LABORATORY HEALTH AND SAFETY PLAN

DEP LABORATORIES

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

TALLAHASSEE, FLORIDA

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I. LIST OF ACRONMYS

ACGIH	American Conference of Governmental Industrial Hygienists
AHERA	Asbestos Hazard Emergency Response Act
AM	Agent Manager
APR	Air Purifying Respirator
ASME	American Society of Mechanical Engineers
ASQAB	Analytical Services and Quality Assurance Branch
LABS	Laboratories
BMC	Bob Martinez Center
BSC	Biological Safety Cabinets
CAHO	Chemical Agent Hygiene Officer
CAO	Chemical Agent Operator
CASRM	Chemical Agent Standard Reference Material
CBRN	Chemical, Biological, Radiological, and Nuclear
CCTV	Closed Circuit Television
CDC	Centers for Disease Control
CGC	Compressed Gas Cylinder
CHO	Chemical Hygiene Officer
CHP	Chemical Hygiene Plan
COB	Close of Business
COR	Contracting Officer's Representative
CWA	Chemical Warfare Agent
DMS	Department of Management Services
DO	Designated Official
DOT	Department of Transportation
DSHP	Dilute Solution Hygiene Plan
EAP	Emergency Action Plan
ECBE	Edgewood Chemical/Biological Center
FDEP	Florida Department of Environmental Protection
FDLE	Florida Department of Law Enforcement
FEV	Forced Expiratory Volume
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FVC	Forced Vital Capacity
HAZMAT	Hazardous Materials
HAZWOPER	Hazardous Waste Operations and Emergency Response
HPD	Hearing Protective Devices
IAA	Interagency Agreement
IDLH	Immediately Dangerous to Life or Health
IDS	Intrusion Detection System
IH	Industrial Hygiene
LBC	Laboratory Branch Chief
LIMS	Laboratory Information Management System
LLNL	Lawrence Livermore National Laboratory
MCE	Maximum Credible Event
MLB	Microbiology Laboratory Branch

MSDS	Material Safety Data Sheet
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NIH	National Institute of Health
NIOSH	National Institute of Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
O&M	Operations and Maintenance
OEC	Occupant Emergency Coordinator
OEP	Occupant Emergency Plan
OPP	Office of Pesticide Programs
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Level
PPE	Personal Protective Equipment
RAC	Risk Assessment Codes
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit
RSO	Radiation Safety Officer
SCBA	Self-Contained Breathing Apparatus
SES	Select Exempt Service
SOP	Standard Operating Procedure
STEL	Short-Term Exposure Limit
STS	Standard Threshold Shifts
TLD	Thermoluminescent Dosimeter
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
TSS	Temporary Standard Threshold Shifts
TWA	Time-weighted Average
UDA	Ultra-dilute Agent
U.S. EPA	U.S. Environmental Protection Agency
UST	Underground Storage Tank
WPL	Worker Population Limit

II. ADDITIONAL SUPPORTING DOCUMENTS

Florida Department of Environmental Protection, DEP Laboratories, Quality Manual, 2015

Florida Department of Environmental Protection, DEP Laboratories Evacuation Plan or Facility Emergency Action Plan

Workers Compensation and Reporting

Florida Department of Environmental Protection, Bureau of Laboratories, Laboratory Training Module, 2009

1. ROLES AND RESPONSIBILITIES

The implementation of safety, security, and chemical hygiene procedures is the responsibility of all facility staff. The following subsections describe specific safety and chemical hygiene responsibilities for the Florida Department of Environmental Protection Laboratories. A more detailed list of roles and responsibilities, including those required for the Environmental Response Laboratory Network, is provided in the Florida Department of Environmental Protection Quality Manual. The roles and responsibilities provided here refer only to those relevant to Health and Safety. It is the responsibility of all laboratory staff and their managers to know and follow the provisions of this plan. Responsibilities are listed by title.

1.1 Laboratory Director

The Laboratory Director is responsible for ensuring that resources and support are provided for the implementation of this plan and the requirements outlined therein.

Responsibilities:

- Responsible for the health and safety of personnel.
- Responsible to ensure all recognized hazards are promptly addressed.
- Interacts with laboratory management and personnel to ensure that the Hygiene Plan procedures are understood and followed, and assistance or resources are provided as needed.

1.2 Laboratory Managers and Supervisors

Laboratory Supervisors are responsible for the daily execution of the Health and Safety plan as it relates to their programs or projects. They share responsibilities for development, implementation, review, and support of the Health and Safety Plan.

Responsibilities:

- Ensure that their laboratories and other spaces have the required safety supplies and equipment necessary to handle and store Chemical Agent materials safely.
- Ensure that laboratory personnel are trained and routinely follow the requirements and procedures.
- Ensure that safety equipment is checked and ready for use.
- Routinely observes staff performing SOPs and provides recommendations to improve laboratory safety.
- Determines staffing, laboratory access and/or training level needs as necessary, and ensures identified training levels are met by the individual.
- Responsible for conducting or ensuring regular inspections of housekeeping, personal protective equipment (PPE), and emergency equipment.
- Ensures that current copies of the Chemical Hygiene Plan (CHP) and other pertinent documents are readily accessible for use in the laboratories.

- Ensures that security matters as specified in the Florida Department of Environmental Protection Bureau of Laboratories (FDEP B/LABS) Physical Security Plan are met.

1.3 Chemical Hygiene Officer

The Chemical Hygiene Officer (CHO) position is held by an individual having the knowledge and competence to develop and implement this plan, as qualified by appropriate levels of education, training, and experience. The CHO also must demonstrate abilities to use appropriate equipment and testing procedures, to anticipate, identify, and evaluate health, safety, and environmental hazards, as well as to suggest means for reducing those risks.

Responsibilities:

- Responsible for development, implementation, review, and technical support of the Health and Safety Plan in conjunction with the Laboratory Branch Chief (LBC).

- Provides technical, environmental, health and safety guidance to the LBC in development and implementation of programs and procedures related to the laboratories.

- Advises and assists in the improvement of laboratory safety procedures, and reviews and updates the Health and Safety Plan on an annual basis as necessary.

- Responsible for the Health and Safety Plan with full authority to prepare and enforce safety policies.

- Investigates reports or situations of nonconformance with Health and Safety Plan requirements.

- Prepares and/or approves training materials for visitor, Chemical Agent Operator (CAO) laboratory personnel, responder, and remediation training levels. Provides and/or approves training level certifications for visitors, staff, managers, and others as appropriate for the assigned duties and level of potential exposure.

- Audits laboratory functions for compliance with the Health and Safety Plan DSHP, Occupational Safety and Health Administration (OSHA) regulations, Resource Conservation and Recovery Act (RCRA) regulations, and other requirements or laboratory procedures.

- Determines the level and type of personnel protective equipment (PPE) required for the various laboratory procedures, conditions, audits, dry runs, and emergency response or decontamination procedures.

1.4 Laboratory Staff

The laboratory staff includes anyone who works directly with laboratory equipment, solutions, or samples. The following tasks are the responsibility of the Laboratory Staff.

Responsibilities:

- Responsible for informing their supervisor of any factors that may compromise the safe operation of the laboratory. In addition to responsibilities under the primary Chemical Hygiene Plan, laboratory staff working in ultra-dilute agent facilities must receive chemical agent orientation and safety training, and will comply with the accountability procedures.
- Immediately report any accidents, incidents, hazardous conditions, or unusual circumstances to their immediate supervisor, LBC, AM and/or CAHO/CHO. Any event that could potentially cause or result in exposure or injury within the designated UDA laboratory areas must be reported.
- Conduct all operations strictly in accordance with the provisions of the DSHP, SOPs, and all applicable regulations, manuals, and directives. Any improvements or alternates must be formally approved by laboratory management before changes to the original SOP operations or procedures can be implemented.
- Perform all UDA operations using only the current and approved SOP for which operator certification has been completed.
- Use PPE and equipment required by the CAHO and SOPs in the prescribed manner.
- Ensure all chemical solutions used or prepared are properly labeled and stored, and will be responsible for housekeeping in their own work area.
- Responsible for maintaining the security and integrity of the stored and in-use UDA solutions at all times. Hold the numerical combination to the keypad entry system (secondary lock and key entry requirement) on the UDA standard storage refrigerator.

2. FIRE AND EMERGENCY EVACUATION PROCEDURES

The primary Chemical Hygiene Plan (CHP) and Occupant Emergency Plan (OEP) contain defined fire and emergency evacuation procedures for the FDEP B/LABS laboratory facility. The following subsections describe specific fire and emergency evacuation procedures associated with the laboratory and use areas. It is the responsibility of all laboratory staff and their managers to know and follow these procedures. Responsibilities or actions are listed by title.

For UDA related spill emergencies and related decontamination procedures, refer to section 13 of this CHP, Chemical and Biological Spill, Control and Reporting.

2.1 Non-Chemical Related Evacuation and Emergency Procedures

If chemicals are being manipulated and the facility fire alarm system is activated unrelated to the chemical work or the laboratory areas, the CAOs must:

1. Immediately cease operations, stop all work and close all open chemical materials.

2. Quickly ensure all materials are secured with appropriate secondary containment in the laboratory fume hood at a minimum.

3. Immediately exit the laboratory, following the standardized exit procedures below.

    - Remove PPE and place in the non-hazardous waste container
    - Wash hands with soap and water
    - Exit laboratory and verify door closed and is secure
    - Proceed to the closest evacuation assembly area and announce presence to Co-coordinator

If chemical materials are being manipulated and a non-chemical related medical situation (life threatening), incident or injury occurs, the CAOs must:

1. Immediately cease operations, stop all work and close all open chemical materials.
2. Quickly ensure all chemical materials are secured with appropriate secondary containment in the laboratory fume hood at a minimum
3. Depending on the severity and magnitude of the incident:

    - Call 911 first, and then notify Security and the CAHO Manager.
    - Perform appropriate decontaminations to patient prior to removing PPE, if needed. Remove PPE and wash hands with soap and water (buddy/rescuer).
    - Initiate first-aid or CPR procedures (first-aid kit is located on the wall immediately outside the laboratory).
    - Provide support until medical/responsible parties arrive (Note: See Exhibit 2.2 at the end of this section for the "Response to Life-Threatening or Serious Illness/Injury Form")

2.2 Chemical Related Evacuation and Emergency Procedures

In the event of known or potential chemical related exposure, or any suspected compromise to the health and safety of any person, the CAOs must:

1. Immediately cease operations, stop all work and close all open chemical materials.
2. Depending on the severity and magnitude of the incident:

    a. Notify Security or the CAHO Manager, or call 911 first, then notify Security or the CAHO Manger via the two-way radio. The CAHO Manager may initiate a facility-wide evacuation.

    b. If appropriate, available and properly trained, administer Mark I kit to victim and buddy/rescuer. (Note: Use of Mark I kits are based on exhibited symptoms. See

Exhibit 2.2 at the end of this section for the "Response to Life-Threatening or Serious Illness/Injury Form")

c. If appropriate, initiate Ambulatory Exposure Decontamination Procedures:

- If large body surface area exposure: Exit the immediate area and initiate emergency shower rinse, removing PPE and clothing as appropriate under the shower deluge while awaiting response.
- If localized surface area exposure: Remove affected PPE and clothing. Repeatedly wash the affected area with copious amounts of liquid soap and water (minimum of three times).
- Don Tyvek garment if clothing was removed.
- Exit the laboratory and await instructions from the CAHO Manger, or EMT/Paramedic response.

d. If appropriate, initiate Non-Ambulatory Exposure Decontamination Procedures:

- While buddy/rescuer maintains PPE, remove/drag patient to clean anteroom or other laboratory area and lay/roll them onto a blanket over a plastic barrier sheet (on a gurney if available).
- Remove any articles of PPE or clothing known or suspected of being contaminated.
- Repeatedly wash the affected area (patient's) with copious amounts of liquid soap and water a minimum of three times.
- Remove PPE (buddy/rescuer) and wash hands.
- Perform first-aid or CPR as needed.
- Cover the patient with a blanket and provide support until EMT/Paramedic response arrives.

2.3 Hood Failure and/or Utility Outages

In the event of a known or suspected fume hood, ventilation, utility or life safety system failure with the potential to adversely affect the health and safety of any person, the CAOs must:

1 Immediately exit the laboratory, following the standardized exit procedures below:

- Remove PPE and place in the non-hazardous waste container.
- Wash hands with soap and water.

- Exit laboratory and verify door is closed and secure.
- Notify Security or the CAHO Manager via two-way radio or by calling Security.

2.4 Damage Assessment Team

In the event of an evacuation from the laboratory or other use areas due to a potential fume hood, ventilation or other utility failure:

1. The Occupant Emergency Coordinator (OEC) or the Designated Official (DO) will ascertain the cause and extent of the outage to determine if evacuation or activation of the OEP Team is necessary as per the FDEP B/LABS OEP.

2. If necessary, the OEC, in conjunction with the DO, and CAHO Manager will select and equip (PPE) a Damage Assessment Team based on training, medical surveillance, respiratory clearance and other requirements.

3. Under no circumstances are unqualified and/or uncertified personnel allowed to enter the controlled spaces without proper escort.

2.5 Forms

Figure 2.1 "First-Aid Response Form" (Page 1)

First-Aid Response

1. **Engage alarm** to alert CWA H&S Manager and Supervisors OR

   Call 9-911 *(depends on severity of illness or injury)*

2. **Nature of the injury/illness**: *(Circle one)*

Medical problem:	***Injury:***	***Potential Exposure:***
Describe:	Puncture	Compromised PPE
	Cut	Spill/Splash
	Bruise	
	Fall	
	Other: _____	**Other:**

3. Decontamination:

_____ Remove PPE

_____ Leave the room for outer clean room

_____ Decontaminate/wash as appropriate (Check each that applies)

_____ Wash in sink (decontamination soap & water)

_____ Eyewash

_____ Deluge shower

4. Treatment/Care: (*Choose one*)

_____ a. **First Aid Injury**: Administer first aid as appropriate.

Describe:

_____

(*example: Applied a Band-Aid*)

_____ b. **Illness** (for a preexisting reason other than chemical exposure):

Provide support with appropriate first aid until EMTs/responsible party arrives.

Describe:

_____

_____ c. **Potential Exposure (**but symptom-free and ambulatory**):**

Accompany the worker to CHO/immediate supervisor.

Pursuant to 29CFR 1910.1020(d)(1)(i)(B), this record is not subject to medical records retention requirements.

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Figure 2.1 "First-Aid Response Form" (Page 2)

First-Aid Response

Patient Name _____

Rescue Buddy _____

Chemical being analyzed _____

Date: _____ Time: _____ Room Number: _____

Other Responders:

_____ _____

_____ _____

_____ _____

DESCRIBE:

Events leading to incident:

_____

_____

_____

_____

_____

(Patient should describe or concur if she/he is able) _____

Hazards remaining in the room where the incident occurred:

_____

_____

_____

FORM INSTRUCTIONS
• This form should be filled out every time there is a first aid response for a lab worker who is working the day of the incident in a laboratory space
• To be filled out by "Buddy" first responder immediately after incident
• Buddy makes 2 copies of this report. i. Original goes to the CHO on the day of the incident. ii. One copy goes to the worker's direct supervisor. iii. Originator (Buddy) keeps a copy for 30 days, then passes that copy to the CHO for disposition.

Pursuant to 29CFR 1910.1020(d)(1)(i)(B), this record is not subject to medical records retention requirements.

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Figure 2.2 "Response to Life-Threatening or Serious Illness/Injury Form" (Pg. 1)

Response to Life-Threatening or Serious Illness/Injury

- **Use Mark I** (if appropriate – possibly for victim **and** buddy/rescuer)
- **Call 9-911**
- **Engage alarm** to alert CWA H&S Manager and Supervisors

ID the nature of the injury/illness: (Circle one)

Medical problem:	***Injury:***	***Exposure:***
Dizzy	Puncture	Compromised PPE
Chest Pain	Cut	Spill/Splash
Disoriented	Fall	Explosion
Asthma Attack	Stain/Sprain	Protective Engineering Failure
Unconscious		
Other: _____	Other: _____	Other: _____

RESCUERS (Medical/Injury only):

- Remove to clean anteroom
- Lay patient on a clean blanket
- Remove PPE (cut away?)
- Not breathing? Establish airway
- No pulse? Administer AED
- Support until EMT Team arrives

RESCUERS (possible Exposure):

- Remove to clean anteroom
- Lay patient on a blanket over a plastic barrier sheet on gurney
- Begin decontamination procedure (see separate instructions)
- Remove and bag clothes & blanket
- Replace with Tyvek garment
- Support until EMT Team arrives

Once E.M.T. arrives be prepared to:

_____ Supply patient name

_____ Name of chemical patient was working with

_____ MSDS for CWA/MOU/"Grab and Go" Packet

Contacts (check as they are completed):

_____ H & S Manager has been notified

_____ Patient's direct supervisor notified

Form is subject to OSHA medical records regulation 1910.1020 Rev 2 - 8/06/08

Form does not replace EPA Accident/Illness/Injury Report Forms

Figure 2.2 "Response to Life-Threatening or Serious Illness/Injury Form" (Pg. 2)

Response to Life-Threatening or Serious Illness/Injury

Patient Name: _____

Rescue Buddy: _____

Chemical being analyzed: _____

Date: _____ Time: _____ Room Number: _____

Other Responders:

_____ _____

_____ _____

_____ _____

DESCRIBE:

Events leading to incident (Patient should describe or concur if she/he is able)

_____

_____

_____

_____

_____

Hazards remaining in the room where the incident occurred

_____

_____

_____

FORM INSTRUCTIONS
• This form should be filled out every time there is a serious/life-threatening first aid response for a lab worker who is working in a laboratory space
• To be filled out by "Buddy" first responder immediately after incident
• Buddy makes 2 copies of this report. i. Original goes to the CHO on the day of the incident. ii. One copy goes to the worker's direct supervisor. iii. Originator (Buddy) keeps a copy for 30 days, then passes that copy to the CHO for disposition.

Form is subject to OSHA medical records regulation 1910.1020 Rev 2 - 8/06/08

Form does not replace EPA Accident/Illness/Injury Report Forms

3. PERSONAL PROTECTIVE EQUIPMENT

The primary FDEP Labs Chemical Hygiene Plan (CHP) contains defined Personal Protective Equipment (PPE) requirements for the FDEP laboratory facility operations. The following subsections describe specific PPE requirements and procedures associated with the laboratory and use areas. It is the responsibility of all laboratory staff and their managers to know and follow these requirements.

The purpose of PPE is to protect employees from the risk of injury by creating a barrier against workplace hazards. Selection and use of work practice controls (engineering, administration and PPE) is critical to ensuring all personnel have proper protection against potential hazards. Engineering controls (e.g., fume hoods) are the preferred means of protecting laboratory employees against hazards, followed by management/administrative policies (e.g., SOPs). When engineering and administrative controls are insufficient for minimizing and controlling hazards or potential exposures, then PPE should be selected and worn. It is never intended that PPE be used as a substitute for proper and effective engineering or administrative controls.

3.1 PPE Requirements and Laboratory Access Levels

Each person entering the laboratory is required to use PPE. Gloves are to be worn at all times while working with any chemicals in the laboratory. All personnel entering the laboratory must be trained on how to use the PPE. This training must be provided to the individual prior to using the assigned PPE or conducting any activities that require PPE. The training must include how to don, doff and maintain the PPE, and what limitations exist on using the PPE. Retraining must be conducted if changes in PPE requirements render initial training obsolete, periodically to maintain competency, or if the employee no longer demonstrates an understanding of the PPE requirements.

