectious, or otherwise hazardous to humans.
  - o The hazard of such evidence will vary according to the nature and concentration of the agent, the routes by which the agent can be transmitted (e.g., respiratory, ingested or absorptive), and the susceptibility of the exposed laboratory worker. Each evidence item must be considered a potential hazard and handled in a manner that protects the employee and others in the immediate vicinity from contamination. Common routes of contamination include:
    - **Absorption**  
Open cuts or scratches on the skin, particularly the hands, provide a point of entry for infectious agents. Penetration of intact skin is possible by some infecting agents and chemicals, while others may enter through the conjunctiva of the eye or other mucous membranes as a result of contact with contaminated hands.
    - **Direct Inoculation**  
Broken glassware, needles, syringes, forceps, staples on packaging materials, and other sharp objects provide a means of direct injection of infecting agents into the bloodstream.
    - **Ingestion**  
Smoking, eating, or drinking after handling evidence items and prior to hand washing may result in oral ingestion of infective agents or hazardous chemicals. Mouth pipetting, placing objects such as pens or pencils in the mouth, and hand contact with mucous membranes may also result in contamination.
    - **Airborne Contaminants**  
Infectious agents may become airborne through accidents, such as spilling or breaking a container, or through a variety of standard laboratory procedures, such as centrifuging, vortexing, ultrasonic use, Pasteur pipette transfer and mixing, evidence homogenizing, removing caps or stoppers from tubes, and mechanical handling of clothing and other materials. Splashing liquid and flaking material from dried stains are additional sources of airborne agents. Proper ventilation or breathing protection is imperative to reduce the danger of airborne infectious materials and chemicals.
- **Universal Safety Precautions**
  - o Universal safety precautions are intended to minimize exposure to chemical and biological contamination.
  - o Food and beverages are prohibited in the section laboratory areas.
  - o Eating, drinking or smoking in the section laboratory areas is prohibited.
  - o Mouth pipetting is prohibited.
  - o Wash hands thoroughly after handling evidence and before eating, drinking, smoking, or using the restroom.

- o Avoid placing pens or pencils in the mouth
  - o Access to work areas should be limited to the employees performing the examinations when hazardous evidence is being handled. When handling hazardous evidence, the employee should avoid making or receiving phone calls.
  - o Use personal protective equipment (PPE) as appropriate to protect skin and mucous membranes from exposure.
    - Use appropriate lab coat or disposable coveralls to protect skin and clothing.
    - Wear the appropriate gloves to protect hands. Disposable gloves should not be washed or decontaminated for reuse.
    - Protect mouth and nose with surgical type mask or air purifying respirator (APR).
    - Protect eyes with close fitting goggles or wrap-around glasses that contact the skin around the eyes. Ordinary glasses do not provide complete protection due to gaps.
    - Foot and hair covering optional.
    - Stay aware of the condition of the PPE (personal protective equipment) while wearing it. Change to new equipment if pieces are torn, punctured, ripped, or wetted with chemicals.
    - Before leaving the laboratory, all protective clothing should be removed
  - o Smoking is only permitted in designated areas outside the facility.
  - o Storage of food or drinks in refrigerators where chemicals or evidence is stored is prohibited.
  - o While processing evidence at remote locations, follow all safety protocols that would apply while working in the Forensic Science Bureau Laboratory, as far as practical.
  - o Case records should be protected from chemical or biological contamination.
  - o Employees are responsible for keeping their work area, instrument rooms, hoods, and evidence storage areas clean and organized.
  - o Reagents and chemicals should be returned to the proper shelf after use, with their labels facing the front of the shelf. Spills on the sides of bottles should be cleaned off.
  - o Access to exits, emergency equipment, controls, and such should never be blocked.
- **Evidence Handling**
    - o Evidence will be handled only in the laboratory operational areas. Do not handle evidence or perform laboratory tests in office areas, except in the latent prints office.
    - o Assume that all evidence is contaminated
    - o Appropriate personal protective equipment must be selected based on the hazards associated with the type of evidence examined.
  - **Avoid Underestimation of Risk**
    - o One should assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity are toxic.
    - o Avoid performing chemical procedures while alone in the lab.
  - **Use of ventilation hoods**
    - o Employees will not use a ventilation hood that is not operational. If the flow monitor is in alarm or if there is any question regarding the effectiveness of the ventilation hood, the employee will notify their supervisor and cease working in the ventilation hood.
    - o The hood must remain "ON" at all times, regardless whether any work is being done in the hood.
    - o Any syntheses will be conducted in the fume hood.
    - o Highly flammable chemicals with a low flash point will be used in the fume hood.