The LBC is responsible to ensure that the required PPE training has occurred prior to granting personnel access to the laboratory or work areas. Laboratory escorts assigned to visitors are responsible to provide the training on the use of the required PPE prior to providing the PPE to the visitor.

Four different levels of laboratory access have been established: Visitor, Chemical Agent Operator (Laboratory Worker), Response/Decontamination, and Remediation. Each of these access levels has separate and distinct PPE requirements, as summarized below in Table 3.1.

3.2 Eye and Face Protection

Safety glasses with side shields attached or goggles must be worn in the laboratory at all times. Safety glasses must meet the ANSI Z87.1-2003 standard. Persons who require visual correction to perform laboratory operations or emergency procedures must have eye protection that incorporates their prescription lenses.

Chemical goggles or a face shield must be worn whenever a splash hazard is present, or when an activity requires extra face protection. Splash shields can be requested if required, but should not be used unless it has been determined that they do not adversely affect the laboratory fume hood rating or operation when in place. This determination must be made for the specific hood footprint being used for the activity.

Visitors must be supplied with eye protection prior to entry into the laboratory. The visitor's escort should ensure that protective eyewear is compatible with any corrective eyewear the visitor may be wearing. Visitor safety glasses designed to wear over traditional corrective eyewear are available from the CAHO Office.

3.3 Protective Clothing and Shoes

Proper attire is required in the laboratory areas at all time. Proper attire is defined as shoes acceptable for laboratory work (no open toe or exposed skin along the foot), long pants (skirts may be allowed for visitors if no agent manipulation is occurring) and a shirt.

All personnel will wear footwear appropriate to the types of hazards to which they are exposed (i.e. close toed shoes). Open toe shoes, sandals, bare feet, etc. are prohibited in all laboratory areas.

3.4 Additional PPE

Additional PPE may be required for specific tasks or projects as determined by the hazard analysis. These items may include face shields, respiratory protection, etc. When additional PPE is required, the specific laboratory SOP will state what is required for that activity.

3.5 Ultra Dilute Agent PPE

Two layers of gloves are required when working with UDA reference standards or other materials potentially containing UDA.

When working with the primary UDA concentrations (10.0 mg/L or greater), or materials containing an unknown amount of UDA, an inner nitrile glove (affixed with duct tape to the disposable laboratory coat sleeve) used in conjunction with a second (outer) layer of nitrile gloves allows for five minutes of work. At the end of five minutes, the outer glove should be removed and placed into the appropriate waste container, and a new set of nitrile outer gloves donned.

If additional time is required between changing gloves while working with primary UDA or unknown concentrations, an outer layer of silver-shield gloves may worn over the single pair of nitrile inner gloves for up to four hours of UDA work. Alternately, the silver-shield gloves may be worn as the inner glove (affixed with duct tape to the disposable laboratory coat sleeve), with nitrile gloves worn as the outer glove. This reverse combination still allows for up to four hours of UDA work, and is the preferred arrangement since it allows more flexibility and mobility for the wearer.

For handling more dilute (secondary) solutions, two layers of nitrile gloves are sufficient and need only be changed if contaminated (e.g., a solution spill), torn or otherwise compromised. The inner nitrile glove must be affixed with duct tape to the disposable laboratory coat sleeve to ensure the inner is retained while changing the outer.

The double layer of nitrile gloves and the Silver Shield/nitrile glove ensembles should be changed as soon as practical following any known contact with a solvent or UDA solution. In no case should the authorized wear time be exceeded. Work should be planned with these maximum wear times in mind.

All gloves must be leak-tested before donning by trapping a small amount of air within the glove and squeezing. Discard any gloves that do not hold air.

Disposable Tyvek laboratory coats are available in the UDA laboratory. They must be worn at all times to protect against chemical spills and potential contamination of street clothing while working in the laboratory. Disposable Tyvek laboratory coats should be routinely removed prior to exiting the UDA laboratory, but they are also required to be worn during chemical material transfers to or from the laboratory. Laboratory coats shall not be worn outside of laboratory space (e.g., office areas or conference rooms) at any time.

Duct tape shall be used to secure gloves to the Tyvek laboratory coat sleeves, as this will help protect skin from exposure to the UDA solutions or other chemical materials. The tape must be made to adhere properly to the glove and lab coat sleeve, but care must be taken not to over tighten the tape against the forearm. After going around the glove cuff with the tape at least twice, the end portion of the tape must be folded over to form a "flap" in order to facilitate quick removal.

3.6 Safety Showers and Eyewashes

Safety showers and eyewashes are located within the laboratory areas. It is very important for all staff to stay situationally aware as to where the nearest safety shower and eyewash is located in relation to their present job task and position. Showers and eyewashes are never to be obstructed and must always have a clear path leading to them.

3.7 Fume Hoods

3.7.1 Chemical Fume Hoods

All work involving open containers/vials shall be performed in a chemical fume hood with proper secondary containment in place. Chemical fume hoods prevent vapors from entering the laboratory atmosphere, place a physical barrier between the user and the solution, and provide an effective containment device for accidental chemical spills.

Fume hoods are not intended for storage of chemicals. Temporarily stored chemicals must reside in secondary containment trays and be positioned in such a way as to not block or alter the airflow patterns.

Fume hoods shall all be equipped with containers of prepared decontamination solution. Fume hoods must be equipped with secondary containment spill trays lined with paper absorbent towels to assist in recognition and containment of spillage. Fume hoods have audible and visual alarms to warn of low flow air movement conditions.

3.7.2 Ultra Dilute Agent Fume Hoods

Satisfactory fume hood performance and operations are to be verified before each use (hand held analog magnehelic flow meter must indicate approximately 100 linear feet per minute). All UDA fume hood operations are to be tested and verified by CAHO personnel monthly. Fume hood operational verification is also required immediately after any malfunction is noted, or with significant change in equipment within the hood which could impact air flow. The CAOs are to immediately report to the DSHO or the CAHO Manager any suspected or known fume hood malfunction, and any change in equipment/placement occurring since the last monthly verification that could impact air flow.

At no time during fume hood usage is the face of the CAO to break the plane of the fume hood sash. The sash must be properly positioned below the breathing zone of the user at all times while in use.

Fume hoods in the UDA laboratories are stand alone, constant volume hoods. They are independent from other FDEP LABS manifold variable volume or stand alone constant volume ventilation systems. The fume hood working surface is marked at 20 cm into the laboratory hood opening. This demarcation line acts as a safety zone from which agent materials are not to leave the hood without decontamination. If any sinks or other drains are present in the hood, they must be sealed off prior to use.

3.8 PPE Hazard Assessment

Each new laboratory task or operation requires a hazard assessment be completed prior to commencing the operation to determine the appropriate PPE. For operations involving the use of PPE, the proper use, maintenance, care, decontamination, testing, and disposition of personal protective equipment must be included in the hazard assessment. (See Sections 7.4 and 7.5 Hazard Evaluation and Identification for more information.)

3.9 Forms and Table

Table 3.1 Ultra-Dilute Chemical Warfare Agent PPE Requirements

PPE Requirements for UDA Access Levels				
PPE	**Visitors**	**CAO**	**Staff**	**Maintenance**
- Safety glasses	X	X	X	
- Lab coat	X	X	X	
- Acceptable shoes (no open toe or exposed foot)	X	X	X	X
- Long pants (skirts may be allowed for visitors if no agent manipulation)	X	X	X	X
- Goggles (if splash hazard exists)		X	X	
- Face shield (if splash hazard exists)		X	X	
- Gloves, double nitrile, 5 minute outer glove limit (during primary agent standard manipulation)		X	X	
- Gloves, double nitrile, (change outer glove as needed if compromised due to contamination, tear, etc.)		X	X	
- Gloves (nitrile over silver shield, 4 hour limit)			X	
- Minimized amount of exposed skin	X	X	X	X
- Escape Only Respirators (where applicable)		X	X	

PPE Requirements for UDA Access Levels				
PPE	**Visitors**	**CAO**	**Staff**	**Maintenance**
- Respirators - CBRN Air Purifying Respirators		X	X	
- Respirators - CBRN			X	
-Self-Contained Breathing Apparatus (SCBAs; where applicable)			X	
- Additional levels of skin protection (e.g., Tyvek, poly-coated Tyvek, Saranex, etc.)			X	

Visitor – Someone who does not work with equipment and whose visit to the lab is a one-time event
Maintenance – Maintains the facility (janitorial staff)
Staff – Works in the labs and with the UDAs

FDEP B/LABS UDA LABORATORY GLOVE REQUIREMENTS	
Two Pairs of Nitrile Gloves (when handling primary standards or unknowns)	**5 minute time limit on outer glove**
Two Pairs of Nitrile Gloves (when handling secondary standards)	**Replace outer glove if compromised**
Inner layer of Nitrile gloves and outer layer of silver-shield gloves	**4 hour limit**
Outer layer of Nitrile gloves and inner layer of silver-shield gloves	**4 hour limit**

4. ELECTRICAL SAFETY

Ordinarily, electrical and magnetic power sources are not viewed as hazards in chemical laboratories. But electrical sparks have started many volatile flammable solvent fires and have caused explosions. Also, the lab utilizes and stores chemicals that are corrosive to electrical systems and can thereby negate the fire protection offered by so called explosion-proof motors.

Besides the overt hazards of electrical shock and fire from sparks, there are the deceptive hazards of power outages in chemical laboratories. Refrigerated items that are hazardous to store at room temperature can warm up and become dangerous. The corroded "spark proof" refrigerator motor or the waste heat of refrigeration may then serve to ignite or explode the contents, with the door of the refrigerator acting to hold in the pressure until it flies off. These electrical hazards are unlikely to occur

if every employee takes electrical safety seriously. All it takes is a minor spark to cause a major explosion. Inspect power cords regularly!

5. RESPIRATORY PROTECTION PROGRAM FOR ULTRA DILUTE AGENTS

5.1 Respirator Selection

Air purifying respirators (APR) used in support of the Ultra-Dilute Agent (UDA) program are selected by the CAHO/CHO in accordance with the selection criteria presented in American National Standard Practices for Respiratory Protection, ANSI Z88.2-1980. APRs are chosen from a list of those tested and certified by the National Institute of Occupational Safety and Health (NIOSH) for use in chemical, biological, radiological, and nuclear (CBRN) environments.

The FDEP B/LABS CAHO/CHO has chosen to use the CBRN APR with a full face mask and the CBRN canister for use in emergency situations. Respiratory protection is approved by NIOSH as a unit. Interchanging respiratory protection components from different manufacturers or from different models by the same manufacturer is prohibited.

5.2 Respirator Use

Each laboratory person working with the UDA primary standards or unknowns will be assigned a CBRN APR full face mask.

UDA laboratory personnel are assigned the CBRN respirator primarily for use during minor spill clean-up activities. The CBRN respirator may also be used for escape purposes in the event of a catastrophic event. Self-contained breathing apparatus (SCBA) are available for use by the FDEP B/LABS emergency response team as described in the FDEP B/LABS Chemical Hygiene Plan. Use and maintenance of the SCBAs shall be in accordance with the facility maintenance practices.

5.3 Medical Evaluations, Training, and Fit-Testing

As per the OSHA Respiratory Protection Standard (29CFR1910.134), each person who may potentially wear a respirator must be first medically cleared to wear respiratory protection devices. The respiratory protection medical clearance must be given prior to assignment of the CBRN respirator. Each UDA CAO will receive respiratory protection training. The training will consist of a combination of classroom and hands-on exercises appropriate for the projected use and type of the respiratory protection device assigned. Response and Remediation personnel at the FDEP B/LABS are expected to also maintain Hazardous Waste Operations and Emergency Response (HAZWOPER) training certifications and must participate in annual spill response training events and exercises.

All individuals in the FDEP LABS respiratory protection program must be fit-tested annually in the size, brand and type of respirator assigned or projected for use.

5.4 Respiratory Storage, Maintenance, and Other Requirements

The assigned CBRN APR respirator must be stored within the UDA laboratory, in the dark, and within a sealed plastic bag or container. The respirator must be located in a position to help protect it from incidental damage, yet easily accessible by the CAO during an emergency. The respirator will be inspected by CAOs monthly and after each use to ensure that they are in satisfactory working condition. The CAHO/CHO must be informed of any detected or suspected faults with the respirator.

The respirators must be cleaned by the CAOs after each use, with at least an isopropyl alcohol wipe. Additionally, they shall be cleaned and disinfected periodically by using a mild detergent solution and water. CAO personnel should not place the respirator back into storage until it is clean and completely dry. (See Table 5.1, Respirator Inspection Checklist)

The cartridge life of the CBRN canister is dependent on the type of contaminant, concentration of the contaminant, and the breathing rate of the individual. To determine the actual service life of the CBRN canister, consult with the CAHO/CHO. Each time the mask is doffed, the cartridges are to be replaced.

At the FDEP LABS, CBRN cartridges are to be used one time only (single use only).

The unused CBRN canisters shall be kept in their originally sealed packages until necessary for use; this will help prevent saturation of the canister sorbent materials. Any CBRN canister used during an actual UDA material emergency (spill clean-up, etc.) must be considered contaminated. Contaminated cartridges must be treated like other contaminated PPE and decontaminated prior to disposal. (See Section 13, Chemical Spill Control and Reporting, or Section 14, Hazardous Waste Management for additional information).

5.5 Tables and Forms

All respirators must be inspected before and after each use, or monthly, whichever occurs first. A respirator kept ready for emergency use must be inspected before and after each use and at least monthly, to ensure that it is in satisfactory condition. Use this form to document the inspections.

Table 5.1 Respirator Inspection Checklists

Name: Brand and Type of Respirator:

Date											
Face piece											
Connections											
Headbands											
Valves											
Cartridges											
Other											

Comments:

FDEP LABS CAHO / CHO Annual Review:

6. RADIATION PROTECTION PROGRAM

6.1 Radiation Protection Program Requirements

6.1.1 The Radiation Protection Program

The U.S. Nuclear Regulatory Commission (NRC) has been given the authority by Congress to relinquish certain regulatory responsibilities via a formal agreement with the states that have an existing radiation control program. Currently there are 29 "agreement states." Florida became an agreement state in 1964. The Florida Department of Health (DOH) is the regulatory agency that issues licenses for the use of radioactive materials in this state.

Each agreement state must promulgate a set of regulations that are compatible with Title 10 of the Code of Federal Regulations (10 CFR) under which the NRC operates.

Florida's "Control of Radiation Hazard Regulations", Chapter 64E-5, Florida Administrative Code (FAC), embodies the rules and regulations governing almost all sources of radiation in this state.

DOH issues and inspects the activities conducted under our radioactive materials licenses. A DOH inspection team periodically visits DEP/Chemistry Section to review every phase of the radiation-related activities conducted under our license.

DOH inspectors check for compliance with the following five criteria:

1. Specific conditions written into the license;
2. Written statements made by the licensee in the license application process;
3. "Generally accepted good health physics practices";
4. Recommendations made by DOH that the licensee has agreed to do:
5. And, of course, the rules in chapter 64E-5, FAC.

<u>FDEP/ Chemistry Section Licenses with DOH</u>

Most of our activities are conducted under a general license. The rules require the general license to have a comprehensive radiation safety program, including a Radiation Safety Officer. Individual users of radioactive materials are listed on a general license.

Radioactive material and radiation sources at the Chemistry Laboratory must be used in accordance with rules and regulations contained in the Florida Administrative Code, Chapter 64E-5 Standards for Protection Against Radiation Hazard and under the conditions specified in several radioactive materials licenses issued by the State of Florida Department of Health. The Radiation Safety Officer has developed a radiation safety program in order to assure compliance with the provisions of these documents.

The program is designed to protect the health and safety of the workers and public from potentially harmful effects of radiation through maintaining both external and internal exposures As Low As Reasonably Achievable (ALARA).

The radiation safety manual sets forth the rules and procedures of the safety program. Users must become familiar with regulations in the appropriate sections of the manual. Many of the regulations in the manual are based on the requirements of Chapter 64E-5.

6.1.2 Radiation Safety Officer

A Radiation Safety Officer has the responsibility to implement the radiation protection program. Such a program would include:

1. Authorization of individuals and work areas for use of radioactive materials or radiation producing equipment;
2. Assuring the safe use of radioactive material and radiation producing equipment;
3. Approval of all purchases of radioactive material;
4. Maintaining an inventory of all radioactive material received;
5. Assuring that all required surveys and records are maintained;
6. Certifying the proper disposal of radioactive waste;
7. Monitoring leak testing of sealed radioactive materials;
8. Surveys of radiation producing equipment;
9. Responding to radiation emergencies;
10. Providing training to workers.

6.1.3 Authorization to Use Radioactive Materials and Radiation Devices

Procurement and Receipt of Radioactive Materials

It is the responsibility of the Unit Supervisor to notify the Radiation Safety Officer and the Laboratory Manager when a purchase order number is issued for radioactive material orders. Since purchase order numbers are used in identifying incoming shipments, it is important that the Radiation Safety Officer be informed as soon as possible.

Procurement of Radiation Producing Devices

The Radiation Safety Officer must approve the purchase of any device that produces ionizing or nonionizing radiation; therefore, all requisitions to purchase such equipment (gas chromatography EC detector) shall be submitted to the Radiation Safety Officer.

6.1.4 Radiation Caution Signs, Notices, and Posters

The Radiation Safety Officer is responsible for posting of proper radiation warning signs in all areas in which ionizing radiation are used.

The following must be posted where radioisotope are used:

Emergency Notification	Notice to Employees
Emergency Procedures	Safety Rules

All radiation labels on empty shipping containers must be removed or defaced prior to disposing of the container in regular trash.

6.1.5 Sealed Source Leak Tests

All Gas Chromatography with ECD shall be leak tested at intervals not to exceed six months. Individuals who are authorized by the license shall do leak tests and the test samples are sent to National Leak Test Center, NLTC Industries, Inc., P.O. Box 486, N., Tonawanda, NY 14120.

A licensee shall retain leak test records for 3 years. The record shall contain the manufacturer, the model and serial numbers of each sealed source tested, the identity of each sealed source radionuclide and its estimated activity, the measured activity of each test sample expressed in microcuries, the date of the test and the signature of the radiation safety officer or designee.

If the leak test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall:

1. Immediately withdraw the sealed source from use and repair or dispose of in accordance with these regulations; and

2. File a report with the DOH within 5 days of receiving the leak test result describing the equipment involved, the test results, and the action taken.

6.1.6 Radiation Control Member

Listed below are names of the current and past Radiation Safety Officers:

Nhon Vo	Radiation Safety Officer	850-245-8137
Liang Lin		850-245-8088
Marek Topolski		850-245-8132

6.1.7 Office of Radiation Control

If there are any changes in the licensee, notification should be addressed to

Department of Health
Office of Radiation Control
Radioactive Materials Program
4052 Bald Cypress Way BIN #C21
Tallahassee, FL 32399-1741
Phone: 850-245-4545

The Department of Health should be notified by mail within 30 working days.

6.1.8 Inventory Requirements

The Radiation Safety Officer shall conduct a physical inventory of all sealed sources semiannually unless another interval is specified in the license. Inventory records shall be retained for 3 years. Inventory records shall contain the following:

a. The model number and serial number of each sealed source;
b. The identity of each sealed source radionuclide and its estimated activity;
c. The location of each sealed source;
d. The date of the inventory;
e. A signature of the radiation safety officer.

6.2 Monitoring (Dosimetry)

Personnel are included in the FDEP LABS radiological monitoring program, as described above. This includes CAO personnel potentially engaged in internal chemical-related emergency response activities, or sample custodian personnel at the FDEP LABS, who perform the required radiological screening on in-coming unknown samples.

Figure 6.1 FDEP LABS Radiation Action Levels

FDEP LABS personnel enrolled in the radiological monitoring program are issued a radiation monitoring badge, also known as a thermoluminescent dosimeter (TLD). The assigned TLD badge must be worn at all times in the FDEP LABS facility, as well as when conducting activities in the field.

The TLD badges are sent every quarter for analysis to a qualified laboratory or an FDEP approved contract laboratory. The Dosimetry control TLDs and the extra TLDs are kept by the FDEP LABS Radiation Safety Officer (RSO). The RSO evaluates all radiological exposure data, provides radiological data and information to the individual employee, and maintains radiological records at the FDEP B/LABS.

6.3 Radiological Action Levels

Although the NRC/OSHA regulatory annual radiation exposure limit is 5.0 REM/year, for FDEP B/LABS personnel a whole body exposure of only 500 mREM (0.5 REM) per year is permitted. If any dosimetry TLD badge indicates an exposure value of equal to or greater than 50 mREM (0.05 REM) per quarter, an RSO/CAHO Manager investigation will occur.

Laboratory personnel in the radiological monitoring program are required to disclose any inadvertent dosimeter or personal exposures to ionizing radiation. This may include inadvertent dosimeter exposures received by wearing the TLD while receiving medical or dental x-rays, or while traveling by air on non-official governmental activities.

If a woman suspects or knows she is pregnant, she must declare in writing to the FDEP LABS RSO that she is pregnant. At that time, if she chooses, she may be reassigned to duties at the FDEP LABS that do not involve work with radiological materials.

The maximum permissible exposure given on the following page are specified by Federal regulations as set forth in the Code of Federal Regulations, Title X, Part 20, "Standards for Protection Against Ionizing Radiation," and by the Florida Department of Health, "Control of Radiation Hazard Regulations", Chapter 64E-5 (as amended July, 1997). Since any radiation exposure is undesirable, it is important that all exposures be kept as low as possible.

A. Maximum Permissible Occupational or Restricted Area Exposure:

1. Whole body; head and trunk; active blood forming organs; lens of eyes; or gonads.....	1.250 Rems per calendar quarter
2. Hands and forearms; feet and ankles	18.750 Rems per calendar quarter
3. Skin of whole body	7.500 Rems per calendar quarter

B. Maximum Permissible Non-Occupational or Unrestricted Area Exposure and Maximum Permissible Exposure to Minors and Women Who Have Declared Pregnancy.

1. Whole body; head and trunk: active blood forming organs; lens of eyes; or gonads	0.125 Rems per calendar quarter
2. Hands and forearms; feet and ankles	1.875 Rems per calendar quarter
3. Skin of whole body	0.750 Rems per/cal. Qtr.

FDEP LABS Radiation Action Levels

- Less than twice gamma background levels – assume no radiation hazard is present.
- Greater than 3-5 times background levels, but less than 1mR/hr on contact – there is probably radioactive material present, which could present a disposal problem, but no immediate danger from external gamma radiation. Consult with the FDEP B/LABS RSO before disturbing or sampling the radioactive material. The source type of radiation (alpha, beta, or gamma) and origin should be determined prior to further handling.
- Above 1mR/hr but less than 5 mREM/hr on contact – there is the potential for a radiation hazard. Consult with the FDEP B/LABS RSO before disturbing, unpacking, or sampling the radioactive material. Isolate the material by placing it in a remote area, and handle it as little as possible.
- Material above 5 mREM/hr on contact – there is a radiation hazard present. Pull back from the contaminated area and establish a "hot line" where the area gamma measurements are 2-3mR/hr. This establishes a formal radiation area, and should be posted as such. No personnel should enter this radiation area without the RSO's supervision, badging, and other specific radiation protection measures.
- The above guidelines do not apply to alpha emitters. Contact the FDEP B/LABS RSO for more information if you are working with or have questions about materials that emit alpha particles.

6.4 Contamination

If radiological contamination is discovered in a work area or detected from in-coming unknown samples, access to that area must be immediately restricted. The FDEP LABS RSO must be immediately notified, and may direct that signs be posted to further restrict access to any equipment or area that may be potentially contaminated. A full investigation must be performed by the responsible parties at the local (FDEP LABS RSO, LBC and/or CAOs) and regional levels (Regional RSO). This investigation must be completed prior to the areas being reopened for use by any FDEP B/LABS personnel. Since the FDEP LABS maintains an NRC License, the NRC must be notified (in writing) of the incident within 30 days of the date of the incident.

7. OCCUPATIONAL SAFETY AND HEALTH PROGRAM

The primary FDEP LABS Chemical Hygiene Plan (CHP) contains defined Occupational Safety and Health Program requirements for the FDEP LABS laboratory facility operations. It is the responsibility of each laboratory worker and their managers to know and follow these requirements.

7.1 FDEP Occupational Safety and Health Program Elements

The objectives of the Occupational Health Program are to:

a) Assure that all FDEP personnel are physically and mentally suited to their assigned positions and those physical and mental healths are monitored in selected personnel to detect early deviations from the norm.

b) Protect FDEP personnel against adverse effects of health hazards in the work environment, to include field activities and industrial workplaces.

c) Assure proper medical care and rehabilitation of the occupationally ill and injured.

d) Reduce economic loss caused by compensation claims due to illness, physical impairment and injury of FDEP personnel.

e) Prevent performance degradation caused by occupational illness and injury of FDEP personnel, thereby enhancing productivity.

The Occupational Safety and Health (OSH) program promotes health and reduces risk of illness arising from the individual's work environment. This encompasses special preventive measures for personnel who are exposed or potentially exposed to toxic materials, infectious agents, or other health hazards in the work environment.

The OSH program is comprised of clinical and preventive services. As a minimum, the OSH Program should include the following elements:

1) An inventory of chemical, biological and physical hazards in the work environment of Bureau of Laboratory facilities.

2) Job-related medical surveillance.

3) Administrative medical exams.

4) Employee education about job-related health hazards.

5) Treatment of occupational illness and injury.

6) Emergency treatment of non-occupational illness and injury.

7) Hearing conservation.

8) Occupational vision.

9) Job-related immunizations.

10) Illness absence monitoring.

11) Chronic disease surveillance.

12) Epidemiologic investigations of occupational illness and injury.

13) Maintenance of OSH medical and administrative records and reports.

14) Industrial hygiene surveys and health inspections.

Occupational Safety and Health (OSH) is an essential element of the FDEP Occupational Safety and Health Program. This section prescribes the manner in which all phases of the FDEP LABS level program are established as an integral part of the FDEP program. The FDEP LABS facility OSH program responsibilities are:

1. Surveying FDEP LABS facility operations, reporting any imminent danger situations, making recommendations for controlling health hazards, and follow-up of those recommendations.

2. Establishing a mechanism for inclusion of recognized and documented occupational health hazards into recommended hazard abatement plans.

3. Assigning Risk Assessment Codes (RACs) to recognized and documented hazards to ensure timely response to OSH recommendations and prioritization of hazard abatement plans.

7.2 Medical Surveillance and Screening

Medical screening is used to identify previously unrecognized disease of an occupational origin in individuals. Screening tests are used to identify disease in apparently well persons who unknowingly have an illness and may otherwise be asymptomatic.

An exposure-based medical surveillance program will be used to maintain employee health by identifying exposures to health hazards in the workplace in conjunction with early detection of any adverse health effects among individuals.

The elements of the medical surveillance program are:

1) Position Description and Duties

The surveillance program is based on a comprehensive evaluation of the FDEP's workforce, work sites and job duties. Wherever possible, employees are divided into homogeneous exposure groups. The workplace hazards associated with each group will be identified by industrial hygiene surveys.

2) Exposure Assessment Strategy

a. To establish potential health risks faced by each worker.

b. To distinguish between acceptable and unacceptable exposures and to control unacceptable exposures.

c. To document a worker's history of exposures.

d. To demonstrate compliance with FDEP and other exposure guidelines.

e. To educate workers on the risks associated with their work environment and how to prevent these risks.

f. To manage the medical surveillance program in an efficient and cost-effective manner.

3) Medical Evaluation Guidelines

a. Initial entry into the medical surveillance program will be dependent upon the job category to which the employee is assigned. Occupational exposures will be determined for each job category to characterize the types of health hazards encountered in that particular job and the degree of exposures. Entry of personnel in other job categories not normally included, or re-entry of excluded personnel may be required if exposure monitoring determines that additional exposures exist or the degree of exposure has reached the "action level" (50% of the exposure limit). The lowest possible exposure limit will be used to determine the action level. An exposure limit may be an OSHA permissible exposure level (PEL), a NIOSH recommended exposure limit (REL) or an American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV).

b. Medical Surveillance consists of a baseline evaluation, periodic assessments, an exit evaluation, special exams dictated by the hazardous activity, and laboratory tests. Laboratory tests may include blood and urine tests, x-rays, electrocardiograms, audiograms, vision acuity tests and pulmonary function tests as deemed necessary by the physician.

4) Medical Documentation

Procedures for documentation of services are developed to ensure a high quality of service, worker confidentiality, education, acceptance, and regulatory requirements.

5) Data management

To create a surveillance program that can be used for health planning, cost-benefit analyses and epidemiologic tracking, several datasets must be combined into one comprehensive database. These sets include employee characteristics, workplace health hazard inventories, air monitoring results, and medical and surveillance/screening data.

6) Surveillance outcome

Outcomes to surveillance/screening are defined as:

a. The employee is medically qualified for work.

b. The employee is medically qualified with certain restrictions.

c. The employee is recommended to receive further medical evaluation.

d. The employee is not medically qualified to perform the job.

Medical personnel cannot recommend termination of employment; health care providers can only recommend medical restrictions. The employer is responsible for all human resource issues and decisions.

7) Confidentiality

Confidentiality of the information provided by the worker to the health care provider is a major concern of workers. Individual test results should only be seen by the health care provider and the employee. Surveillance information should not be used for "fitness of duty" or disability retirement exams. It is important to incorporate medical information obtained from a surveillance, wellness, or acute care program into one medical record.

8) Program evaluation/quality review

Ongoing program evaluations are an essential element in this surveillance program. Identification and correction of any problem areas are critical to the operation and success of a quality medical surveillance program.

7.3 FDEP LABS Chemical Hygiene (Safety) Committee

The FDEP LABS Chemical Hygiene (Safety) Committee normally meets at least quarterly and is composed of the:

- Laboratory Safety Officer
- Chemical Agent Hygiene Officer (CAHO)
- Agent Manager (AM)
- A representative from the Chemical Agent Operators (CAO)
- Laboratory Manager
- Laboratory Technician

Contact your supervisor, or the FDEP LABS CAHO Manager to determine who the current organizational representatives are.

7.4 Hazard Identification

An inventory of occupational safety and health hazards is maintained at the FDEP LABS. The inventory process is used to recognize occupational health hazards prior to their evaluation and control, as well as to rank and prioritize recognized hazards for risk reduction purposes.

This inventory will be reviewed, audited, and updated periodically as necessary. It will include all potentially hazardous workplace operations and areas. Information derived from safety committee meetings, audits, monitoring and other feedback and evaluation activities will be used to supplement and update the hazard inventory.

7.5 Hazard Evaluations, Risk Determination, and Ranking

Potential OSH hazards recognized and identified during the hazard identification and inventory process will require evaluation to determine the degree of hazard severity. Air sampling for airborne contaminants and ventilation flow rate measurements are common examples of techniques used for evaluation.

All operations, exposures, and deficient control measures that create a potential for adverse health effects will be assigned an RAC by the FDEP/LABS CAHO Manager or delegated personnel. RACs are used to assign a priority for scheduling and funding of corrective actions at all levels and will reflect a comprehensive evaluation. Tables for determining FDEP facility RACs are included below.

Table 7.1 Hazard Gravity Categories

Description	Category	Definition
CATASTROPHIC	1	Death, loss of plant, production line loss, or severe environmental damage.
CRITICAL	2	Severe injury, severe occupational illness, major line or environmental damage.
MARGINAL	3	Minor injury, minor occupational illness, or minor line or environmental damage.
NEGLIGIBLE	4	Less than minor injury, occupational illness, or less than minor line or environmental damage.

Table 7.2 Hazard Probability Levels

Description	Level	Definition
FREQUENT	A	Likely to occur frequently
PROBABLE	B	Will occur several times in the life of the production line.
OCCASIONAL	C	Likely to occur sometime in the life of the production line.
REMOTE	D	Unlikely but possible to occur in the life of the production line.
IMPROBABLE	E	So unlikely, it can be assumed occurrence may not be experienced

Table 7.3 Risk Prioritization Table

Hazard Category Frequency	Catastrophic	Critical	Marginal	Negligible
A FREQUENT ($X > 10^{-1}$)	1A	2A	3A	4A
B PROBABLE ($10^{-1} > X > 10^{-2}$)	1B	2B	3B	4B
C OCCASIONAL ($10^{-2} > X > 10^{-3}$)	1C	2C	3C	4C
D REMOTE ($10^{-3} > X > 10^{-6}$)	1D	2D	3D	4D
E IMPROBABLE ($10^{-6} > X$)	1E	2E	3E	4E

Table 7.4 Hazard Risk Decision-Making

HAZARD RISK INDEX	DECISION-MAKING CRITERIA
1A, 1B, 1C, 2A, 2B, 3A	Unacceptable; Stop operations, notify the FDEP LABS CAHO Manager and rectify immediately.
1D, 2C, 2D, 3B, 3C	Undesirable; FDEP LABS CAHO Manager must review and approve decision to accept risk and proceed with activity.
1E, 2E, 3D, 3E, 4A, 4B, 4C, 4D, 4E	Acceptable after review and approval by FDEP B/LABS CAHO Manager.

7.6 Exposure Assessment / Environmental Monitoring

An essential part of determining the OSH risks and severity at the FDEP LABS is determining, as close as possible, the actual chemical, physical, and biological agent exposures to the FDEP LABS personnel and within the FDEP LABS facility. This necessitates area and personal air monitoring as well as regular evaluations of engineering controls that are in place, such as fume hoods and biological safety cabinets (BSCs). This monitoring will focus on the reagents and products of the analytical processes in use at the FDEP LABS.

All area exposure data will be made available to all FDEP LABS personnel, and all personal exposure monitoring will be made available to the monitored individual.

7.7 Hazard Control

7.7.1 Hazard Abatement Plan

Once hazards have been identified and ranked, a hazard abatement plan and schedule should be developed, in coordination with the responsible supervisory and facilities management personnel.

7.7.2 Worker Education and Training

A program of education and orientation is necessary to insure that FDEP LABS personnel are specifically informed about potential hazards, preventive measures, emergency procedures, and proper operation of equipment. This is accomplished through:

1. Initial Occupant Emergency Training provided to all new personnel and contractors.
2. Initial CAHO training for laboratory and field personnel.
3. Annual CAHO refresher training for laboratory and field personnel.
4. Additional specific/advanced training as necessary.

7.7.3 Industrial Hygiene Program Evaluations

Annual program self-evaluations are conducted by the FDEP LABS CAHO Manager and/or designated representatives, to ensure that program objectives and goals are being met, and to update any necessary changes to the program.

Formal program evaluations are conducted periodically by FDEP Bureau of Laboratories staff. The evaluations are an in-depth review of the FDEP LABS OSH program. The purpose of the evaluation is to define the technical and program needs, and the information gathered may be used to:

1. Illustrate industrial hygiene (IH) program support.

2. Update CAHO support service requirements.

3. Conduct onsite and problem solving consultations with FDEP LABS staff and management concerning identified program improvements.

4. Determine the effectiveness and completeness of the FDEP LABS OSH program.

7.8 Reporting and Record Keeping

Injuries, accidents or illnesses that occur in the workplace, or as result of the workplace, must be recorded in compliance with 29 CFR 1904, Recording and Reporting Occupational Injuries and Illness and the laboratory's Worker's Comp Provider. Each employer is required to keep records of fatalities, injuries, and illnesses that are qualified work-related incidents. Generally, the qualifications for a recordable case are that it must be a new case and meet one or more of the recording criteria:

- Death
- Time away from work
- Restricted work activities or transfer to another job due to injury or illness
- Medical treatment beyond first aid
- Loss of consciousness
- A significant injury or illness diagnosed by a physician or other licensed health care professional.

The FDEP LABS is required to complete an injury/illness log (i.e., OSHA 300 Log or equivalent) and post a summary of the log (i.e., OSHA 300A or equivalent) annually. The summary information required on the OSHA 300A or equivalent are the calendar year covered, the company's name (FDEP), establishment name (FDEP B/LABS), establishment address (2600 Blair Stone Road, Tallahassee Florida 32399-2600), annual average number of employees covered by the OSHA 300 Log, and the total hours worked by all employees covered by the OSHA 300 Log. A copy of the annual summary must be posted in each establishment in a conspicuous place where notices to employees are customarily posted ensuring that the posted annual summary is not altered, defaced or covered by other material. The summary must be posted no later than February 1 of the year following the year covered by the records and kept in place until April 30.

Should you have any questions regarding the Occupational Safety and Health Program, hazards and risks at the FDEP LABS, or any applicability to your plans or activities, contact the CHO/FDEP LABS CAHO Manager.

The FDEP LABS has approximately 100 employees who perform a variety of tasks including facility inspections and laboratory analytical procedures that involve possible exposure to harmful materials. The facility is located at 2600 Blair Stone Road, Tallahassee Florida 32399-2600. An occupational medical monitoring program is established to protect and monitor the health of those employees from exposures to a wide range of hazards.

In general, the technical portion of the FDEP LABS Medical Monitoring program consists of the following elements:

- *Participant Selection*. Enrollment for employees engaging in laboratory (or field) activities less than 30 days per year is based on evaluating risk assessment and exposure data for routine or periodic exposure to hazardous chemical, radiological, biological or physical hazards. Employees engaging in laboratory (or field) activities more than 30 days per year are required to participate. Position descriptions and the prior experience of supervisors, employees, and/or the Safety and Health Manager can be used to provide job specific hazard/exposure profiles.

- *Exposure Evaluations.* Industrial hygiene surveys and periodic work site monitoring are critical in completing quantitative risk assessments.

- *Medical Surveillance Evaluations*. The types of medical evaluations include baseline examinations (complete physicals) for new employees, periodic examinations, exit exams, and special medical examinations.

7.9 Medical Surveillance Programs

FDEP LABS lab employees must be considered for enrollment in the FDEP LABS Medical Surveillance Programs, and the personnel handling of certain samples may have specific additional medical exams.

In general, the program consists of the following:

1. Baseline examinations (complete physicals) for new employees.

2. Periodic examinations every 2 or 3 years, depending on the position, consisting of an interim medical and occupational history review, a job-specific screening physical when required by abnormal findings, basic blood and urine laboratory tests and a physician's evaluation. Additional procedures and tests will be included as warranted by exposure to specific hazards or occurrence of specific individual medical events.

3. Termination examinations (identical to baseline physical) for employees ending their employment with the FDEP.

4. Interim examinations following acute exposure to hazardous materials to evaluate any health effects (e.g., symptoms of clinical infection or allergic symptoms).

5. Necessary immunizations for protection of employee health.

Each laboratory or field employee supervisor is responsible for nominating the members of their staff who are in need of enrollment into the FDEP LABS medical monitoring programs. Supervisors are also responsible for making recommendations to modify an employee's job tasks or job assignment based on changes in an employee's health status. The FDEP LABS CAHO Manager will verify these nominations and recommendations.