- o The operation of the hood should be checked periodically to guard against airflow blockage.
  - o Malfunction of the hoods should be reported to the building service personnel, who are responsible for the certification, service and maintenance of the vent hoods.
- **Laboratory Equipment Hazards**
  - o No alteration of the manufacturer's safety features will be allowed.
  - o Any electrical failure or evidence of undue heating of equipment should be reported immediately to a supervisor. Qualified personnel will perform all maintenance.
  - o Employees are responsible for familiarization with instrumentation within their work area.
  - o Body fluid contamination will be cleaned up immediately.
- **Safety Inspections**
  - o The Laboratory Director will ensure that safety inspections are conducted annually. The Bureau Safety Officer or other appointed employees will conduct the inspections. The inspections will be documented in written communication to the laboratory director.
  - o Each supervisor is responsible for reviewing the inspection report for their respective section and ensuring that issues are addressed.
  - o The Laboratory Director will maintain a file or record book detailing the results of each inspection, the name of person conducting inspection, and the corrective measures taken.

### **3 EMERGENCY PROCEDURES AND SAFETY INTERNAL TO LABORATORY**

#### **3.1 Emergency Action Plan**

- An Evacuation Plan is posted in close proximity to each section/laboratory entry door.
  - o The plan outlines escape routes (designated by arrows) from each section.
  - o The locations of fire extinguishers are designated on the evacuation plan.
  - o In case of fire call the fire department (9-911).
  - o Inform the control booth (ext. 4-5061) that the fire department has been called and what type of fire is involved.
  - o Close all doors, when practical.
  - o Employees are to evacuate as per the evacuation plan posted in their respective section.
  - o All Bureau employees will assemble at their respective rally point (west side of the vehicle processing facility or the northwest side of the parking lot).
  - o The Supervisor will inform the chain of command that all employees from the Forensic Science Bureau are accounted for or the names of employees missing.
  - o In the case of injured employee(s) requiring medical assistance, Call EMS (9-911).

#### **3.2 Fire Safety Equipment**

- Alarms are designed so that all personnel are alerted. All employees should become familiar with the location of the nearest fire alarm.
- Smoke Alarms are located in various areas of the building. Activation of any smoke alarm will activate alarms throughout the building.

- Sprinklers are heat activated, and employees should not attempt to shut off the system. The activation of the sprinklers will activate the building's alarm system.
- Fire Extinguishers are available in laboratory areas, in the laboratory response truck, in crime scene unit vehicles and at outside storage sites. The building services personnel are responsible for annual inspection of fire extinguishers. They are of a type suitable for chemical fires, paper fires, and electrical fires.
  - o To effectively operate an extinguisher, think **P-A-S-S**
    - **P** -> pull the pin
    - **A** -> aim the hose at the base of the fire
    - **S** -> squeeze the handle
    - **S** -> sweep the hose back and forth
  - o Ensure the extinguisher used is proper for the type of fire. Most new extinguishers are the ABC type that are effective on all but Class D fires,
  - o Fires are classified in four types
    - Class A for wood, paper and other similar combustibles.
    - Class B for flammable liquids
    - Class C for electrical fires
    - Class D for flammable metals
  - o Multipurpose dry chemical fire extinguishers are located accordingly in each section. Extinguisher acts as a smothering agent on a fire. Dry chemical agents tend to leave residues. They are intended for use on wood, paper, flammable compounds and electrical fires.
- Blankets:
  - o Should not be used as a means to extinguish a fire.
  - o Should be used as a means to keep shock victims warm.
  - o Are located throughout the laboratory.
- First Aid Kits are located in each section of the laboratory, vehicle processing facility and crime scene vehicles. The first aid kits will be inspected at least annually and kits will be restocked when needed.
- Flammable cabinets will be used to store flammable solvents.

### 3.3 Electrical Safety

- Make certain before working on internal circuitry of any electrical instrument that it is unplugged from the electrical supply.
- Worn electrical cords, connectors, or other electrical problems should be brought to the attention of the Section Supervisor for immediate repair.

### 3.4 Fires

- Small Fires (extinguishable within 1-2 minutes)-Cover fire with inverted beaker or wet paper towels. If this fails to extinguish the fire, use a fire extinguisher
- Large Fires
  - o REMAIN CALM, and activate manual pull alarm if smoke alarm system was not activated by smoke.