Contractor personnel working at the FDEP LABS should be enrolled in their employer's medical surveillance programs, as necessary. These employers may contact the FDEP LABS CAHO Manager to obtain specific information regarding the hazards and activities at the FDEP LABS. It is the responsibility of the employer and the employee to notify the CAHO Manager regarding any medical conditions that could be adversely affected by activities and substances at the FDEP LABS.

Appointments will be established for each patient to minimize waiting. All examinations except blood and urine should be accomplished during one office visit. Blood and urine analysis should be available to the physician before the hands-on examination, in order to provide more complete medical data to the physician.

Physicians are reminded that the purpose of the hands-on physical examination is to closely examine the patient for possible exposure to laboratory chemicals and biologicals (for chemists and biologists) and exposure to hazardous waste (for inspectors). The examination must be detailed and include close inspection of the eyes, ears, nose, throat and skin for chemical or physical and any other part of the body that may have been affected.

Personnel in need of one of the above medical exams may contact the FDEP LABS CAHO Manager to obtain the necessary forms and instructions on how to arrange a medical exam. For regular periodic exams, personnel will receive notification as to when a new exam is needed.

7.9.1 Medical Examination Requirements

The requirements for each kind of examination are described below.

1. Baseline exams conducted by a physician for new employees will consist of at least:

- A complete medical history. A medical history is to be completed by the employee. The physician may require additional information.
- Physical examination by a physician.
- Visual acuity examination.
- Pulmonary function examination.
- Electrocardiogram.
- Complete blood count.
- Micro urinalysis.
- Blood chemistry (See Table 7.5).

2. Periodic examinations will consist of at least:

- Interval medical history.
- Physical examination by a physician.
- Visual acuity examination.
- Pulmonary function examination.
- Complete blood count.
- Micro urinalysis.
- Blood chemistry.

3. Termination examinations for departing employees will consist of all items required for baseline examinations.

4. Unscheduled examinations following acute exposure to hazardous materials will include, at a minimum, a complete medical history and a physical examination by a physician.

7.9.2 Specific Tests to Be Performed

Pulmonary Function: Forced Expiratory Volume timed for one second (FEV1) / Forced Vital Capacity (FVC). Ratio of FEV1/FVC.

Serological Tests: As necessary

Special tests, if required by:

- Anticipated possible exposure to specific hazards (e.g., asbestos) during course of employment.

- Indications from medical or occupational history or as recommended by physician.
- Acute exposure to hazardous materials.

Others, including chest x-ray and electrocardiogram, as recommended by physician after examination and review of medical history.

Table 7.5 Possible Medical Serological Tests (exact tests scheduled are based on the current medical monitoring contract)

7.9.3

Blood Count	Urinalysis	Blood Chemistry	Special
Red cell count	Specific gravity	Glucose	Cholinesterase
Red cell indices (MCV, MCH, MCHC)	(micro) pH	Blood urea nitrogen	Methemoglobin
	Microscopic examination	Creatinine	Heavy metal screen (As, Cd, Cr, Hg, Pb)
Hemoglobin and hematocrit	Protein-albumin	Sodium	Urine and sputum cytology
	Glucose	Potassium	
Reticulocyte count	Ketones	Chloride	Polychlorinated Biphenyl (PCB)
Platelet count	Occult blood	Uric acid	
White cell count	Bile (Optional)	Calcium	
Blood differential		Iron	
		Phosphorus	
		Cholesterol	
		Triglycerides	
		Total protein	
		Albumin	
		Globulin	
		A/G ratio	
		Alkaline phosphates	
		Lactic dehydrogenase (LDH)	
		Total bilirubin	
		Serum glutamic oxalacetic transaminase (SGOT)	

Requirements of Medical Personnel

The examining physician must be a licensed medical physician with experience in the field of Occupational Medicine and Industrial Health or a board certified Internist/Family Practitioner, and must be capable of assessing the work-relatedness of an abnormal finding.

Laboratory tests must be performed by a clinical laboratory that is licensed by the FDOH, participates in one or more proficiency testing programs, and maintains rigorous quality control. Laboratory personnel must be certified by the FDOH.

Blood and urine are collected during the physician office's visit. If biological samples need to be collected first, a physician's order will be required.

7.9.4 Reporting Requirements

Evaluation and interpretation of tests results will be performed by appropriate, qualified personnel (e.g., chest x-ray will be interpreted by a board certified radiologist or certified "B Reader").

Each FDEP employee will be provided with a personalized report of findings and test results which document work-related findings plus any other medically significant findings of a non-work relationship which should be brought to the attention of the employee's personal physician by the employee. This report along with a copy of the laboratory report will be given to the employee within two weeks of the examination. The significance of abnormal findings will be fully explained by the physician.

Life-threatening medical conditions that are not work related will be reported directly and immediately to the employee's personal physician.

The FDEP's contracted medical monitoring physician will provide the FDEP CAHO Manager and the FDEP LABS CAHO Manager with a summary of the number of examinations given, the names of employees examined, and a copy of each employee's Fitness for Duty form signed and dated by the attending physician. For each employee, the contractor will indicate the kind of examination and any special tests performed. An abnormal finding for which the cause is work related must be reported to the FDEP B/LABS CAHO Manager by phone immediately and in writing within two weeks of the exam.

The medical monitoring requirements for each employee will be transmitted to the examining physician at the time of appointment scheduling. It will indicate the kind of examination required and special tests known to be applicable. Additional tests may be performed on the physician's recommendation with the verbal approval of the Facility or FDEP CAHO Manager.

7.9.5 Record Keeping

The medical records will be maintained in a classified data handling system administered by the FDEP's contracted medical monitoring physician in such a way as to ensure confidentiality. Only the FDEP employee, Occupational Medical Officer, Occupational Physician, contractor physician and their medical staff shall have access to the results of the medical examinations. Copies of all records will be sent to the FDEP Medical Officer, Occupational Health & Safety Staff in Tallahassee, FL. The FDEP CAHO Manager in Tallahassee maintains copies of the medical clearance statements. If restrictions are listed on the medical clearance statement, copies are then provided to the employee's supervisor and the Human Resources Branch.

7.9.6 Confidentiality

Confidentiality of the information provided by the worker to the health care provider is a major concern. Individual test results are only seen by the health care provider and the employee. Surveillance information should not be used for "fitness of duty" or disability retirement exams. It is important to incorporate medical information obtained from a surveillance, wellness or acute care program into one medical record. The FDEP LABS CAHO Manager will only receive a copy of the completed medical clearance statement sheet.

7.10 Hearing Conservation Measures

Evidence is well established that worker exposure to noise of sufficient intensity and duration can result in hearing damage. Noise-induced hearing loss rarely results from just one exposure; it can progress unnoticed over a period of years. In many instances hearing loss can be permanent.

Exposure to noise may also cause other undesirable physiological reactions, including a rise in blood pressure, increased heart rate, breathing changes, abnormal hormone secretions, nervousness and irritability.

FDEP LABS personnel or researchers working in and around shop areas may be exposed to harmful levels of noise during the course of their work.

As such, this Hearing Conservation Measures has been developed to use engineering and administrative controls and education in order to reduce or prevent exposure to hazardous levels of noise in the workplace.

Hearing Conservation Measures have been established for FDEP LABS employees in accordance with the Occupational Safety and Health Administration Occupational Noise Exposure Standard (29 CFR 1910.95)

7.10.1 Hearing Conservation Policy

It is the policy of the FDEP LABS to provide employees with a safe and healthful working environment. This is accomplished by utilizing facilities and equipment that have all feasible safeguards incorporated into their design. When effective engineering controls are not feasible, or when they are being initiated, administrative controls will be used when and where possible followed by the use of personal protective equipment.

The primary goal of this program is to reduce, and eventually eliminate hearing loss due to workplace noise exposures. The program includes the following elements:

a. Identification of work environments to determine levels of hazardous noise and personnel at risk to noise exposures that exceed an 8-hour time-weighted average (TWA) of 85 decibels on an A-weighted scale (dBA).

b. Environments that contain equipment that produces potentially hazardous noise should, wherever it is technologically and economically feasible, be modified to reduce the noise level to acceptable levels.

c. Where engineering controls are not feasible, administrative controls and/or hearing protective devices will be employed.

OSHA requirements dictate that whenever employee noise exposures equal or exceed an 8-hour time-weighted average (TWA) of 85 dBA (slow response), a continuing effective hearing conservation program shall be instituted.

The FDEP LABS CAHO Manager is aware that excessive noise exposure is a potential cause of hearing loss and is establishing a hearing conservation program that is more conservative than that required by OSHA. As such, all employees who work in areas that exceed 80 dBA over an 8-hr TWA will be enrolled in the FDEP LABS Occupational Medical Surveillance Program in order to have baseline and annual audiograms (hearing tests) as appropriate. Feasible administrative or engineering controls will be instituted when the sound levels exceed 80 dBA (slow response). When these controls fail to reduce the sound levels to within those listed above, hearing protection will be provided and used to reduce the sound levels to an acceptable level. In addition, double hearing protection should be worn at all times in areas where noise levels exceed 104 dBA (slow response).

7.10.2 Background

Education is vital to the overall success of hearing conservation. An understanding by employees of the permanent nature of noise-induced hearing loss, the FDEP LABS Hearing Conservation Program, and the employee's responsibilities under the program are all essential for program effectiveness.

Sound level is measured in decibels, (dB), and the frequency of sound, or pitch, is measured in hertz (Hz). The human ear can hear sounds in the range of 0 to 140 dB, in a range of frequencies from 20 to 20,000 Hz. Sound levels ranging from 0 to 70 dB offer no cause for concern, and are not considered hazardous. Sound levels ranging from 70 to 79 dB may be considered a nuisance (levels generated by air conditioning equipment, chemical fume hoods, and copier machines), but are not harmful. At levels between 80 to 135 dB hearing protection is recommended or even required. The threshold of pain for many people begins at 140 dB. Table 7.6 below lists common sources of noise and their levels.

Table 7.6 Noise Levels in dB

Saturn Rocket	194	Noisy Environment	80
Turbojet	150	Fume Hoods	65
Threshold of Pain	140	Conversational Speech	60
Punch Press	110	Private Speech	50
Factory	90	Whisper	20

Noise can cause damage in two ways, either by acoustic trauma (hearing loss due to sudden intense auditory trauma such as an explosion) or by sensory-neural loss (the damage to the hair cells of the inner ear due to prolonged and continuous exposure to noise levels greater than 85 dB).

7.10.3 Responsibilities

FDEP LABS Safety Officer: is responsible for developing, implementing, and administering the FDEP LABS Hearing Conservation monitoring for FDEP LABS personnel. Additional responsibilities include:

a. Based on sound survey and personal monitoring data, the FDEP LABS CAHO Manager, in cooperation with the FDEP's contracted medical monitoring physician, will establish an audiometric program wherever employees are exposed to 80 dB or above at no cost to the employee. In accordance with FDEP CAHO guidelines, a technician, audiologist, or

physician who is certified by the Counsel of Accreditation in Occupational Hearing Conservation shall perform all examinations.

b. Identification of work areas and equipment within FDEP LABS facilities where noise levels equal or exceed 80 dB.
c. Identification, through personnel monitoring, of FDEP LABS employees whose noise exposure level equals or exceeds an 8-hour TWA of 80 dB. Annual monitoring of identified at-risk employees.
d. Resurvey of work areas and equipment where noise levels exceed 80 dB every two years.
e. Training of employees in the need for, proper use, and care of hearing protection devices.
f. Retention of all training records.
g. Identification of noise control measures (including engineering and administrative controls) and recommendations.
h. In work locations where, either through administrative or engineering controls, noise levels are found to have fallen such that the employee's 8-hour TWA is below 80 dB, the FDEP LABS Safety Officer shall notify the FDEP's contracted medical monitoring physician and the employee's Supervisor, by memo, that the employees working in that area may no longer be required to be enrolled in the Hearing Conservation Program. Determination to remove individuals will be made with an audiologist or physician trained in occupational hearing loss.

Supervisors: It is the responsibility of Supervisors to ensure the health and safety of their employees, as stated in 29 CFR 1960. As such, Supervisors at the FDEP LABS are responsible for the following:

a. Notifying the FDEP LABS CAHO Manager of noise complaints or potential noise hazards, and maintaining a list of areas or operations under their control deemed as noise hazard areas or operations.
b. Enforcing the use of engineering and administrative controls in designated noise hazardous areas, where applicable.
c. Ensuring that employees are provided hearing protection when required.
d. Ensuring that employees properly use and care for hearing protection devices when required.
e. Ensuring that identified noise hazard areas are labeled appropriately (areas with sound levels at or greater than 80 dB).
f. Notifying the FDEP LABS CAHO Manager of processes, materials, or equipment changes that may alter noise exposures.
g. Maintaining a list of potentially overexposed employees and ensuring that these employees are provided with a baseline audiometric hearing test prior to their initial work assignment and annually thereafter.

h. Ensuring that employees are properly trained in accordance with FDEP and FDEP LABS policy and are aware of all noise hazard areas or operations in their assigned workplace.
i. Providing employees and visitors with the proper hearing protection.

Employees: Employees are responsible for the following:

a. Implementing safe work practices to reduce or eliminate exposure to noise hazards while performing their assigned duties.
b. Wearing and maintaining hearing protective devices as instructed.
c. Participating in the audiometric testing program as appropriate, including attending required training sessions.
d. Notifying their supervisor prior to starting any activity in which they feel they aren't properly protected or trained for, or any time they feel unqualified to perform a particular task.
e. Reporting hazard noise levels that they have encountered while performing their official duties.

Contractors: are responsible for the same items as employees, as required by their employer.

7.10.4 Noise Evaluation and Surveillance Procedures

Identification of Hazardous Noise Areas:

The FDEP LABS CAHO Manager will identify work areas within the FDEP B/LABS facilities where noise levels equal or exceed 80 dB. Records shall be maintained by the FDEP LABS CAHO Manager and updated approximately every two years to determine if any alteration in noise levels has occurred. Those areas where the noise levels are below 80 dB will not be routinely monitored. Identification of hazardous noise areas and equipment and any subsequent noise monitoring will be conducted.

Signs will be posted at the entrance to any work area where noise levels exceed 84 dB, requiring anyone entering the area to wear proper hearing protection. Personnel who work in these areas shall have hearing protection supplied to them, shall be instructed in its proper use, and be required to wear this equipment when in these identified areas. It is the responsibility of the area supervisor to ensure that these precautions are maintained. Portable or hand held equipment that produces noise levels greater than 84 dB, or 140 dB peak sound pressure levels shall also be appropriately labeled.

Noise Measurements and Exposure Assessments

In order to effectively control noise it is necessary that the noise be accurately measured according to standard procedures and that the measurements be properly evaluated against accepted criteria. All noise monitoring will be conducted in accordance with established standard operating procedures.

The monitoring of employees for noise exposure is conducted in a two-part process consisting of area and personal monitoring. Area measurements are generally obtained first in areas where noise levels are at or above 80 dB; personal monitoring using dosimeters is then performed if the exposure is anticipated to exceed 85 dB. Sample data sheets will be used to record monitoring data for both area and personal noise monitoring results.

EPA Safety, Health, and Environmental Management Program (SHEMP) Operations Manual for Laboratories defines noise above 70 dB in front of a laboratory fume hood as nuisance noise. Exposure to laboratory nuisance noise does not exceed the threshold for entry into the Hearing Conservation Medical Surveillance Program.

Area Measurements

In an area survey, measurements of environmental noise levels are recorded using a sound level meter to identify work areas where employees' exposures may be above hazardous levels, and where more thorough exposure monitoring may be needed. Area monitoring is conducted using a calibrated sound level meter set to the A scale, slow response. Within the area of interest, several different locations will be measured.

A map of the area will be included with the results showing the locations where the noise readings were obtained. Typical measurement locations will include:

- In the hearing zone at the employee's normal work location.
- Next to the noise source(s).
- At the entrance(s) to the work area.
- At other locations within the area where the employee might spend time working.
- An 80 dB radius shall be established.

In areas where noise levels are below 80 dB basis in the area, no further routine monitoring will be required for that area. Should any of the noise measurements equal or exceed 80 dB, records shall be maintained as to the noise levels recorded, where they were taken, and the source(s) of the

noise. These records shall be updated approximately once every two years to determine if any changes have occurred that would warrant monitoring of exposed personnel.

Monitoring of Hazardous Noise Areas

All areas where noise levels equal or exceed 80 dB shall be monitored approximately every two years. Employees who work for extended periods of time (2 hours) in the high noise areas and where their 8-hour TWA equals or exceeds 80 dB will be monitored every year to determine their personal noise exposure.

Whenever an employee exhibits a standard threshold shift (STS), as determined by an audiometric examination, the clinic will notify the FDEP LABS CAHO Manager, and the employee's work place shall be monitored to identify and ameliorate the cause if work-related.

Monitoring Due to Changes

Any area with noise levels that equal or exceed 80 dB shall also be monitored whenever a change in production process, equipment, or controls increase the noise exposure such that additional employees are exposed to noise levels at or above 80 dB on a time-weighted average basis. Areas where the noise levels have dropped below 80 dB due to alterations in equipment, controls or process changes shall be eliminated from the monitoring program.

7.10.5 Noise Control Methods

Engineering and Administrative Controls

The primary means of reducing or eliminating personnel exposure to hazardous noise is through the application of engineering controls. Engineering controls are defined as any modification or replacement of equipment, or related physical change at the noise source or along the transmission path, that reduces the noise level at the employee's ear.

Engineering controls such as mufflers on heavy equipment exhausts or on air release valves are required where possible.

Administrative controls are defined as changes in the work schedule or operations, which reduce noise exposure. If engineering solutions cannot reduce the noise, administrative controls such as increasing the distance between the noise source and the worker or rotation of jobs between workers in the high noise area should be used if possible.

The use of engineering and administrative controls should reduce noise exposure to the point where the hazard to hearing is eliminated or at least more manageable.

Personal Protective Equipment

Hearing protective devices (HPDs; e.g., ear plugs, muffs, etc.) shall be the permanent solution only when engineering or administrative controls are considered to be ineffective, infeasible or cost prohibitive. Hearing protective devices are defined as any device that can be worn to reduce the level of sound entering the ear. Hearing protective devices are required to be worn by all personnel when they must enter or work in an area where the operations generate noise levels:

- Equal to or greater than 85 dB TWA
- 140 dB peaks sound pressure level or greater

FDEP field employees who visit non-FDEP facilities in the course of their work should comply with the facility's policy for the use of hearing protection, or this policy, whichever is the most restrictive.

Issuance of Hearing Protective Devices

Hearing protective devices are available from the FDEP LABS CAHO Manager, and are located adjacent to hazardous noise areas. In addition, earplugs are available, by request, for use in other areas.

Use of Hearing Protective Devices

HPDs must always be used and maintained as originally intended and in accordance with instructions provided. Earmuff performance may be degraded by anything that compromises the cushion to flesh seal. This includes other pieces of personal protective equipment such as eyewear, masks, face shields, and helmets. Hearing aids must not be worn with HPDs.

Reusable earplugs, such as the triple flange or formable devices should be washed in lukewarm water using hand soap, rinsed in clean water, and dried thoroughly before use. Wet or damp earplugs should not be placed in their containers. Cleaning should be done as needed.

Earmuff cushions should be kept clean. The plastic or foam cushions may be cleaned in the same way as earplugs, but the inside of the muff should not get wet. When not in use, earmuffs should be placed in open air to allow moisture that may have been absorbed into the cups to evaporate.

Ototoxic Chemicals

Ototoxicity is hearing loss caused by poisoning to the inner ear (which controls both hearing and balance) or the vestibulochochlear nerve (the nerve that carries sounds to the brain). It occurs when individuals come in contact with chemicals or drugs (typically antibiotics) that are ototoxic agents. Some ototoxic agents that could possibly be found at the FDEP are:

- Trichloroethylene
- Xylene
- Styrene
- Butyl nitrite
- Toluene
- Hexane
- Carbon disulfide
- Mercury
- Manganese
- Tin
- Lead
- Carbon monoxide

Contact with some of these chemicals can be reduced or eliminated by wearing heavy protective devices.

Possible symptoms of ototoxicity are inability to tolerate head movement, feeling or being unsteady, lightheadedness, fuzzy vision, oscillopsia (bouncing vision), severe fatigue, and tinnitus (ringing in the ears).

Ototoxicity can be temporary or irreversible. There are currently no cures or medications for ototoxicity. However, hearing aids can help with the hearing loss, and physical therapy may help with the components of balance.

7.10.6 Training

The training and education program will provide information about the adverse effects of noise and how to prevent noise-induced hearing loss. At a minimum, all training will cover the following topics:

- Noise-induced hearing loss
- Recognizing hazardous noise
- Symptoms of overexposure to hazardous noise
- Hearing protection devices – advantages and limitations
- Selection, fitting, use, and maintenance of HPDs
- Explanation of noise measurement procedures
- Hearing conservation program requirements.

Employees will also be provided with copies of the OSHA noise standard (29 CFR 1910.95) and other handouts describing the FDEP LABS Hearing Conservation Program.

All personnel should receive initial instruction in the requirements of hearing conservation. Ideally this will be done when hearing protection is dispensed. The FDEP LABS CAHO Manager or designated representative will give appropriate refresher training annually thereafter, as part of the OSHA 8 hour refresher training. Supervisors must contact the FDEP LABS CAHO Manager to schedule training for new personnel assigned to work in noisy environments and for retraining of current personnel.

FDEP LABS personnel are being encouraged to use HPDs when they are exposed to hazardous noise during activities at home (e.g., from lawn mowers, rock concerts, car races, power tools, etc.).

7.10.7 Program Evaluation

Periodic program evaluations will be conducted to assess compliance with federal and state regulations and FDEP LABS Program requirements. Both the monitoring and audiometric testing portions of the FDEP LABS Hearing Conservation Program will be reviewed annually to assure its quality and effectiveness. An evaluation of the Program, including wearer acceptance, appraisal of protection afforded, hearing protection use, training methods, and record keeping will be conducted at least annually.

The findings of the FDEP LABS Hearing Conservation Program evaluation will be documented and this documentation will list plans to correct faults in the program and set target dates for the implementation of the plans.

7.10.8 Record Keeping

All sound surveys (area noise surveys) and personal exposure records shall be kept on file in the FDEP LABS CAHO Manager Office for a period of at least two years.

Should you have any questions regarding the FDEP LABS Medical Surveillance Programs or Hearing Conservation Program and its applicability to your plans or activities, contact the FDEP LABS CAHO Manager.

8. HAZARD COMMUNICATION

Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and Safety Data Sheets (SDS) and precautionary labels are tools that laboratory and management use in conjunction with their chemical safety plan to improve overall safety in the laboratory. GHS, SDS, and precautionary labels share this objective and they should be built into laboratory safety information and training programs.

8.1 Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

GHS stands for the Globally Harmonized System of Classification and Labelling of Chemicals. GHS defines and classifies the hazards of chemical products, and communicates health and safety information on labels and safety data sheets). The goal is that the same set of rules for classifying hazards, and the same format and content for labels and safety data sheets (SDS) will be adopted and used around the world.

8.2 Safety Data Sheets (SDS)

An SDS is a technical document that usually consists of two or more pages of information comprising a compendium of relevant chemical, physical, and toxicological data; procedures for safe handling, storage, and use; implementation of emergency measures. All SDS for hazardous chemicals must contain at least the following information.

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); ACGIH Threshold Limit Values (TLVs); and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the SDS where available as well as appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*

Section 13, Disposal considerations*

Section 14, Transport information*

Section 15, Regulatory information*

Section 16, Other information, includes the date of preparation or last revision.

SDS documents for chemicals likely to be present at the FDEP LABS are included in Appendix 2.

8.3 Air Concentration Limits for Selected Agents

Table 4.1 Air Concentration Limits for Select Chemical Agents

Chemical agent[1]	Volatility (mg/m^3)[2]			IDLH (mg/m^3)[3]	WPL (mg/m^3)[3]	STEL (mg/m^3)[3]	MCE (mg/m^3)
GB (Sarin)	22,000	@	25°C	0.1000	0.00003	0.0001	0.00010
GD (Soman)	3,900	@	25°C[5]	0.0500	0.00003	0.0002	0.00010
GF (Cyclosarin)	898	@	25°C	0.0500	0.00003	0.0002	0.00010
VX	10.5	@	25°C	0.0030	0.000001	0.00001	0.00010
HD (Mustard Gas)	610	@	20°C	0.7000	0.0004	0.003	0.00010
L (Lewisite)	2,730	@	20°C	0.003[4]	0.003[4]	NA	0.00010

[1] Chemical agent list identified in the IAA dated November 22, 2006. Maximum concentration and total masses allowed under the program are also identified in the IAA.
[2] Chemical volatility data was obtained from the U.S. Army Center for Health Promotion & Preventative Medicine Web site, http://www.agpeea.army.mil/dts.dtchemfs.htm.
[3] *Implementation Guidance Policy for Revised Airborne Exposure Limits*, Dept. of the Army, June 18, 2004.
[4] Lewisite IDLH is the Maximum Use Concentration (MUC), per AR 385-61, Table 2-2; WPL is from Table 2-3.
[5] Volatility data for cyclosarin from Material Safety Data Sheets (MSDS) provided by ECBC, dated July 17, 2006.

8.3 Labeling

The manufacturer labels many laboratory reagent containers with the kind of precautionary information required for consumer products. The purpose of a label for a hazardous chemical used in the laboratory is to prevent injury. The content of the precautionary label should appear as follows:

1. The identity of the chemical or hazardous component
2. A signal word: Danger, Warning, or Caution
3. Statement(s) of hazard(s)
4. Precautionary measure(s)

A precautionary label is a limited source of information. The label reflects the judgment of the label writer, who decides what part of the total should be presented in the limited area of the label. Clearly, in laboratory work with hazardous chemicals, a precautionary label must be supplemented with training based on the MSDS.

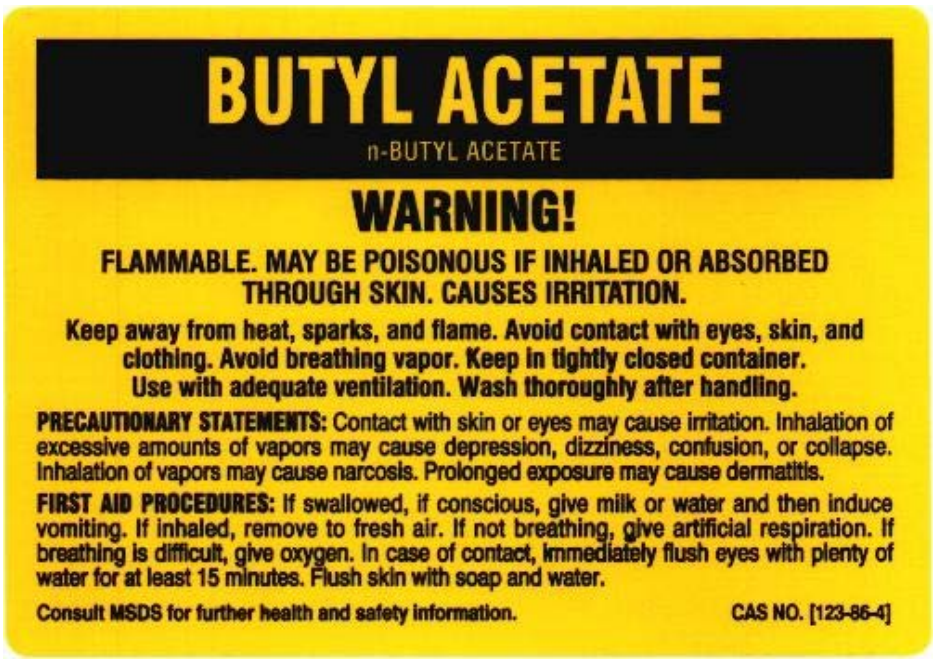

Figure 8.2 Example of Precautionary Labels

8.4 Ultra Dilute Laboratory Signage

Rooms defined as UDA laboratories will bear signage identifying them as a CA UDA Laboratory. Only authorized personnel are permitted in these spaces. Access to the UDA laboratories will be controlled by locked rooms and keypads.

The laboratory sign-in boards are used to define more specifically where and what is being done within the laboratory. This information is posted on a dry-erase board or signage at the laboratory entrance. This information is vital in the event of a chemical incident and must be clearly filled out. When multiple activities are occurring sequentially in one laboratory, all activities should be listed initially, and the board should be updated as soon as possible for clarity. The posted information should indicate:

• Specific laboratory fume hood or instrument being used.	• Identities of the operator and buddy.
• Agent in use.	• Date.
• General level of concentration (UDA or UDA+unknown).	• Start time.
• Volume of agent.	• Completion time.
• Activity being performed.	• Safety checklist.

Refrigerators containing UDA standards or unknown samples will be clearly marked with a sign identifying their contents as hazardous in the secured UDA laboratory. The refrigerator contents will be protected with a security lock on the UDA refrigerators.

Instrumentation used for the analysis of UDA materials will be identified with signage clearly identifying them as such. The signage will also indicate the current operation type in progress on the instrumentation (e.g. 'UDA Analysis' or 'Clear for Routine' analysis).

The following signs shall be posted in the areas of UDA analyses:

In the hallway directly outside of UDA storage and analyses area/s:

- "Authorized Personnel Only,"
- An egress route from the facility, and
- "Stop" sign – to be posted when UDA material is being utilized.

Inside UDA Laboratories:

- "Emergency procedures for spills, hood failures and power failures: Evacuate Immediately and Notify the CAHO,"
- Information on the symptoms of nerve agent exposure (GB, GD, GF, VX) and immediate treatment,
- Personnel decontamination procedures,
- Maximum height that the lab hood sash is allowed to be opened,
- Results of monthly lab hood tests (posted outside hood). Hood reports are retained in a log book,
- UDA spill cleanup procedures,
- On Refrigerator (s): "UDA Primary Solutions and Secondary Solutions" and a sign identifying their contents as hazardous, and
- Inside of lab door: "Remove PPE & Wash Your Hands".

8.5 Labeling of Containers for CWA Hazardous Materials

All UDA standards, reagents, samples, and waste containers will be clearly labeled identifying their contents. Equipment released for washing will be labeled as 'Decontaminated' prior to removal from the UDA laboratory.

Each inner container and the outer container label for CWA dilute solutions must be distinctive (e.g., borders) from other non-CWA agent labels used in the laboratory, and must be large enough to be easily

identifiable. Each inner container and the outer container of dilute solutions and agent candidates must be labeled with its agent and/or code name to properly identify the contents. The label will have a red border (or other distinguishable marking). Containers too small for complete information must have the name or code name (e.g., xGA, xVX, xHD, XL, etc.), and the custody number of the chemical agent clearly marked. The "x" prefix used in conjunction with the agent code name indicates it is an UDA agent solution (for example, xVX or xGB).

Containers with non-primary solutions of the ultra-dilute CWAs are also identified with a different border label and prefix code "UD" to distinguish these from primary UDA dilute solutions.

The mandatory outer container label information for dilute agent solutions includes:

- TOXIC CHEMICAL (in bold red letters),
- The original issue quantity of agent in the container stated in metric terms and the concentration,
- Type of chemical agent involved (name or code name),
- Accountability document number (lab book, unique identification (ID), number for the individual solution),
- The refrigerator ID where the material is stored,
- The name and telephone number of the Agent Manager (AM) of the material,
- The date when the material was first placed in storage,
- Special instructions or notes regarding use or removal of the contents, and
- Expiration date of the solution.

The current volume of Primary dilute solution is tracked electronically using the CA Dilute Solution Primary Standard Record in the LIMS.

8.6 Training

All employees shall be provided with effective information and training on UDA in accordance with 29 CFR 1910.1200(h)(1). Specifically, employees shall be provided with effective information and training on UDA in their work area at the time of their initial assignment, and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., toxicity, carcinogenicity, etc.) or specific chemicals. Chemical-specific information must always be available through labels and material safety data sheets.

Personnel at FDEP LABS will receive training on the hazards and hazard communication systems employed in the UDA laboratories consistent with their job function. Training for UDA areas is categorized into four levels: Tier 1 – General Awareness, Tier 2 – Visitor, Tier 3 – Operator/Laboratory Worker, and Tier 4 – Response/Decontamination and Remediation.

- Tier 1 training – Tier 1 training is general awareness training that shall be given to those individuals who will not enter the UDA laboratory areas. This will include FDEP B/LABS general staff and guards. Training may include information on chemical hazards and signs and symptoms of overexposure.

- Tier 2 training – Tier 2 training shall be given to visitors and personnel that could enter the UDA laboratory areas. These personnel shall be 100% escorted. This will include visitors, auditors, maintenance personnel and janitorial staff. Training may include information on chemical hazards, signs and symptoms of overexposure, alarms in the UDA laboratory areas and evacuation procedures.

- Tier 3 training - Tier 3 training shall be given to those personnel working *unescorted* in the UDA laboratory areas. This includes the CAOs, auditors, management, sample custodian, security officer and CHO. Training may include information on chemical hazards, signs and symptoms of overexposure, alarms in the UDA laboratory areas, evacuation procedures, first aid procedures (including use of the Mark I kits), decontamination procedures, PPE, laboratory hoods, security and accountability procedures and emergency procedures.

- Tier 4 training – Tier 4 training shall be given to personnel who may be responding to emergencies including medical emergencies and spill events. This includes personnel on the emergency response team, medical personnel and offsite responders. Training may include information on chemical hazards, signs and symptoms of overexposure, first aid procedures (including use of the Mark I kits), decontamination procedures, PPE and emergency procedures

9. FACILITY PROTOCOLS

9.1 Housekeeping and Laboratory Cleaning

All working surfaces (floors, benches, counters, etc.) should remain orderly and unobstructed. Maintaining a clean work area promotes safety and health as well as more efficient work. The janitorial contractors are prohibited from cleaning any surface, which may contain hazardous materials or residues (e.g., lab bench tops, fume hoods, lab refrigerators, lab freezers, etc.). Although the FDEP LABS janitorial contractor performs most housekeeping duties, they only empty the trashcans daily and occasionally damp mop the floor in the individual laboratory areas. Therefore, it is best for all laboratory personnel to clean up as they work in order to prevent any potential unexpected hazards.

- Assign a proper place for all equipment and return equipment to that place after use.

- Store chemicals below eye level, not overhead, unless in a proper chemical storage cabinet.

- Immediately clean up all spills on floors, tables, and bench tops; (Notify the CAHO Manager for all spills and dispose of cleanup materials properly).

- Place glassware and other breakables away from the outer edge of a bench.

- Store gas cylinders and flammable liquids away from heat or ignition sources.
- Gas cylinders must be secured during storage, transport and/or use.
- Place heavy items, such as 5-gallon containers, on the floor or a lower shelf, with secondary containment, unless actually adding materials to the container.
- Dispose of all laboratory waste properly and promptly.
- Some floor drains at the FDEP LABS are equipped with automatic water systems to prevent the release of sewer gases.
- If an odor is detected coming from an unused floor drain or cup sink call the Facility Help line (ext. 8084) or contact the CAHO to initiate a janitorial staff response. The janitorial staff will typically add 3 to 5 gallons of water to the sink or drain depending on the actual layout or location.

9.2 Laboratory Inspections

Formal Internal Safety, Health and Environmental Management inspections are conducted periodically by the FDEP LABS CAHO Manager with support from the Regional CAHO Manager. The purpose of these inspections is to identify hazardous conditions and/or work practices, to ensure that regulatory compliance is maintained throughout the facility and to initiate corrective action on the part of the facility personnel. The inspections are aimed at trying to reduce/eliminate employee exposure to toxic and hazardous substances through promoting a safe and healthy working environment.

10. LABORATORY SECURITY

Refer to the Laboratory Security SOP LB-018-1.0 for details regarding laboratory security.

11. CHEMICAL MANAGEMENT

11.1 Procurement and Tracking

11.1.1 Chemical Procurement and Tracking

The FDEP laboratories use the Laboratory Information Management System (LIMS) system to track chemicals. The protocol for procuring, tracking, and removing chemical materials is as follows:

1. When FDEP personnel determine that the current supply of a specific substance is low via physical inspection and a search in the FDEP LIMS database, or they are need of a new chemical not listed in the inventory, they complete an initial procurement request form.

2. The originator then takes the procurement request form to the FDEP safety designee, the FDEP Senior Scientist or the FDEP LABS CAHO Manager to complete a hazardous materials review and either approve or deny the chemical procurement request.

3. If the hazardous material reviewer approves the chemical purchase, the originator then submits the approved request to the appropriate laboratory manager/supervisor for fiscal and final approval.

4. Once all of the appropriate approvals are recorded, the chemical procurement request is provided in writing to the FDEP contracting officer or bankcard holder, who procures the materials.

5. Upon delivery to the FDEP loading dock, the shipping package is received and inspected for damage via the package receipt contractors, who notify the FDEP analytical personnel of the delivery.

6. The FDEP personnel will receive the package, place the package receipt stamp on the packing slip, then sign the stamp as "Received" and deliver the package and packing slip to the originator of the procurement request.

7. The originator (FDEP employee) inspects the package, and signs the package receipt stamp as "Accepted" and also indicates whether the shipment was partial or complete.

8. The packing slip is then forwarded to the contracting officer.

9. The originator completes the chemical inventory tracking form and forwards it to the FDEP LIMS inventory manager.

10. The LIMS inventory manager then enters the data into the FDEP LIMS database.

11. The substance will be stored in the appropriate and indicated location.

12. Once a container is empty, FDEP personnel remove the FDEP LIMS barcode label from the material prior to disposal.

13. The LIMS inventory manager will then use the removed FDEP LIMS chemical inventory barcode to subsequently remove the material from the FDEP LIMS database.

Actual disposal of the container/material is accomplished by in-house waste disposal contractors who triple rinse the container, remove all remaining labels from the container using water or steam, and then place the container in the appropriate recycling, hazardous waste, or non-hazardous waste stream.

11.1.2 Ultra Dilute Agent Procurement and Tracking

Shipments of UDA standards are to be received only by the Point of Contact (POC) or designated alternate. Shipments of standards are accepted only with prior notification of shipment from the supplier. In case of Laboratory Manager's (LM) and Agent Manager's (AM) absence, delivery of UDA

reference material is not to be accepted. Also, unannounced, unplanned or unscheduled shipments of UDA reference material will not be accepted.

The package is inspected upon receipt to ensure no leakage has occurred and the package and contents are not compromised. If there is any suspicion that the materials have been compromised, e.g., the box is wet or a residue or stain is noted on the outside of the box, the box should not be handled and the UDA Principal Investigator (PI) and Chemical Safety Officer (CSO) must be contacted immediately. All personnel that have handled the package to this point should wash their hands three times with soap and warm water and remain in the loading dock until it can be reasonably confirmed that no exposure has occurred.