- Call Fire Department (9-911).
- If possible, turn off all sources of heat, electricity, and gas.
- Evacuate by the stairwell, NOT the elevator, assist the injured.
- Exit building as quickly as possible.
- Individual On Fire
  - Rescuer should have victim **STOP - DROP - ROLL**
  - Use fire blanket to help prevent victim from going into shock, not as a means of putting out the fire.
  - Call EMS and Fire Department (9-911)

### 3.5 First Aid

- **Wounds**
  - **Small cuts and scratches**
    - Clean area with soap and water.
    - Apply direct pressure by pressing the palm of one hand on compress of cloth over the entire area of the wound.
    - Elevation -- if direct pressure does not control bleeding, raise the area above the level of the victim's heart.
  - **Significant bleeding**
    - Call EMS (9-911).
    - Follow directions of small cuts.
- **Burns**
  - **Thermal burns**
    - First degree burns are characterized by redness or discoloration of the skin, mild swelling and pain. (ex: sunburn or mild steam burn)
      - i. Apply cold water applications and /or immerse in cold water for at least 10 minutes.
      - ii. Apply burn cream/spray, if desired.
    - Second and third degree burns are characterized by red or mottled skin with blister for 2nd degree, and white or charred skin for 3rd degree.
      - i. Wrap area in clean, dry material.
      - ii. Call EMS (9-911).
  - **Chemical burns**
    - **Skin**
      - i. Remove victim's clothes and shoes.
      - ii. Rinse the area with large quantities of water for at least 15 minutes (sink, shower, or hose).
      - iii. DO NOT apply burn ointments / spray to affected areas.
      - iv. For large affected areas, call EMS (9-911).
    - **Eyes (acid/alkali)**
      - i. Rinse area of eyes, eyelids, and face thoroughly with lukewarm water for at least 15 minutes at the eye wash station.
      - ii. Cover both of the victim's eyes with sterile gauze.
      - iii. Call EMS (9-911).
- **Ingestion**
  - Call EMS (9-911) IMMEDIATELY.



- If the victim is awake and able to swallow, give water or milk. If they become nauseated, do not continue to administer fluids. **Call the Poison Center 1-800-222-1222**
  - If the victim is unconscious, turn their head or entire body onto their left side. Be prepared to start CPR, but be cautious about exposing yourself to chemical poisoning via mouth-to-mouth resuscitation. If available, use a mouth to mask resuscitator.
- **Inhalation**
    - Evacuate the area and move the victim into fresh air.
    - Call EMS (9-911).
    - If the victim is not breathing, perform CPR until EMS arrives. Be careful to avoid exposure to chemical poisoning via mouth-to-mouth resuscitation. If available, use a mouth-to-mask resuscitator.
    - If breathing, loosen victim's clothing and maintain the airway.
      - Lay victim flat on their back.
      - Place hand under their neck and lift.
      - With the heel of the other hand on the victim's forehead, rotate or tilt head backward into maximum extension.
      - If additional airway opening is required, it can be achieved by thrusting the lower jaw into jutting-out position.

## 4 EMERGENCY PROCEDURES AND SAFETY EXTERNAL TO LABORATORY

### 4.1 Chemical Storage Units

The Chemistry Section is responsible for the care, custody and control of the Chemical Storage Units 3A, 3B, 4A, 4B, 5A and 5B. Refer to their section operations manual for details.

### 4.2 Vehicle Processing Facilities

The Crime Scene Section is responsible for the care, custody and control of the Vehicle Processing Facilities. Refer to their section operations manual for details.

## 5 CHEMICAL HYGIENE PLAN

### 5.1 Components of the Chemical Hygiene Plan

- **Chemical Procurement and Distribution**
  - Procurement (does not pertain to evidence submitted for analysis).
    - Before a substance is opened, information on proper handling, storage, and disposal should be known to those who will be involved.
    - If MSDS is not on file, one should be ordered along with the substance.
    - No container should be accepted without an adequate identifying label.
  - Distribution (does not pertain to evidence submitted for analysis) will be on an "as needed" basis.
- **Environmental Monitoring**

Monitoring of airborne concentrations is not usually justified or practical in the laboratory. It will be done as needed in a clandestine laboratory situation.