"Accountability" of the primary and non-primary CWA standards means that the lab must be able to secure, track, document, and audit each of the standards from the time of initial receipt until their disposal. Custody of all UDA will be maintained from receipt through destruction via analysis or disposal. The POC will relinquish UDA standards to the PI or other designated personnel. The PI and another chemical agent operator (CAO) will transport the box into unknown accessioning or place the box in secondary containment for transport to the Chemical Terrorism Suite. The box is placed in a hood prior to opening and unpacking. Either the PI or CAO will don two pairs of gloves prior to opening the box while the other person documents receipt of the materials by logging them into the chemical agent inventory and standard receipt form noting any damage or discrepancies. The standards are then locked in the UDA standard refrigerator and a copy of the standard receipt form is scanned and emailed to the standards provider (LLNL or ECBC) and Terry Smith at EPA Office of Emergency Management.

An inventory of each vial containing UDA primary standards will be maintained and the amount of material tracked to the microliter (µL). An inventory of solutions derived from primary standards will be maintained although volumes will not be tracked. UDA will be identified through a physical inventory conducted semiannually (January and July). This inventory will be conducted by the PI, with the assistance of the Senior Scientist or other designated persons. The inventory is compared to current log sheets and discrepancies noted and investigated. Any discrepancy will be reported immediately to the RO and documented on a DCLS Incident Report form with proposed corrective actions and included with the Inventory Summary Report. Discrepancies will also be reported to the points of contact at ECBC/LLNL and EPA Office of Emergency Management.

Log-in is the procedure by which submitted UDA materials are introduced into the laboratory. The documentation recorded during log-in of reference materials includes: agent name and ID number, origin and quantity (concentration and volume per vial and number of vials). Upon receipt, the accompanying documentation (chain-of-custody sheets and certificates), preservation, and shipping conditions are documented by electronic entry into the LIMS Standard Preparation module. Both the AM and CAOs must be present to access material in the primary UDA refrigerator. This material is tracked in the UDA Accountability records maintained in the LIMS Standard Preparation Module.

11.1.2.1 CWA Dilute Solution Primary Standard Record

The following information must be entered into the LIMS for each Primary Standard.

- Primary Solution ID
- Agent Name

- Concentration
- Solvent
- Date of Receipt
- Storage Location
- Storage Conditions
- Usage of the Primary Standard to Prepare Secondary or Working Standards
  - Date of Operation
  - Operation Type
  - Amount Only Used to Perform Dilution
  - Total Used, including Amount used for Dilution and Waste (to nearest microliter)
  - Remaining Amount
  - Diluted Solution ID
  - Storage Location of new Secondary or Working Standard
  - Operator Approval (Name)
  - Custodian Approval (Name)
- Expiration Date
- Disposal of Primary Solution
  - Disposal Date
  - Disposal Operator Approval (Name)
  - Disposal Custodian Approval (Name)

11.1.2.2 CWA Dilute Solution Non-Primary Standard Record

The following information must be entered into the LIMS for each Secondary, Working or Spike Standard.

- Preparation Date of Secondary, Working, or Spike Standard
- Primary Solution ID
- New Secondary or Working Solution ID
- Chemical Agent Name (s)
- Concentration(s)
- Solvent Used
- Volume of Non-Primary Solution
- Storage Location
- Storage Conditions
- Expiration Date
- Operator Approval (Name)
- Custodian Approval (Name)
- Disposal of Secondary, Working, or Spike Solution
  - Disposal Date
  - Disposal Operator Approval (Name)
  - Disposal Custodian Approval (Name)

11.2 General Chemical Use Rules

1. Use appropriate safety equipment wherever experiments are being conducted, i.e., safety glasses, rubber gloves, protective aprons, shoes, shields, etc. Safety glasses must be worn in the laboratories at all times.

2. An individual who has open cuts or abrasions should take extra precautions when working in the laboratory environment by using an appropriate bandage or covering.

3. Work with chemicals should be performed in a chemical fume hood or well-ventilated area.

4. Exposure to all chemicals, even those of no known significant hazard, should be minimized.

5. Uncovered chemicals should never be left unattended.

6. All containers must be labeled properly to identify the contents.

7. Unknown chemicals shall be analyzed and properly disposed of as waste.

8. After working with toxic materials, workers should immediately wash their hands and arms. This is especially important when leaving the laboratory.

9. Chemicals should be returned to their proper storage area when not in use. No chemicals shall be left out overnight.

10. Familiarize yourself with the location and use of the emergency equipment (i.e., first aid materials, fire extinguishers, eye washes, and showers.)

11. Keep laboratories clean and orderly with all chemicals properly labeled and stored.

12. Before beginning each experiment review potential hazards, which may be associated with the experiment and then take necessary precautions to counteract or eliminate the hazard.

13. Avoid repeated and/or prolonged contact with all laboratory chemicals.

14. Avoid prolonged contact of chemicals with skin; wash hands and face frequently; be sure laboratory clothing is cleaned regularly.

15. If water is not the appropriate washing agent, or antidote, procure proper first aid supplies before starting work.

16. Avoid inadvertent contamination by not returning unused portions of reagents to stock bottles; stoppers should be held while pouring.

17. Never taste a chemical.

18. Smell cautiously - sniff or waft the odors towards the nose (never inhale).

19. Use a safety pipet filler, (pipeting by mouth is forbidden).

20. Cool sealed vials of chemicals below the boiling point of the substance contained therein before breaking seal. Cool gradually, first in ice water, then CO_2 etc., to avoid temperature shock to the glass vial and a possible explosion.

21. Add concentrated chemicals to water (never vice versa).

22. Keep flammable solvents such as methanol, ether, etc. away from hot plates and flames.

23. Use care in transporting chemicals; never carry more than two at a time by hand; carry large bottles in buckets or safety carriers.

24. Use caution when working with mercury. The equilibrium concentration of mercury vapor over liquid mercury at room temperature is approximately 20 times the threshold toxic limit.

25. Memorize the locations of safety showers and eye washes in your primary laboratory and know how to use them.

26. After using a reagent, be sure that any residual material is wiped or rinsed from the external surface of the container.

27. Oxidizing materials, such as nitrates and chlorates, should be stored in a dry area apart from organic material.

28. Care must be taken to be certain that all chemicals are compatible with the material of construction of the containers in which they are handled. For example, hydrofluoric acid is not to be handled in glass equipment.

29. Flammable solvents must only be stored in an approved solvent storage cabinet or a well-ventilated area.

30. When opening bottles, which may be under pressure (e.g., hydrochloric acid or ammonium hydroxide), cover the bottle with a towel to divert any chemical spray.

31. Use bottle carriers when transporting glass bottles containing hazardous chemicals (acids, corrosives or flammable liquids).

32. Hand washing with lukewarm water and antimicrobial soap (not bar soap) must be performed immediately following removal of gloves and other personal protective equipment. When hand washing facilities are not available, antiseptic hand cleansers or antiseptic towelettes may be used until proper hand washing is accomplished. This step is an especially important function to perform before leaving the laboratory. Use mild detergents when washing exposed skin surfaces. Never wash with solvents or other chemicals that may cause adverse effects.

33. Practical jokes and horseplay have no place within a laboratory. They lead to accidents and injuries. Do not run through the corridors. When entering different FDEP B/LABS areas, open doors slowly as persons walking by may be on the path immediately outside the doorway.

34. Laboratory personnel may not eat, drink, chew gum, use tobacco products, smoke, and/or apply cosmetics or lip balm while in a laboratory. This rule in conjunction with good personal hygiene practices such as washing hands, arms, and face if necessary, reduces the involuntary ingestion and cross-contamination of hazardous chemicals.

35. Reactors, stills, or other equipment operating at pressures or temperatures significantly above or below ambient levels or containing hazardous materials may require shielding to protect persons and property in the vicinity. A self-supporting plastic shield is the minimum for bench-top work. It is required for lab glassware under pressure or vacuum and glassware containing:

- Flammable materials exceeding 1 L
- Corrosive chemicals
- Reactive chemicals
- Chemicals absorbed through the skin
- Unknown reactions
- Exothermic reactions

The CAHO Manager Office may recommend a steel barrier or shield surrounding equipment situations that involve:

- Containing undefined reactions
- Containing exothermic reactions
- Operating at very high pressure

Whenever operating pressure will be above 15 psig, the equipment must be inspected and approved in accordance with the American Society of Mechanical Engineers (ASME) Pressure Vessel Code.

36. A large percentage of laboratory injuries are due to glass cuts. Most cuts cause only superficial injury but some glass cuts may puncture blood vessels and cause severe bleeding. Severe cuts may sever tendons and result in permanent damage. Inspect all glassware to be used under pressure or vacuum. Minimum precautions to be followed when using glassware include:

- Do not exceed the manufacturer's recommendation for maximum working pressure and temperature. Use only reactors designed for reactions known to be safe.
- Discard any bottles subjected to hard impacts or that have observable scratches or other defects on the surface.
- Make sure the reactor, when under pressure, is inside a perforated metal sleeve or similar protection.

- Use supplementary shielding, such as a plastic half-cylinder.

37. Glass vials sealed with a flame are sometimes used as containers for chemicals or samples. Heavy-walled glass tubes are sometimes sealed and used as reaction vessels. Excessive pressure, thermal shock, mechanical shock, or faulty glass in one of these vials can result in a violent rupture. Use extreme care to prevent such breakage. Table shields or other devices must be used to protect the operator and others from the chemical contents of the tube, glass fragments, and heating bath liquid. Temperature should be raised and lowered slowly, and a cushion should be provided for protection against mechanical shocks.

38. Vacuum or pressure operations need approval from the CAHO Manager Office if they are more than the 2 L capacity. Most hard glasses are highly resistant to all acids except hydrofluoric acid. Compared to acids, however, the corrosion of glass by strong alkaline solutions is high. If you expect to operate any glass equipment under vacuum pressure, ensure that it is shielded or guarded as safely as pressurized equipment because an implosion can scatter sharp-edged glass fragments just as violently as an explosion of a vessel. Certain types of glass equipment, such as heavy-walled filtration flasks, are made for use under vacuum. Vacuum distillations in glass should be performed only in round-bottom flasks.

39. Vacuum pumps must have a belt guard as part of the pump or included as a separate item. If the pump is to be located where flammable liquids, gases, or ducts are present, the proper explosion-proof motor and switch should be specified (See National Electrical Code, Article 500). A trap should be used on the suction line to prevent liquids from being drawn into the pump. If vapors are being drawn through the pump, a cold trap should be inserted in the suction line to prevent dilution of the pump oil. A pan under the pump is useful to catch any dripping oil. If the pump is used for vacuum distillation or filtration of organic liquids, the discharge should be directed to an operating hood or other exhaust system.

40. Many double-walled vessels are used throughout the FDEP B/LABS to transport or handle cryogenic materials. Because the space between the two walls is a vacuum, a possibility always exists for implosion. A crack in the inner wall may allow the cryogenic material to leak in between the walls, causing a sudden expansion of gas and possibly an explosion of the Dewar. Many Dewars are encased in a metal sheath to prevent physical shock. Smaller Dewars are often unprotected and must be wrapped in friction tape or other secure binding and coated with a special plastic dip, or encased in metal. Even when protected, Dewars must be handled carefully to prevent breakage.

41. Household-type blenders used in the laboratory are a common cause of solvent fires. The motors of such blenders have constantly sparking brushes that can readily ignite released vapors or liquid splashed out of the cup. Consequently, solvents having a flash point below 100 °F (37.8 °C) must never be used in such equipment and all equipment must be approved by a recognized certifying agency. A catch pan under a blender is useful for limiting spills of liquid or solids from the cup. If a fire should occur, its extent will be limited and extinguishing it should be easy.

42. Food must never be placed in a refrigerator or freezer used for storing chemicals or biological agents. All refrigerators must be marked either “FOOD ONLY” or “CHEMICAL ONLY”. “FOOD ONLY” refrigerators may not be located in laboratories. No food or drink may be stored in a refrigerator once used to store hazardous materials.

43. Flammable liquids (flash point below 100 °F [37.8 °C]) must be stored in explosion-safe or explosion-proof refrigerators or freezers. Refrigerators and freezers must have signs on the doors specifying their use, "NO FLAMMABLE LIQUIDS," or "EXPLOSION PROOF" or "EXPLOSION SAFE". If the appliance will contain flammable materials but be in a room free of vapors or gas, an explosion-safe unit can be purchased at lesser cost. Either type, however, must include an "EXPLOSION PROOF" or "EXPLOSION SAFE" warning sign, whichever is applicable.

> It is FDEP LABS policy that NO food, drinks, or food preparation and/or consumption utensils are allowed in any area where chemicals, reagents, wastes or other hazardous materials are used or stored. Foods, drinks, or food preparation and/or consumption utensils are only permitted in the non-laboratory or offices spaces within the FDEP LABS. See the FDEP LABS CAHO Manager for additional information.

11.3 Inventory

11.3.1 Chemical Inventory

The FDEP LABS is required by the OSHA Hazard Communication Standard, the OSHA Laboratory Standard, local fire department regulations and FDEP regulations to maintain an accurate inventory of all chemicals present in the facility.

All of the organizations at the FDEP LABS utilize the Laboratory Information Management System (LIMS) as a chemical tracking mechanism for reagents and standards used in analyses. All chemicals used at the FDEP LABS are tracked via a inventory management system, with the exception of gases and analytical standards. The chemicals at the FDEP LABS are inventoried annually. Safety data sheets (SDS) are available on all chemicals. Hard copies of the SDS are stored in notebooks and are continually updated as new versions are received. Additional SDS information can be obtained from the FDEP LABS library, or from various Internet web pages (i.e., www.sigma-aldrich.com).

The SDS must be reviewed prior to the first use of each chemical. All SDS must be properly maintained, updated and be readily accessible to laboratory personnel. FDEP LABS employees may review any SDS at any time in the FDEP LABS library.

11.3.2 Ultra Dilute Concentrations, Volumes, and Amounts

The definition and limits of ultra-dilute CWA solutions are provided in an Interagency Agreement (IAA) between EPA and DOD dated November 22, 2006. Table 11.1 summarizes the dilute agent levels.

Table 11.1: Maximum Concentrations, Volumes, and Amounts for Chemical Agent Solutions

Ultra-Dilute CWA Thresholds		
Agent	Maximum Concentration[a]	Agent Total Mass[b]
Sarin (GB)	10 mg/L	100 µg
Soman (GD)	10 mg/L	100 µg
Cyclohexyl Sarin (GF)	10 mg/L	100 µg
VX	10 mg/L	100 µg
Sulfur Mustard (HD)	10 mg/L	100 µg
Lewisite (L)	10 mg/L	100 µg

[a] Concentrations are aggregate. If more than one agent is in a single solution, the sum of their concentration is used to determine the classification.

[b] Not to exceed 10 mL total volume separated in 1 mL vials.

11.3.3 Ultra Dilute Agent Inventory

A blind inventory of all primary UDA solutions must be performed on a quarterly basis. The inventory is recorded in a designated "Inventory logbook", providing a line item name, description (agent type), volume (of primary solutions), location, and signatures of the person performing inventory and a witness. The blind inventory must be performed without prior knowledge of the recorded inventory. Thus, the inventory document must not include any information about the number of containers, custody numbers, or volumes prior to opening the storage unit containing the Chemical Agents. The Agent Manager will physically remove all agent containers from their storage locations and the witness will observe and record the volumes of the primary standards with solution IDs and the number of vials of non-primary standards on the inventory sheet.

The physical inventory is correlated by the Agent Manager with the UDA Primary Standard and Dilute Standard Tracking Worksheets. Any discrepancies are rectified. Any agent shortages are reported to the CAM. The notification to the CAM should be using the Difficulty Report (DR) system.

11.3.4 Ultra Dilute Agent Reports

The Agent Manager prepares a Quarterly UDA Standard Summary of neat agent equivalents and number of vials present at the FDEP Central Laboratory and a semi-annual Dilute Solution Standard Report. The AM will include these reports in the appropriate agent consumption report to the COR (Contract Office's Representative). The reports will include information on all UDA solutions and separately, all ultra-dilute agent solutions listed in Table 11.1

11.3.4.1 Quarterly UDA Standard Summary

The primary tool for accomplishing the Quarterly UDA Standard Summary is the LIMS Standard Preparation module, which contains all the pertinent information. These records include information

about the preparation, use, tracking, and disposal of all solutions at or below Dilute Agent Solution thresholds.

The AM will prepare separate summary reports for the Ultra-Dilute CWA Solution Consumption/Inventory on a quarterly basis. The summaries will include neat agent equivalents and number of ultra-dilute CWA solution vials present at the FDEP facility at that time. Quarterly UDA Solution Reports will be completed by the Agent Manager (AM) by the second day of the following month. The AM will include the quarterly UDA Solution summary in the appropriate quarterly agent consumption/inventory reports to the COR by the fifth day of the following month.

11.3.4.2 Semiannual Dilute Solution Standard Report

The semiannual Ultra-Dilute Solution Standard Report, with cut-off dates at close of business (COB) June 30 and December 31, is prepared by the AM by the second day of the following month. The AM will provide the semiannual report to the COR by the fifth day of the following month and follow the guidelines provided by the ECBC Accountability Officer.

11.3.4.3 Laboratory Audits

An audit of inventory files for the ultra-dilute CWA solutions with concentrations listed in Table 1 will be conducted at least annually by the FDEP Quality Assurance Officer. The audit reports will be provided to the appropriate staff for review and corrective action. The completed report is subsequently routed to the AM, the Laboratory Director, the LM and finally to the QA Officer for final review, approval, and archiving.

11.4 Standard and Sample Descriptions

The general analytical standard information provided in this section is designed to give accountability requirements and not technical procedural instruction.

11.4.1 Primary Standards

A primary standard is the first dilution from Chemical Agent Standard Reference Material (CASRM) chemical agent. This would be the ultra-dilute CWA solution supplied by the Army or Lawrence Livermore National Laboratory (LLNL). As a primary standard, the purity, source, and expiration date should be provided by the supplier. All primary standards are permanently recorded and tracked in the LIMS on a microliter level.

11.4.2 Non-Primary Standards

A non-primary standard is a second or further dilution from the primary standard solution. This solution may be designated as a Secondary or Working standard. The non-primary standards are permanently recorded and tracked in the LIMS on a microliter level.

11.4.3 Spikes

Every sample that is created for analysis in the Laboratory (such as Laboratory Fortified Blanks or Matrix Spikes) must be accounted for using Non-primary Standards accountability protocol. The spikes must be entered into the LIMS in the same fashion as the secondary and working standards in Section 11.4.2.

11.4.4 Field Samples

Field samples received for CWA analyses are not tracked using this SOP, but must be evident in the laboratory records. Procedures for the receipt and log-in of field samples at the FDEP Central laboratories are provided in DEP SOP RC-007 "Chemistry Section Receiving Room Standard Operating Procedure for the Receipt and Log-in of Samples by the DEP Central laboratory." For chain-of-custody protocols refer to DEP SOP RC-009 "Standard Operating Procedure for Documentary Evidence Chain-of-Custody within The DEP Laboratory." As well as RF-005 "State of Florida Department of Environmental Protection Chain-of-Custody Form"

11.5 Chemical Storage

There are two major principles that apply for safe and proper storage of chemicals in the laboratory. These two principles are maintaining control of the inventory and segregating incompatible chemicals from one another. When these are overlooked, accidents will happen.

11.6 Cryogenics and Compressed Gas Handling

Figure 11.1 shows a typical cryogenic liquid cylinder. Cryogenic liquid cylinders are insulated, vacuum-jacketed pressure vessels. They come equipped with safety relief valves and rupture disks.

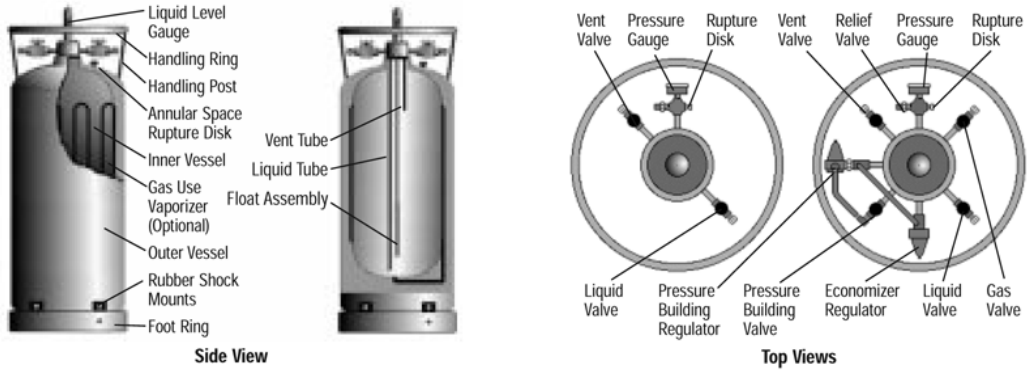

Figure 11.1 A Cryogenic Liquid Cylinder

11.6.1 Chemical Storage and Handling

11.6.1.1 Chemical Storage and Handling

Cryogenic containers are equipped with pressure relief devices to control internal pressure. Under normal conditions, these containers will periodically vent product. Do not plug, remove, or tamper with any pressure relief device. Never allow any unprotected part of the body to come in contact with uninsulated pipes or equipment that contains cryogenic product. The extremely cold metal will cause the flesh to stick fast and tear when one attempts to withdraw from it. Use a suitable hand truck for container movement. Containers should be handled and stored in an upright position. Do not drop, tip, or roll containers on their sides. Do not remove or interchange connections. Discontinue use and contact the vendor if you experience any difficulty operating the container valve or with the container connections. Use the proper connection, DO NOT USE ADAPTERS! Use piping and equipment designed to withstand the pressures to be encountered. On gas withdrawal systems, use a check valve or other protective apparatus in any line or piping from the container to prevent reverse flow. To prevent cryogenic liquids or cold gas from being trapped in piping between valves, the piping should be equipped with pressure relief devices. Only transfer lines designed for use with cryogenic liquids should be used. Some elastomers and metals such as carbon steel may become brittle at low temperatures and will easily fracture. These materials must be avoided in cryogenic service. It is recommended that all vents be piped to the exterior of the building. Compressed gas manufacturers provide cylinders, specific valves, gauges, fittings, labels and markings as recommended by Compressed Gas Association, Inc. (CGA) and in compliance with Department of Transportation (DOT) regulations. The DOT regulations cover materials and manufacture, testing and certifying, inspecting and dating, filling of cylinders and record keeping.

Cylinders are tested under hydrostatic water pressure every 5 years. The latest date stamped on the cylinder is the date of testing. Typically, the interior area of a cylinder is approximately 10 ft^2. At an interior gas pressure of 2000 psi, the total force on the interior walls of the cylinder is 28,000.00 lb. If the fixture is broken off when the cylinder is knocked over, then that cylinder becomes a destructive, uncontrolled rocket. Therefore, it is important to keep the protective cap screwed on the compressed gas cylinder (CGC) when moving or changing cylinders.

The following rules should be generally applied to the handling of all cylinders containing compressed gases.

1. Before using the compressed gas, be sure the gas cylinder is properly supported to prevent it from being knocked over.

2. Use suitable hand truck, fork truck, roll platform or a similar device for transporting and unloading a CGC.

3. Do not deface or remove any marking, labels, decals, tags and stencil marks from the CGC. The supplier uses these markings for identification of the content of the gas cylinder.

4. Never use a flame to detect flammable gas leaks. Use a soapy solution.

5. Keep the cylinder valve closed at all times, except when the cylinder is in active use.

6. Cylinders containing compressed gases should not be subjected to temperatures above 125 °F. A flame should never be permitted to come in contact with any part of a CGC.

7. Before changing a CGC or returning empty cylinders, be sure to close the main valve. When returning empty cylinders see that the cylinder protective caps and outlet caps or plugs, if used, are replaced.

8. Do not lift cylinders by the cap.

9. Do not tamper with the safety relief devices on CGC or their valves.

10. Never use cylinders as rollers, supports, or for any purpose other than to contain the content as received.

11. The user is responsible for the handling and replacement of the compressed gas cylinder and the regulator unless other arrangements are made by your laboratory.

12. After the regulator has been attached to the cylinder (do not use teflon tape on the threads), open the cylinder valve “slowly” to prevent rupturing the regulator diaphragm.

13. Cylinders should never be dropped or permitted to strike each other.

14. After a cylinder has been set in its final storage area and all necessary piping connections have been made, the connections should be tested thoroughly with a soapy solution.

Figure 11.2 Typical Compressed Gas Cylinder

11.6.1.2 Ultra Dilute Agent Storage and Handling

The handling and use of UDA material (other than receipt of the samples) is to be restricted to UDA laboratories. All sample receipt procedures and UDA operations are to use the "buddy system" with a second person, trained in the CWA handling procedures. The second person must observe the procedures from a safe location, but still within eyesight. Under no circumstance should laboratory staff work with CWA samples or standards alone.

UDA reference material moved outside of the UDA laboratory must be in triple containment at all times.

When the standard is removed from the storage location, but is still in the same laboratory complex, the move is called "checkout" and is recorded in the LIMS Standard tracker. Information recorded in the LIMS standard tracker includes Standard ID, location, the reason for checkout, name of person performing checkout, date of checkout, name of person performing check-in, and check-in date.

When the standard is to be permanently moved to another laboratory complex the move is called "transfer" and the appropriate Dilute Standard Tracking Worksheet row must be moved to the new storage location's worksheet. All transfers within the laboratory require secondary containment.

Unique identification numbers are given to each primary and subsequent solution.

Refrigerators used to store UDA standards or unknown samples are equipped with alarms designed to sound when the refrigerator temperature set points are exceeded. Loss of refrigerator temperature control may create a vapor hazard. In a situation where the standards need to be moved to another refrigerator, only trained staff must move the standards. All UDA standards and unknown samples will be stored in double containment. Packaging will be selected to provide containment of dilute solution liquid and vapor. CASARM-certified dilute solutions are stored under refrigeration, or in accordance with instructions supplied by the CASARM Quality Assurance, Quality Directorate or provider. Dilute agent solutions with similar physiological effects should, when possible, be stored as a group, separate from other agents (e.g., nerve agents separated from blister agents). Each UDA agent must be stored separately in secondary containment in locked refrigerators (plastic containers with lids within trays on each shelf). Primary UDA glass vials are to be stored in the designated UDA refrigerator in closed secondary containers within trays on each shelf.

The refrigerator electronic system retains a record of entry in both refrigerators. The CAOs will record this information daily for entry in the Refrigerator Entry & Temperature Log daily. Due to possible inhalation hazards, if the temperature of the UDA materials is outside of the 4±2°C range, the refrigerator is not to be opened and the LBC is to be notified. The temperature charts will be changed by the CAOs each week. The charts will be retained in the Refrigerator Entry & Temperature log.

Incompatible hazardous materials must be stored in separate areas, or at least segregated within secondary containment. Labels for all incoming hazardous materials are maintained on the container, and are not removed or defaced until the container is empty or submitted for disposal. It is preferable that labels on secondary (transport and storage) containers be removed when the hazardous material has been removed. Emptied containers are decontaminated and marked as empty.

All hazardous material containers, including waste containers, must be labeled as to content. Containers that are too small to label in this fashion are placed in a secondary container, and the outer container labeled to show the contents of the inner container.

Prior to beginning any laboratory activities involving agent, operators shall:

- Verify that the passage to all first aid/safety equipment (fire extinguishers, showers, eyewash stations, and emergency exits) is unobstructed;
- Ensure that the first aid kit is properly stocked, including an appropriate number of Duo dote kits;
- Verify that there is an appropriate quantity of personnel decontamination solution (liquid soap and tap water) and sponges for personnel decontamination;
- Verify that an adequate quantity of spill decontamination material (5-6% commercial bleach or prepared from granular chlorine, waste container absorbent lab paper/absorbent mats) is available;
- Ensure that sink drain stoppers are in place, and catch pools or drains for emergency showers are available, and;
- Ensure that waste disposal containers are available.

In addition, the CHO shall conduct spot checks to reinforce that the safety equipment listed above is utilized in accordance with this procedure.

Primary UDA glass vials are to be stored in closed secondary containers within trays on each shelf.

UDA glass ampoules shall only be opened in UDA laboratory fume hoods. When opened, UDA vials shall be supported by a vial rack or other physical support to prevent tipping. At no time should the CAO's face/head break the plane of the hood sash while handling UDAs.

If suspected or actual direct contact or exposure to UDA, wash with liquid soap and rinse with tap water. This wash and rinse cycle is to be repeated three times using the sink or safety shower.

Labels on agent vials must not be removed or defaced until the container is empty, decontaminated and ready for disposal. If labels are accidentally removed, this is to be noted in the UDA Accountability Notebook and the AM notified.

11.6.2 Preparation of a Dilution from a UDA Standard

11.6.2.1 Preparation of a Dilution from a Primary Standard

The original UDA solutions received by the laboratory may require dilution in order to be used. This section describes the first dilution performed on the original UDA solutions.

A CAO removes the Primary Standard from storage and performs the necessary operations using the appropriate SOP.

Agent information includes: preparation date, solution ID, agent present, concentration, solvent type, expiration date, operation type, amount used, amount remaining, new standard solution ID, and storage location of new solution. All of this information must be entered and recorded into the LIMS Standard Preparation module.

The Dilute Primary Standard Record is started with receipt of the Primary Standard from ECBC or LLNL. A separate CWA Dilute Solution Primary Standard Record is generated for each stock standard solution.

When the balance remaining in the container is determined, this number will be recorded in the appropriate Primary Standard LIMS record.

The container is returned to its designated storage when finished.

The Agent Manager must provide custodial approval of the entered information concerning Primary Standard usage. This approval is used as verification that the record is complete and accurate.

The operator must complete the LIMS Primary Standard Record. An ID number is automatically generated once a LIMS standard record is complete. The Primary Standard ID must be printed on a label from the LIMS and placed on each standard solution.

All further uses of the Primary Standard are tracked within the LIMS.

Note: Primary standard usage will be recorded to the nearest µL (0.001 mL). Usage that is measured in the fractions of a µL (e.g., 0.2 µL) will be recorded at the next highest whole µL.

11.6.2.2 Preparation of a Dilution from a Non-Primary Standard

Most working standards will be prepared directly from the original primary standards as described in Section 11.6.2.1. However, if it becomes necessary to prepare a working solution from a secondary stock solution, then the following procedure is to be used.

A CAO removes the non-primary standard from storage and performs the necessary operations using the appropriate SOP.

Agent information includes: preparation date, original solution ID, new solution ID, agents present, concentration of agent(s), solvent used, initial volume (mL), expiration date, storage location of new solution, and operator name. All of this information must be entered and recorded into the LIMS Standard Preparation module.

A separate Dilute Standard Tracking Record is generated for each standard prepared.

The original container is then returned to storage.

Disposal of the non-primary standards is tracked in the LIMS standard preparation module.

Custodial approval is not required for non-primary standards.

An ID number is automatically generated once a LIMS standard record is complete. The standard ID must be printed on a label from the LIMS and placed on each standard solution.

11.6.3 Gas Cylinder Manifold Room

For safe cylinder management and ideal laboratory accessibility it is necessary to pipe gases from a central compressed gas dispensing facility (manifold) instead of placing cylinders in each laboratory unit.

A central gas cylinder manifold room should be located in a room with an outside wall for explosion venting in the ratio of one square foot of venting surface for each 40 to 60 cubic feet of room volume or be housed in a room attached to the outside of the building. The room should be adequate in size to store the various gases in segregated locations (1) full cylinders and (2) empty cylinders awaiting removal for refilling, as well as the various manifolds necessary for piping the gases. Ventilation in the manifold room should be adequate to vent heat from the sun load on the roof and walls and to remove gases leaking from a failed regulator or valve. Rigid and secure supports for gas tanks should be provided, and they should be designed to provide maximum storage flexibility. Adhere to the preceding rules listed in section 11.6.1.1 when handling compressed gas cylinders in the manifold room.

Storage of gas cylinders is an important factor in gas safety. Always assign a definite area for cylinder storage. Don't lay them down and allow them to roll. Rather store them upright in racks. Keep the manifold area dry, cool, and well ventilated. Dryness avoids rust and corrosion, and makes maneuvering around the storage area safer. Cool areas avoid pressure increases that can result from

heat or direct sunlight. Prevent sparks and temperatures greater than 130 °F, particularly around flammables. Keep cylinders away from live electrical equipment. Any electrical spark to the cylinder can present heat and weaken the steel at that spot. Ventilation is needed in case of leaks. Separate non-flammables and oxidizers from flammables by at least 20 feet (or by a non-combustible wall). Don't allow smoking near flammable gases since they are a fuel, or near oxidizers, since they make ordinary combustibles easier to burn, and you would be carrying the ignition source. Always secure the cylinder area. Proper strapping will protect cylinders from being struck by objects, the cylinder is under stress and gas is looking for any excuse to get out. Any gas under pressure may explode if the cylinder is improperly stored or handled.

Figure 11.3 Typical Compressed Gas Manifold

11.6.4 Hazard Categories of Compressed Gases

The hazard of compressed gases can be categorized into the following basic hazards:

1. Inert: displace oxygen causing simple asphyxiation. Examples are nitrogen (N_2), argon (Ar) and helium (He).

2. Toxic: cause adverse health effects depending on the type of gas, route of entry, and dose. Examples are carbon dioxide (CO_2) and phosgene.

3. Flammables: cause fire or explosion when ignited. Examples are methane (CH_4) and hydrogen (H_2). Extreme caution should be utilized when handling these gases.

4. Reactives, which can be subdivided into:

   - Corrosives: erode and deteriorate human flesh or equipment, such as C_{12} or hydrochloric acid (HCl).
   - Oxidizers: Are not flammable by themselves, but will react violently when exposed to flammable or combustible materials. Examples are oxygen (O_2) and fluorine (F_2).

11.6.5 Liquid Nitrogen & Argon Bulk Tank

Liquid argon and liquid nitrogen are tasteless, colorless, odorless, non-corrosive, nonflammable, and extremely cold.

Liquid Argon:

Argon belonging to the family of rare inert gases and it is the most plentiful of the rare gases, making up approximately 1% of the earth's atmosphere. It is monatomic and extremely inert, forming no known chemical compounds. Special materials of construction are not required to prevent corrosion. However, materials of construction must be selected to withstand the low temperature of liquid argon. Vessels and piping should be designed to American Society of Mechanical Engineers (ASME) specifications or the Department of Transportation (DOT) codes for the pressures and temperatures involved. Although used more commonly in the gaseous state, argon is commonly stored and transported as a liquid, affording a more cost effective way of providing product supply. When argon is converted to liquid form it becomes a cryogenic liquid. Cryogenic liquids are liquefied gases that have a normal boiling point below -238 °F (-150 °C). Liquid argon has a boiling point of -302.6 °F (-185.9 °C). The temperature difference between the product and the surrounding environment, even in winter, is substantial. Keeping this surrounding heat from the product requires special equipment to store and handle cryogenic liquids. A typical micro-bulk system consists of the following components: a cryogenic storage tank, one or more vaporizers, a pressure control system, and all of the piping required for fill, vaporization, and supply. The micro-bulk tank is constructed like a vacuum bottle. It is designed to keep heat away from the liquid that is contained in the inner vessel. Vaporizers convert the liquid argon to its gaseous state. A pressure control manifold controls the pressure at which the gas is fed to the process.

Being odorless, colorless, tasteless, and nonirritating, argon has no warning properties. Humans possess no senses that can detect the presence of argon. It can act as a simple asphyxiant by displacing the oxygen in air to levels below that required to support life. Inhalation of argon in excessive amounts can cause dizziness, nausea, vomiting, loss of consciousness, and death. Death may result from errors in judgment, confusion, or loss of consciousness that prevents self-rescue. At low oxygen concentrations, unconsciousness and death may occur in seconds and without warning. Personnel, including rescue workers, should not enter areas where the oxygen concentration is below 19.5%, unless provided with a self-contained breathing apparatus or air-line respirator. Extensive tissue damage or burns can result from exposure to liquid argon or cold argon vapors

Liquid Nitrogen:

Liquid nitrogen is inert, colorless, odorless, noncorrosive, nonflammable, and extremely cold. Nitrogen makes up the major portion of the atmosphere (78.03% by volume, 75.5% by weight). Nitrogen is inert and will not support combustion; however, it is not life supporting.

Nitrogen is inert except when heated to very high temperatures, where it combines with some of the more active metals, such as lithium and magnesium, to form nitrides. It will also combine

with oxygen to form oxides of nitrogen and, when combined with hydrogen in the presence of catalysts, will form ammonia.

Since nitrogen is noncorrosive, special materials of construction are not required to prevent corrosion. However, materials of construction must be selected to withstand the low temperature of liquid nitrogen. Vessels and piping should be designed to American Society of Mechanical Engineers (ASME) specifications or the Department of Transportation (DOT) codes for the pressures and temperatures involved.

Although used more commonly in the gaseous state, nitrogen is commonly stored and transported as a liquid, affording a more cost-effective way of providing product supply.

Liquid nitrogen is a cryogenic liquid. Cryogenic liquids are liquefied gases that have a normal boiling point below –130°F (–90°C). Liquid nitrogen has a boiling point of –320°F (–196°C). The temperature difference between the product and the surrounding environment, even in winter, is substantial. Keeping this surrounding heat from the product requires special equipment to store and handle cryogenic liquids.

A typical system consists of the following components: a cryogenic storage tank, one or more vaporizers, and a pressure and temperature control system. The cryogenic tank is constructed like, in principle, a vacuum bottle. It is designed to keep heat away from the liquid that is contained in the inner vessel. Vaporizers convert the liquid nitrogen to its gaseous state. A pressure control manifold controls the pressure at which the gas is fed to the process. Processes that use nitrogen as a liquid do not require the vaporizers and pressure control manifold

Figure 11.4 Bulk Nitrogen & Argon Tank

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12. BIOHAZARDS MANAGEMENT

The handling of biohazardous agents requires care and precaution to prevent accidents and contamination, and to maintain quality control. Information on hazards associated with substances in both MLB and ASQAB may be found in the Centers for Disease Control and Prevention/National Institutes of Health (CDC/NIH) guide entitled "Biosafety in Microbiological and Biomedical Laboratories," 4th ed. The purpose of this chapter is to specify controls and safe handling practices for procurement, receipt, analysis, storage, and waste accumulation of biohazardous agents within the FDEP B/LABS.

General Rules

The guiding principle for work with biohazards is containment, which includes the use of appropriate methods for managing infectious agents with the purpose of preventing or reducing exposures to personnel and the environment. Containment begins with facility and/or laboratory design (i.e., fume hoods, biological safety cabinets), followed by good laboratory practices, and supplemented by proper use of PPE.

Good Laboratory Practices:

A. General

1. Control the biohazard area.

- Post a warning sign when a biohazardous agent is present in the area. This warning sign should identify the agent and indicate the requirements for entry.
- Limit access to the laboratory during procedures involving biohazardous agents.