- **Housekeeping, Maintenance and Inspections**
  - **Housekeeping**
    - General cleanliness should be maintained on all floors, counter tops and work areas.
    - Waste should be disposed of promptly in appropriate receptacles.
  - **Inspections**
    - Formal housekeeping and chemical hygiene inspections will be performed annually.
  - **Maintenance**

All equipment, whether analytical, safety or otherwise should be inspected and maintained regularly.
- **Personal Protective Apparel and Equipment**
  - **Eye Protection**
    - Eye protection must be available to all personnel and any visitors, as necessary
    - Eye protection that meets the criteria described below provides minimum eye protection for regular use. Additional protection may be required when carrying out more hazardous operations.
      - i. Prescription glasses may be used if they are made of hardened glass or plastic lenses.
      - ii. Non-prescription glasses may be ordinary laboratory safety glasses.
      - iii. Goggles should be used where there is a danger of splashing or flying particles.
      - iv. Face shields should be worn for greater protection from splashing or flying particles. For full protection, wear goggles under the face shield.
      - v. Full face respirator may be used for maximum protection.
    - Contact lenses are discouraged when working in the laboratory, but may be worn at the discretion of the section supervisor. Gases and vapors can concentrate under such lenses and cause permanent damage to the eye. Furthermore, in the event of a chemical splash into the eye, it is often difficult to remove the contact lens to irrigate the eye because of involuntary spasms of the eyelid.
  - **Gloves**
    - Skin contact is a potential source of exposure to toxic material; it is important that the proper steps be taken to prevent such contact.
    - Gloves should be worn whenever it is necessary to handle corrosive materials, rough or sharp-edged objects, very hot or very cold materials, or whenever protection is needed against accidental exposure to chemicals.
    - Many different types of gloves are commercially available and should be selected based on the hazards anticipated.
    - It should be determined prior to chemical use, if submersion is anticipated. Butyl or nitrile gloves will be worn for planned chemical exposure. Latex or nitrile gloves should be worn for non-chemical duties only.
  - **Footwear**
    - Footwear in the laboratory is a MUST. Perforated shoes, sandals, or open toed footwear should not be worn in laboratory work areas.
    - Genuine or manmade leather should suffice for general or routine use.
  - **Laboratory Coats and Aprons**
    - Lab coats are intended to prevent contact with dirt and the minor chemical splashes or spills encountered in laboratory work. The cloth coat is primarily a protection for clothing and may itself present a hazard. Lab coats do not

- significantly resist penetration by organic liquids and, if contaminated, should be removed immediately.
  - Disposable outer garments, such as Tyvek, polyethylene coated Tyvek and Saranex 23-p film on Tyvek, are more desirable in higher risk situations.
  - **Eyewash/Shower**
    - Safety showers and eyewash stations are available in laboratory work areas.
    - Emergency eye wash stations are located in the vehicle processing facilities.
  - **Respirators**
    - Dust particle face masks are available for working with large volumes of powder, marihuana and potentially infectious liquid samples.
    - Air Purifying Respirators (APR) are available in full and half face masks and are assigned to each chemist.
    - Self-Contained Breathing Apparatus (SCBA) are provided for use in clandestine laboratory operations.
- **Signs and Labels**
  - **Warning Signs**

Appropriate warning signs will be posted as appropriate at the entrance to each section of the laboratory.
  - **Labels**
    - Existing labels on incoming containers of hazardous chemicals may not be removed or defaced.
    - An NFPA code or equivalent label will be affixed to each container (or storage location specific to a reagent) prior to storage.
    - Employees may not be required to work with a hazardous chemical from an unidentified container, except for a portable container intended for the immediate use by the employee who performs the transfer.
    - Once a label has been attached to a chemical container, the label shall not be altered or removed without the prior approval of a supervisor.
    - All chemical containers entering and leaving the laboratory will be clearly labeled as to contents, with the label in English, prominently displayed. The label will include appropriate hazard warnings and the manufacturer's name.
  - **Safety Equipment**

All safety equipment, including emergency showers, eyewash stations and fire extinguishers will be properly labeled and clearly identified.
- **Spills and Accidents**
  - **General Safety Guidelines**
    - Employees should know the location of the spill cleanup kits. Kits for acid, base and solvent spills are available.
    - Wear the appropriate personal protective equipment when cleaning spills.
    - Refer to the applicable MSDS for spill procedures.
    - Acid, base and solvent spills may be cleaned up using the spill kits provided in each laboratory.
    - All major spills and accidents will be reported immediately to the Supervisor.
      - i. Employees should take necessary steps to help injured worker(s).
      - ii. Major chemical spills should be referred to the chemistry section for spill cleanup. Major chemical spills after hours should be referred to the chemist on call.
- **Disposal of Chemicals**

- **General Disposal**
  - Organic solvents will not be disposed of down the sink
  - Chemical waste will be transported to the chemistry section for disposal.
  - Hazardous-material waste containers shall have labels indicating their hazards.
  - Volatile chemicals shall be disposed of only under hoods or in well ventilated areas.
  - Hazardous materials shall be disposed of as soon as practical.
- **Clandestine Labs**

Chemicals seized from clandestine labs are considered evidence. Refer to the Chemistry Section manuals for storage, transport and disposal information.

## 5.2 General Procedures for Working with Chemicals

- **Chemical Safety**
  - When working with drugs and chemicals, hands should be kept clean and away from the face. Most chemicals are harmful to some degree; direct contact with any chemical should be avoided. Never taste or smell a potentially hazardous chemical. Those chemicals used as reagents in the laboratory which are highly suspect or known to be carcinogens will be so labeled. Protective gloves should be used.
  - Use of strong acids and bases requires careful handling. Protective gloves, aprons, lab coats, disposable coveralls, and eyewear will be made available. When heating strong acids or bases, use of this protective clothing in addition to a face shield is recommended.
  - Highly flammable chemicals with a low flash point will be used in or near an exhaust hood so that vapors can be rapidly evacuated from the laboratory. All open flames will be extinguished in the immediate area before these chemicals are used.
  - Care should be taken not to allow any organic solvent to come into repeated contact with the skin.
  - Open containers of organic solvents should be handled in the exhaust hood when possible.
- **Flammability**
  - Defined is a measure of how easily a gas, liquid, or solid will ignite and how quickly the flame, once started, will spread. The more readily ignition occurs, the more flammable the material. There are two physical properties of a material which indicate its flammability: flash point and volatility (boiling point).
    - The flash point of a material is the temperature at which a liquid (or volatile solid) gives off vapor in quantities significant enough to form an ignitable mixture with air. Given an external source of ignition, a material can ignite at temperatures at or above its flash point.
    - The volatility of a material is an indication of how easily the liquid or solid will pass into the vapor stage. Volatility is measured by the boiling point of the material that is the temperature at which the vapor pressure of the material is equal to the atmospheric pressure.
    - "Flammable" means a material with a Flashpoint below 140°F. "Extremely flammable" means a material with a Flashpoint below 100°F.
    - Examples of commonly used flammable chemicals are: acetone, ethyl alcohol, ethyl ether, and toluene.
- **Corrosively**
  - Gases, liquids, and solids can exhibit the property of corrosiveness. Corrosive gases are readily absorbed into the body through skin contact and inhalation. Corrosive liquids have

a higher potential to cause external injury to the body. Corrosive solids dissolve rapidly in moisture on the skin and in the respiratory system, the effects of corrosive solids depends on the duration of contact.

- Examples of corrosive chemicals encountered in the APD laboratory or off-site facilities are sulfuric acid, nitric acid, sodium hydroxide, hydrochloric acid, and ammonium hydroxide.

- **Toxicity**

Toxicity is the ability of a substance to cause damage to living tissue, impairment of the central nervous system, severe illness, or in extreme cases, death when ingested, inhaled, or absorbed through the skin. A substance can have either an acute or a chronic toxicity. A substance that is acutely toxic will have immediate effects on the health of an overexposed individual. A substance that has chronic toxicity will eventually affect the health of a person due to long-term exposure to the material.

- **MSDS (Material Safety Data Sheets)**

- Employees should review relevant MSDS for chemicals used, especially if the process is new or infrequently used
- As a source of hazardous material information, copies of MSDS for hazardous chemicals are readily available to laboratory personnel.
- Each MSDS must contain the appropriate rating for health, fire and reactivity hazards, and any special warnings associated with that particular material.
- MSDS records should be kept current.

- **Chemicals of Moderate to High Chronic or High Acute Toxicity**

The precautions and procedures described below should be followed if any of the substances to be used in significant quantities is known to be moderately or highly toxic or if the toxicity of a substance is unknown.

- If any substance is highly toxic or if the toxicity is unknown, it is desirable that there be two people present in the area at all times.
- Protect the hands and forearms by wearing either gloves and a lab coat or suitable long gloves.
- Procedures involving volatile toxic substances and those involving solid or liquid toxic substances that may result in the generation of aerosols should be conducted in a vent hood.
- **Embryotoxins / Teratogens** are substances that act during pregnancy to cause adverse effects on the fetus. These effects include death, retarded growth and postnatal functional deficits.
  - Because the period of greatest susceptibility to Embryotoxins / Teratogens is the first 8 to 12 weeks of pregnancy, which includes a period when a woman may not know she is pregnant, women of child bearing potential should take care to avoid skin contact with all chemicals.
  - The following procedures are recommended to be followed routinely by women of child bearing potential when working with chemicals requiring special control because of embryotoxic or teratogenic properties.
  - All employees should be familiar with the MSDS information provided for the chemicals used.
  - Women of childbearing potential should take adequate precautions to guard against spills and splashes. Appropriate safety apparel, especially appropriate gloves, should be worn.