2. At no time should live cultures be transported outside of the microbiology laboratory wing.

B. General Procedures to Minimize Exposure

1. Aerosols

- Generation of aerosols may be caused by manipulation of microorganisms including, but not limited to, the following: The use of centrifuges, blenders, shakers, magnetic stirrers, sonicators, pipettes, vortex mixers, syringes and needles, freeze-dried samples, vacuum sealed samples, mortar and pestles, culture tubes, inoculating loops, and separatory funnels.
- Perform aerosol-generating activities in a biological safety cabinet.

Aerosols refer to liquid droplets or solid particulates dispersed in air. Aerosols are too small to be seen by the unaided eye and remain suspended for a period of time. The production of aerosols while handling biohazardous agents accounts for the greatest source of laboratory hazards and potential infection.

2. Control of aerosols

- Keep tubes closed when vortexing or centrifuging.
- Mix solutions by discharging the secondary fluid down the side of the container or as close as possible to the surface of the primary solution.

C. Pipettes

1. Never mouth pipette.

2. Pipetting of biohazardous agents must be performed in a biological safety cabinet.

3. Do not use a pipette to bubble air through a liquid containing a biohazardous agent.

D. Centrifuges

1. A biological safety cabinet (BSC) will be used with screw-capped centrifuge tubes when centrifuging infectious materials with a tabletop centrifuge, unless sealed rotors are used. In the case of sealed rotors, the rotors will be opened in a BSC after centrifuging is completed.

2. Before centrifuging, check tubes for cracks, inspect the side of the trunnion cup (tube holder) for rough walls caused by corrosion or adhering matter, and ensure that the rubber cushions are clean, properly sealed and seated.

3. Great care should be taken when decanting centrifuge tubes. All decanting procedures for centrifuge tubes must take place within the BSC to protect against any aerosolized material.

4. Avoid filling the tube intended for angle rotors to the point where the fluid will reach the rim of the tube under horizontal centrifugal force, except in specifically designated centrifuge tube holders with trunnions.

5. Centrifuge tubes will only be filled to the maximum limit set by the manufacturer of the centrifuge, rotor, and/or tubes.

E. Syringes (Please note that syringes are not currently used in any FDEP LABS microbiology laboratory. Should any laboratory analysis require the use of syringes for infectious materials, the following procedures will be adopted.)

1. A needle locking hypodermic syringe will be used whenever possible.

2. The use of syringes for making dilutions is discouraged. Glass tubes with Morton closures shall be used instead.

3. Use an alcohol-soaked pledget around the needle and stopper when removing a syringe and needle from a rubber stoppered vaccine bottle containing infectious material.

4. Needles will not be removed from syringes or multi-draw adapters and the needle covers will not be replaced after removal. However, when necessary, needle covers of needles can be replaced or removed with hemostats or needle-nosed pliers.

13. CHEMICAL AND BIOLOGICAL SPILL CONTROL AND REPORTING

13.1 Spill control procedures and decontamination

All spills must be reported to the CAHO Manager, regardless of the severity of the spill. Even though minor spills may be cleaned up on the spot, additional testing may be ordered to comply with regulatory requirements, to verify complete remediation or assess the environmental impacts of the spill. The FDEP LABS CAHO Manager will make further cleanup or remediation decisions.

A minor spill is defined as an incident that can be handled by laboratory employees in the immediate area without posing any threat to their health and safety, and can be cleaned up with available absorbents or neutralizers. Laboratory personnel must select the appropriate level of protection and absorption/cleanup matrix for the spill after referring to MSDS information and/or the CAHO Manager as necessary. Detailed procedures for each component of the cleanup processes for chemical and biological spills are explained in Tables 13.1 through 13.6.

Please refer to the section in this document on Personal Protective Equipment (Section 3) before attempting to clean up any spill yourself.

Table 13.1: Chemical Spill Control Procedures

Control the Source	Don the proper PPE and stand a spilled bottle upright, or shutoff a flow valve if possible.
Control the Spread	Use the appropriate substance-specific spill pads or socks, absorbents, neutralizers, containment booms, etc., to prevent the spill area from growing in size. If the area involved is more than can be safety handled, immediately obtain assistance from the FDEP B/LABS CAHO Manager or evacuate the facility.
Absorb Free Liquid	Use the appropriate substance-specific spill pads or pillows, absorbents or neutralizers to absorb as much free material as possible and control organic vapors (activated carbon).
Decontaminate Area	Neutralize or remove all residues and clean up the area.
Inspect the Area	Carefully check the entire affected area and beyond for remaining spill or cleanup residue.
Package and Label Residue	Ensure that all spill residues and cleanup materials used are properly packaged and labeled for disposal.

Any incident that cannot be handled safely by employees in the immediate area will be considered a major spill (i.e., a large quantity spill or a spill of a material that poses a hazard to the employees

or the environment) and should be immediately referred to the CAHO Manager who can assess the FDEP LABS' emergency environmental cleanup contractor if needed, or referred directly to the fire department Hazardous Materials (HAZMAT) team if the CAHO Manager can not be reached.

If there is significant danger from spill fumes, the room door should be shut and the FDEP LABS CAHO Manager should be notified immediately. If necessary, the building should also be evacuated. Should there be uncertainty as to the chemical spilled or should a mixture of hazardous chemicals be spilled, the incident should be considered a major spill and should be handled by the fire department HAZMAT team or the FDEP LABS' emergency environmental cleanup contractor.

Any significant spill of a flammable or reactive material that poses a fire hazard should be handled by the local fire department, the environmental cleanup contractor, or both, depending on the nature and severity of the spill. A major spill of this sort should prompt an immediate evacuation.

13.1.1 Small Spill

In the event of an in-hood spill of 1 milliliter (mL) or less, apply decontamination solution to the spill immediately. Wearing nitrile and silver shield gloves, operators shall carefully wipe up the decontamination solution and spilled material using absorbents. Contaminated absorbents shall be placed in the hood decontamination waste container (solid waste).

Then rinse the spill area with water and wipe dry with laboratory tissue/absorbent pads. This material shall be placed in the decontamination containers in the hood.

Following spill clean-up, operators shall dispose of contaminated PPE in hazardous waste decontamination containers for solids in the hood.

13.1.2 Large Spill

In case of larger spills or any spills outside of the fume hoods, evacuate the areas and then notify the CHO or SHEM.

With loss of engineering controls (ventilation, hood alarms or intercom), all personnel shall immediately remove PPE, evacuate the UDA laboratories and call the CHO or the SHEM.

13.2 Biohazard Spill Control Procedures

Most spills of biohazardous agents are likely to be small and easily contained and readily cleaned by laboratory staff. Regardless of how minor a spill, any such occurrence involving a Biosafety Level 2 or Biosafety Level 3 Agent shall be immediately reported to the CAHO Manager.

Table 13.2: Biosafety Level 1 and 2 Spill Control Procedures: *Spills Outside & Inside of the BSC*	
Notify Workers	Alert workers in the laboratory that a spill has occurred
Maintain BSC air flow	Keep the BSC operational. Do not turn off the blower for any reason.
Control the Source	Don the proper PPE and stand the spilled bottle upright, and unplug any small contaminated equipment (i.e., vortex, timer).
Control the Spread	Cover the spill with a paper towel or other appropriate absorbent material to prevent the spill area from growing in size.
Decontaminate Area	Saturate the paper towel or other absorbent material with liquid disinfectant and let stand for 20 to 30 minutes.
Inspect the Area	Carefully check the entire affected area and beyond for remaining spill or cleanup residue.
Decontaminate all clean-up material and PPE	Autoclave contaminated paper towel or other absorbent material and any contaminated writing utensils. Treat contaminated PPE and any contaminated street clothing with disinfectant or autoclave.

Table 13.3: Biosafety Level 3 Spill Control Procedures *Spills Outside of the BSC*	
Notify Workers	Alert workers in the laboratory that a spill has occurred.
Maintain BSC air flow	Keep the BSC operational. Do not turn off the blower for any reason.
Evacuate Laboratory	Remove lab coat and gloves and evacuate the laboratory.
Allow Facility's Ventilation to Remove Aerosols	Wait at least 30 minutes before re-entering the laboratory to allow the FDEP B/LABS' exhaust air ventilation system to remove bioaerosols.
Re-Enter Laboratory	Don the proper PPE before re-entering the laboratory.
Cover the Spill Area	Use a paper towel or other appropriate absorbent material to cover the spill area. Unplug any small contaminated equipment (i.e., vortex, timer).
Decontaminate Area	Saturate paper towel or other absorbent material with liquid disinfectant and let stand for 20 to 30 minutes.
Inspect the Area	Carefully check the entire affected area and beyond for remaining spill or cleanup residue.
Package and Label Residue	Ensure that all spill residues and cleanup materials used are properly packaged and labeled for disposal

Table 13.4: Biosafety Level 3 Spill Control Procedures *Spills Inside the BSC*	
Notify Workers	Alert workers in the laboratory that a spill has occurred.
Maintain BSC Air Flow	Keep the BSC operational. Do not turn off the blower for any reason.
Control the Source	Don the proper PPE and stand the spilled bottle upright, and unplug any small contaminated equipment (i.e., vortex, timer).
Control the Spread	Cover the spill with a paper towel or other appropriate absorbent material to prevent the spill area from growing in size.
Decontaminate Area	Saturate paper towel or other absorbent material with liquid disinfectant and let stand for 20 to 30 minutes.
Inspect the Area	Carefully check the entire affected area and beyond for remaining spill or cleanup residue.
Decontaminate all clean-up material and PPE	Autoclave contaminated paper towel or other absorbent material and any contaminated writing utensils. Treat contaminated PPE and any contaminated street clothing with disinfectant or autoclave.

Table 13.5: Spill Control Procedures for *Bacillus anthracis Spills Inside of the BSC*	
Notify Workers	Alert workers in the laboratory that a spill has occurred.
Maintain BSC Air Flow	Keep the BSC operational. Do not turn off the blower for any reason.
Keep Hands Inside the BSC	Analyst must keep his hands inside of the BSC until clean up is complete.
Control the Spread	Return overturned flask, tube, etc. to an upright position. Cover the spill with paper towels or other absorbent material to prevent the spill area from growing in size. Unplug any small contaminated equipment (i.e., vortex, timer).
Decontaminate Area	Saturate paper towel or other absorbent material with a 1:11.4 dilution of bleach at neutral pH. Let stand for 60 minutes.
Inspect the Area	Carefully check the entire affected area and beyond for remaining spill or cleanup residue.
Proceed with PPE Doffing Procedures	Rinse outer layer of gloves with 1:11.4 dilution of bleach at neutral pH to remove spores. Remove outer layer of gloves and leave in BSC for 60-minute contact time. Proceed with PPE doffing procedures and exit laboratory to contact CAHO Manager and the laboratory director.
Re-Enter Laboratory and Don PPE to Clean Up	Following the 60-minute contact time, don proper PPE to clean up spill site. Place contaminated paper towels/absorbent material and any other items used in clean up into an autoclave bag.
Proceed with PPE Doffing Procedures	Remove PPE as specified in SOP MB-11.
Turn on UV Light in BSC	Leave on UV light over night.
Decontaminate all clean-up material and PPE	Autoclave biohazardous waste. Please refer to specific procedures in SOP MB-11.

Table 13.6: Spill Control Procedures for *Bacillus anthracis Spills Outside of the BSC* (See SOP MB-11 for more details)	
Notify Workers	Alert workers in the laboratory that a spill has occurred.
Remain in Laboratory	Do not exit laboratory. Contact SHEMP Manager and Lab Director (or Security) by telephone from the laboratory.
Remain Calm	Do not remove any of your PPE, especially the respirator.
Notify Workers Outside of the Laboratory	Use the telephone or place a note (readable from the corridor) on the glass section of the laboratory door to warn workers from entering the laboratory.
Wait for Assistance	The SHEMP Manager, Lab Director, or their designees will contact the Hazardous Materials Team for assistance.

13.3 Storage of cleanup material

Cleanup materials and supplies are located throughout the building. These include general purpose absorbents such as silica and vermiculite, and specific absorbents for organic, acid and base spills. (See Table 13.7 for types of cleanup materials.)

13.4 Spill reporting

As stated in the beginning of Section 13, all spills must be reported to the FDEP LABS CAHO Manager. Depending upon the material, the quantity, location, and other factors (such as temperature, presence of

other substances, potential ignition sources, etc.) that may affect the nature, severity and hazards of a spill, different levels of spill response and reporting may be required. There are different spill reporting criteria (e.g., FDEP and NRC) for many substances. Since the reportable quantities vary with each substance and situation, refer to the FDEP B/LABS CAHO Manager for information regarding pertinent requirements for the reporting of a spill externally.

Should a facility evacuation be deemed necessary for any reason, including a spill or release, the procedures delineated in the FDEP B/LABS Occupant Emergency Plan should be followed.

13.5 Table of cleanup materials

Table 13.7: Types of Cleanup Material

Type of Cleanup Material	Uses
Spill Pillows	A general purpose silica absorbent used for any type liquid but hydrofluoric acid.
Vermiculite	A general purpose absorbent
Activated Carbon	Organics
Acid Cleanup Kit	Proprietary material with pH indicator for acid spills.
Basic Cleanup Kit	Proprietary material with pH indicator for base spills.
Mercury Cleanup Kit	Proprietary material for cleaning up lab mercury spills.
Flowers of Sulfur	React with mercury spills.
Peat Moss	Organic, weak polyacidic material useful for caustic spills if temporarily out of caustic cleanup kits.
Agricultural Hydrated	Useful for neutralizing acid spills without spattering.
Biosafety Spill Kit	Materials used for cleaning up spills of biohazardous agents.

13.6 PPE for Cleanup

PPE Requirements for UDA Access Levels	Visitors	CAO	Response	Remediation
Minimized amount of exposed skin	●	●	●	●
Lab coat	●	●	●	
Acceptable shoes (no open toe or exposed foot)	●	●	●	●
Long pants (skirts may be allowed for visitors if no agent manipulation)	●	●	●	●
Safety glasses	●	●		
Chemical splash goggles (if splash hazard exists)		●	●	●

PPE Requirements for UDA Access Levels	Visitors	CAO	Response	Remediation
Face shield (if splash hazard exists)		●	●	●
Gloves, single nitrile	●			
Gloves, double nitrile, 5 minute outer glove limit (while handling agent primary standard)		●	●	●
Gloves, double nitrile (change outer glove as needed, *e.g.*, compromised due to contamination, tear)		●	●	●
Gloves, nitrile over Silver Shield® (4 hour limit for Silver Shield®)		●	●	
Additional levels of skin protection (*e.g.*, Tyvek, poly-coated Tyvek, SARANEX)			●	●
Respirators – Escape only (where applicable)		●		
Respirators - CBRN Air Purifying Respirators		●	●	●
Respirators – CBRN Self-Contained Breathing Apparatus (SCBAs)			●	●

14. HAZARDOUS WASTE MANAGEMENT

14.1 Types of Waste

There are seven basic waste categories at the FDEP B/LABS:

Sanitary Sewer and Lab Wastes	Laboratory wastewater is processed by the FDEP LABS neutralization system, and then combined with facility sanitary sewer output before proceeding to the sewage treatment plant.
Expired or Discarded Chemicals	Expired or tainted commercial chemicals that are removed from inventory and disposed of according to facility hazardous or non-hazardous waste disposal protocols.
Process Wastes	Hazardous and non-hazardous wastes resulting from the various analytical processes occurring at the FDEP B/LABS.
Sample Wastes	Environmental sample materials (samples, sample containers, vials, extracts, etc.) that no longer need to be retained and are disposed of according to facility hazardous or non-hazardous waste disposal protocols.
Microbiological Wastes	Microbiological wastes destined for sterilization.
Repository Wastes	Expired materials from the pesticide repository.
Non-Hazardous Solid Wastes	All remaining solid wastes, including commodity waste, normal trash and recyclables. These materials are removed from each room daily by the FDEP B/LABS janitorial contractor, and removed two times per week from the facility by the Directorate of Public Works. Empty reagent containers are cleaned and disposed of as described in section 11.

14.2 Record Keeping

After all hazardous waste has been properly identified and labeled, it is taken to the FDEP LABS 90-day storage areas by the waste removal contractor or the various FDEP LABS organizational waste coordinators. They record the waste types, amount of waste generated. A generator's report, drum inventories and profiles are prepared by the waste removal contractor each time waste is lab packed for shipment.

The FDEP LABS CAHO Manager maintains all records of waste pickups (drum inventories, manifests, forms, etc.), and is responsible for filling out and filing the biannual hazardous waste report to the State of Florida.

All manifests are retained for at least three years, complying with 40 CFR 262.40. After lab packing of wastes by the hazardous waste transporter, a copy of the manifest is sent to the State of Florida within 5 days to comply with State regulations.

Transportation and disposal of spent/empty glass or plastic chemical/sample containers that are deemed ready for disposal by laboratory personnel will have the LIMS bar code label removed and the cap securely tightened by the analyst, then placed into one of the collection bins. Once a container collection bin is full, the Waste Removal Contractor shall determine the most appropriate disposal mechanism for each container based on the type of container, the original material held by the container, the presence of residues or residual material, and appropriate TSCA or RCRA regulatory requirements.

<u>Recycling and re-use:</u>

For those containers determined to be best disposed of as RCRA or TSCA hazardous waste, the Waste Removal Contractor shall transfer the container to the FDEP 90-day waste storage area, ensure that the proper RCRA or TSCA hazardous waste labeling is present on the waste container and record the transfer into the FDEP 90-day waste room logbook. The Waste Removal Contractor shall identify and record the following information, as a minimum, about the waste on the hazardous waste label and subsequently into the FDEP 90-day waste room logbook:

Constituents of the container

1) Total weight or volume of the container
2) Assigned RCRA waste numbers or codes
3) The date the container was transferred to the 90-day storage area
4) The pH (if applicable) of waste material
5) Name of individual performing the transfer

14.3 Ultra Dilute Agent Waste Management

14.3.1 General Guidelines

Disposal of all hazardous waste must be in accordance with applicable federal, state, and local laws and with the facility CHP.

Materials that have been in contact with UDA shall be treated as contaminated material.

Only chemically compatible substances shall be mixed in a common waste container.

Consult Material Safety Data Sheets (MSDS) as necessary for information concerning chemical reactivity and compatibility.

Expired or other unneeded UDA reference material will be placed in the decontamination solution.

All liquid decontamination waste will be tested prior to disposal. The tests will include KI-paper (to determine the presence of active chlorine) and Gas Chromatography/Mass Spectrometry (GC/MS) screening.

14.3.2 Labeling

Full decontamination solution containers will be labeled for disposal as hazardous waste. This will be documented in the UDA Accountability Notebook.

- Labeling will be as follows:
- Hazardous waste label;
- “Liquid Decon” or “Solid Decon”, depending on the waste matrix;
- Waste Type Code: D002, pH >12.5 solution;
- MD02, decontamination of CWA material;

- Estimate Amount of Waste per ECBC reference shipment: 6 L, and;
- Describe any Treatment: No treatment of the waste is performed in the laboratory.

Uncontaminated solid waste such as packing material will be marked as “Non-hazardous Waste” and will be disposed of as routine non-toxic material for incineration.

14.3.3 Types of Waste Solutions Decontamination

There will be three types of decontamination solutions:

- Waste generated from the decontamination of spills;
- Waste generated from the decontamination of liquids, and;
- Waste generated from the decontamination of solids (includes solid materials such as gloves and paper pads/absorbent material.

15. SUPPLEMENTARY MATERIALS

15.1 Facilities SOPs

15.2 QA Manual

15.3 Training Manual

15.4 Record Management SOP

15.5 Accountability SOP

APPENDIX 1 – LABORATORY SDS DOCUMENTS