- The lab supervisor should be notified of all incidents of exposure or spills of Embryotoxins / Teratogens requiring special control. A qualified physician should be consulted about any exposures of women of childbearing potential.
- **Organic Peroxides** are special classes of compounds that have unusual stability problems that make them among the most hazardous substances normally handled in laboratories. As a class, they are low power explosives; hazardous because of their extreme sensitivity to shock, sparks or other forms of accidental ignition.
- **Ethers**, especially cyclic ethers and those containing primary and secondary alcohol groups, form dangerously explosive peroxides on exposure to air and light.
- **Carcinogens** are agents capable of causing cancer. The list of designated carcinogenic chemicals is constantly being modified. A list of some commonly encountered chemicals is chloroform, formaldehyde, benzene and vinyl chlorides.
- **Mutagens** are chemical and physical agents that induce mutations in DNA and in living cells. This affects the genetic system in such a way as to cause cancer or hereditary changes in chromosomes. Individuals exposed to chemicals with mutagenic properties may develop genetic damage to the extent that future offspring will be affected.
- **Hepatotoxins** are chemicals which affect the liver. Acute hepatitis and Chronic Liver Disease are the two basic types of liver diseases caused by chemicals.
  - Acute Hepatitis may be caused by chlorinated hydrocarbons, nitroaromatics, ether or halogenated aromatics. Chemicals of particular interest are chloroform and yellow phosphorus.
  - Chronic Liver Disease may be caused by long term exposure to alcohols, inorganic elements, or haloalkenes.
- **Chemical Storage Precautions**
  - **Acids**

Precautions that will be followed in storing acids include storing large bottles of acid on low shelves or in acid cabinets; segregating oxidizing acids from strong bases and active metals, such as sodium, potassium, and magnesium; segregating acids from chemicals which would generate toxic gases upon contact, such as cyanide and sulfide salts; and having spill pillows or acid neutralizers available in case of acid spills.
  - **Bases**

Precautions that will be followed in storing bases include segregating bases from acids and having spill pillows or caustic neutralizers available for caustic spills.
  - **Flammables**

Precautions that will be followed in storing flammables include storing them in approved safety cans or cabinets; segregating them from oxidizing acids or oxidizers; keeping them away from any source of ignition, flames, sparks, or localized heat; and keeping firefighting equipment and spill-cleanup materials readily available.
  - **Oxidizers**

Precautions that will be followed in storing oxidizers include storing them in a cool, dry place; keeping them away from flammable and combustible materials, such as paper and

wood; and keeping them away from reducing agents such as zinc, alkaline metals, and formic acid.

- **Water-Reactive Chemicals**

Precautions that will be followed in storing water-reactive chemicals include storing them in a cool, dry place. In case of fire, keep water away from these chemicals to avoid a reaction.

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

- **Pyrophoric Chemicals**

Precautions that will be followed in storing pyrophoric chemicals include storing them in a cool, dry place.

**WARNING:** Pyrophoric chemicals ignite spontaneously upon contact with air.

- **Light-Sensitive Chemicals**

Precautions that will be followed in storing light-sensitive chemicals include storing them in a manner that avoids their exposure to light and storing them in amber bottles in a cool, dry place.

- **Toxic Chemicals**

Precautions that will be followed in storing toxic compounds include storing them according to the hazardous nature of the chemical, using appropriate security when necessary, and posting emergency telephone numbers near the telephone.

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

- **Peroxide Forming Chemicals**

Precautions that will be followed in storing peroxide-forming chemicals include storing them in airtight containers in a cool, dark, dry place; and properly disposing of peroxide-forming chemicals before the expected date of first peroxide formation. At the present time, little is known about the mechanism, which causes the spontaneous formation of explosive peroxides in various ethers, or the exact chemical nature of these peroxides. Experience indicates that while peroxide formation can occur under many conditions, the reaction apparently is accelerated by heat, light, and air.

- **Carcinogens**

Precautions that will be followed in storing carcinogens include storing them according to the hazardous nature of the chemical, and using appropriate security when necessary.

- **Teratogens**

Precautions that will be followed in storing teratogens include labeling all containers "teratogenic," and storing them according to the hazardous nature of the chemical, using appropriate security when necessary.

- **Compressed Gases**

- Compressed gases present a unique hazard in that they have the potential for simultaneous exposure to both mechanical and chemical hazards (depending on the particular gas).

- i. If the gas is flammable, flash points lower than room temperature compounded by high rates of diffusion (instant permeation throughout the laboratory) present the danger of fire or explosion.
- ii. Additional hazards can arise from the reactivity and toxicity of the gas, and asphyxiation can be caused by high concentrations of even "harmless" gases such as nitrogen.
- iii. The large amount of potential energy resulting from compression of the gas makes a compressed gas cylinder a potential rocket or fragmentation bomb. Thus, careful procedures are necessary for handling the various types of compressed gases, the cylinders that contain them, the regulators used to control their flow and the piping used to confine them during flow.
  - a. All gas cylinders will be properly labeled as to the contents of the cylinder.
  - b. All gas cylinders will be properly labeled as to the status (whether full, in use or empty).
  - c. Compressed gas cylinders will be moved only when caps are securely fastened.
  - d. When the cylinder is at the lab bench, it will be secured in its standing position with a suitable, noncombustible bench strap.
  - e. Cylinders should be placed so that the cylinder valve is accessible at all times. The main cylinder valve should be closed as soon as it is no longer needed.
  - f. Cylinder valves should be opened slowly; the valve on an unregulated cylinder should never be "cracked." The temperature of Hydrogen increases when expanded and the static buildup of the escaping gas can result in ignition.
  - g. It is never necessary to open the main cylinder valve all the way. Open the main valve only to the extent necessary.
  - h. Because soap solutions can damage the capillary columns of the GC, use only 50/50 solution of isopropanol and water.
  - i. All line connections should be checked regularly for leaks.
  - j. Never empty a cylinder below 100 psi. For convenience, reorder when 400-500 psi is reached.
  - k. Never use oil or lubricants on the regulator of an Oxygen cylinder.
  - l. Cylinders, when not in use, must be stored secured in an upright position to a fixed object with noncombustible strap. The strap cannot be secured around the valve and incompatible chemicals must be stored separately.

## 6 BLOODBORNE PATHOGENS EXPOSURE CONTROL PLAN

### 6.1 HIV and HBV

- Universal precautions should be taken at all times when evidence is being handled or processed.
- HIV (Human Immunodeficiency Virus) and HBV (Hepatitis B Virus) are a major concern to personnel handling evidence in the laboratory and at scenes.



- All evidence is considered contaminated.
- The Department offers HBV vaccinations and titer determination at no charge to the employee.
- Blood is the single most common source of HIV, HBV, and other bloodborne pathogens in the occupational setting. Infection control efforts for HIV, HBV, and other bloodborne pathogens must focus on preventing exposures to blood as well as on delivery of HBV immunization. Universal precautions stress that all blood and other potential infectious material should be assumed to be infectious for HIV and other bloodborne pathogens. Universal precautions apply to all body fluids, although the risk of transmission of HIV and HVB from these fluids and materials is extremely low or nonexistent. However, precaution should be taken around any and all bodily fluids.
- Although the potential for HBV transmission in the workplace setting is greater than for HIV, the modes of transmission for these two viruses are similar.

## 6.2 Exposure

All employees of the Forensic Science Bureau have the potential for occupational exposure to bloodborne pathogens.

## 6.3 Methods of Compliance

- **General Considerations**
  - Laboratory personnel face exposure to infectious diseases through contact with body fluid evidence, such as blood, urine, saliva, semen, vaginal fluid, feces, etc. Proper evidence handling can significantly reduce the risks. The greatest risk of infection occurs when infectious fluids enter the body through contact with mucous membranes (mouth, nose, and eyes) or through punctures, cuts, or abrasions in the skin. The risk posed by dried stains is uncertain. While many organisms appear to lose their activity upon drying, others do not. Dried stains should be considered infectious and handled with care to minimize contact, especially with mucous membranes.
- **Handling Biological Evidence**
  - Universal precautions shall be observed to prevent contact with blood or other potentially infectious material.
  - All work bench areas where biological evidence is handled should be cleaned with an appropriate disinfectant. Handling biological evidence only in specially designated areas within the laboratory, off-site facilities and scenes will reduce the area that needs to be cleaned.
- **Biological Evidence in the Courtroom**
  - Biological evidence should be handled in a way to minimize risks to witnesses, court officials, juries, and others present in the courtroom.
  - Whenever possible, prosecutors and judges should be informed of risks before evidence is introduced or handled in the courtroom. Forensic Science Bureau employees should offer suggestions for handling the items.
  - Use gloves when handling blood or other potentially infectious material in the courtroom.
- **Drug Evidence**
  - Drug analysts must be aware of potential hazards in handling drug evidence.
  - Use extreme care when handling syringes.

- Wear appropriate protective equipment. Gowns, gloves, and surgical masks are usually not needed during drug testing. When appropriate, glasses should be worn to protect eyes from chemicals.
- Balloons and other similar containers are sometimes concealed in body cavities and may be infectious. Cigarette butts are stained with saliva and should be considered infectious. Crack cocaine is often hidden in mouth and other body orifices and use of gloves should be worn.
- Use extreme care when using a scalpel or other sharp blade to cut open drug evidence. Any use with potentially infectious materials warrants that the blade be disinfected after use.
- **Exposure to Infectious Biohazards**
  - An employee who sustains a possible percutaneous (through the skin) exposure via contact with a needle, knife, or other sharp object, or has an open wound or mucous membrane (eyes, mouth, or nose) exposed to suspected infectious material should:
    - Encourage the wound to bleed by application of pressure
    - Wash the area thoroughly with soap and water
    - Seek medical attention if necessary
    - Report the incident to their supervisor;

#### 6.4 Communication of Hazards

- Labels and Signs:
  - Warning labels shall be affixed to containers of waste, refrigerators and freezers containing blood or other potentially infectious material and other containers used to store, transport or ship blood or other potentially infectious material.
  - Red Bags or red containers may be substituted for labels.

## 7 EMPLOYEE MEDICAL PROGRAM

### 7.1 Employee Health

- A continuous medical surveillance program should be used to identify as soon as possible signs and symptoms indicating possible overexposure to hazardous or infectious materials. This program should include the following:
  - An initial medical assessment of each employee who is on the clandestine lab team will be completed at no cost to the employee prior to hazardous material training. This medical monitoring has two purposes:
    - To determine if the employee is physically fit to use the required safety equipment.
    - To establish a baseline health assessment for the employee for future determination of adverse health effects as a result of working with hazardous or infectious materials.
  - Post exposure evaluations in the event of accidental exposure to hazardous or infectious materials.
- **Chemical or Biological Exposure**
  - Following an exposure incident, a confidential medical evaluation and follow-up will be made immediately available to the employee at no cost.

- Refer to the APD Policy manual for Reporting on Job Injury/Occupational Illness-Civilian Personnel.
- Obtain additional instructions from Department's Workers' Comp. Rep. regarding your Worker's Compensation claim and proper procedures that you must follow.
- **Hepatitis B Vaccination**
  - Hepatitis vaccine series are available to all Bureau employees at no cost to the employee.
  - If the employee elects not to receive the HBV vaccination, they will complete the Hepatitis B Vaccine Declination Statement Form.
  - If the employee elects to receive the HBV vaccination, they will complete the Hepatitis B Vaccination Record Form.
  - HBV vaccination records are maintained by the Forensic Services Manager.
  - An employee who first declines to receive the vaccination can decide to receive the vaccination at a later date at no cost to the employee.

## 7.2 Medical Records

- All medical records and reports will be retained according to the records retention policy defined in the Bureau policy, and may include:
  - A copy of Hepatitis B vaccinations or declination statement.
  - A copy of all results of examinations, medical testing and follow-up procedures.
  - Employee's copy of health professional's written opinion.
  - A copy of information provided to health care professional.
- All employee medical records are confidential and will not be disclosed or reported without employee's written consent.

## 8 EMPLOYEE RECORD TRAINING AND RECORD MAINTENANCE

To maintain the high standards of professionalism and integrity of the Forensic Science Bureau, safety education and training is required. All training records are maintained by the section supervisors.

### 8.1 Annual CLRT Training and Recertification

Each member of the Clandestine Laboratory Response Team will attend an annual refresher course, if available.

### 8.2 General Safety Education

- Each employee within the Forensic Science Bureau will be provided with information and training so that they are apprised of the hazards of chemicals present in their work area. This training will be given at the time of initial assignment and prior to new assignment involving different exposure situations. Refresher training will be given as needed.
  - Minimum Training Contents
    - Hazardous Communication
    - Bloodborne Pathogens
    - The availability and location of the Bureau Safety Program and Hazardous Communication Program.
    - Location of reference materials, including all MSDSs.
    - Measures to protect employees from these hazards including:

- i. Standard operating procedures
- ii. Work practices
- iii. Emergency procedures
- iv. Personal Protective Equipment

- Each employee should strive to attend classes, seminars and training sessions relating, not only to laboratory safety, but safety in general. The City of Austin offers many classes dealing with safety in the workplace, at no cost to the employee.
- Recognized professional organizations conduct workshops on general laboratory safety, and safety in regard to their specialized field of forensic science.

### **8.3 First Aid Training**

The Bureau will ensure that an adequate number of persons hold current certification in first aid.

### **8.4 Record Maintenance**

- Safety Training records should include date of training, summary of training, and name of the person conducting training.
- Safety records will be maintained according to the City of Austin retention policy.