OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES

PURPOSE:

The Division of Public Health Laboratories (PHL) recognizes the potential hazards for PHL employees who work with hazardous chemicals in laboratories. As a result, the PHL has developed a policy that models the OSHA Lab Safety Standard (29 CFR 1910.1450) in all areas engaged in the laboratory use of hazardous chemicals. As mandated by this standard and by Arkansas Act 556 (Code 12), the PHL has created a Chemical Hygiene Plan (CHP) to minimize these chemical exposures and to provide a safe and healthy laboratory environment.

Part I of this policy implements the CHP. Part II constitutes the PHL Chemical Hygiene Plan. Questions regarding this policy can be directed to Lab Safety Officer at extension 1491. Laboratories are encouraged to supplement the CHP as necessary.

PART I
IMPLEMENTATION OF THE CHEMICAL HYGIENE PLAN

POLICY:

Each laboratory shall carry out the provisions of a written Chemical Hygiene Plan that will:

1. Protect employees from health hazards associated with hazardous chemicals in that laboratory.

2. Keep chemical exposures within limits established by OSHA and the American Conference of Governmental Industrial Hygienists.

3. Protect non-laboratory workers from health hazards associated with hazardous chemicals in the laboratory.
RESPONSIBILITIES:

Responsibility for chemical hygiene rests at all levels including:

1. The **PHL Laboratory Director**, who has ultimate responsibility for chemical hygiene within the Division and detached facilities, and must, with other administrators, provide continuing support for institutional chemical hygiene.

2. The **Section Directors**, who are responsible for:
   a. Implementing this policy as it pertains to their section.
   b. Insuring employees receive the information and training required by this policy.

3. The **Chemical Hygiene Officer (CHO)** whose responsibilities include:
   a. Providing technical guidance in the development and implementation of the Laboratory Chemical Hygiene Plan.
   b. Insuring the completion and documentation of annual audits of compliance with this policy. (This is a shared responsibility with the laboratory supervisor).
   c. Reviewing and updating the policy annually after consultation with the laboratories and administration.
   d. Providing additional technical assistance in determining chemical toxicity classification, chemical incompatibilities, measures to protect employees and the selection of personal protective equipment.
   e. Assisting supervisors perform hazard evaluations of chemicals used in laboratories.
   f. Providing employee chemical exposure monitoring when indicated.
   g. Assisting project directors develop precautions and adequate facilities.

4. The **Laboratory Supervisor**, who has specific responsibilities for chemical hygiene in the laboratory. Those responsibilities include:
   a. Insuring the provision of training and information required by this policy.
   b. Insuring the completion and documentation of annual audits of compliance with this policy. (responsibility shared with the CHO)
c. Ensuring that workers know and follow the chemical hygiene rules; that protective equipment is available and functioning; that the training provided is adequate.

d. Providing regular, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment.

e. Monitoring procurement, use, and disposal of chemicals used in the laboratories.

f. Determining the required levels of protective apparel and equipment. If assistance is required, consult the Data Automation, Quality Assurance And Safety section (DAQAS).

g. Ensuring that special facilities and specific training for use of any ordered material are adequate.

Lab supervisors insure the repair of unsafe items or their removal from service. Supervisors will arrange for one of these actions immediately. Also, that person will judge the severity of danger and decide the availability of the item for non-hazardous uses. Contact DAQAS for assistance.

5. The Project Director or director of a specific operation (such as projects involving maintenance or remodeling), who has primary responsibility for chemical hygiene procedures for that operation.

6. The Laboratory Worker, who is responsible for:

   a. Planning and conducting each operation using this policy and accepted prudent practice.

   b. Developing good personal chemical hygiene habits.
# PART II
## CHEMICAL HYGIENE PLAN CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General principles for working with laboratory chemicals.</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>The laboratory facility.</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>General rules.</td>
<td>8</td>
</tr>
<tr>
<td>4.</td>
<td>Chemical procurement, distribution and storage.</td>
<td>11</td>
</tr>
<tr>
<td>5.</td>
<td>Environmental monitoring.</td>
<td>11</td>
</tr>
<tr>
<td>6.</td>
<td>Housekeeping and maintenance.</td>
<td>13</td>
</tr>
<tr>
<td>7.</td>
<td>Inspections.</td>
<td>13</td>
</tr>
<tr>
<td>8.</td>
<td>Medical program.</td>
<td>13</td>
</tr>
<tr>
<td>9.</td>
<td>Protective apparel and equipment.</td>
<td>15</td>
</tr>
<tr>
<td>10.</td>
<td>Records</td>
<td>15</td>
</tr>
<tr>
<td>11.</td>
<td>Signs and labels</td>
<td>15</td>
</tr>
<tr>
<td>12.</td>
<td>Spills and accidents.</td>
<td>16</td>
</tr>
<tr>
<td>13.</td>
<td>Information and training.</td>
<td>18</td>
</tr>
<tr>
<td>14.</td>
<td>Waste disposal.</td>
<td>19</td>
</tr>
<tr>
<td>15.</td>
<td>Provisions for work with particularly hazardous substances.</td>
<td>21</td>
</tr>
<tr>
<td>16.</td>
<td>Prior approval.</td>
<td>21</td>
</tr>
<tr>
<td>17.</td>
<td>Compressed gas cylinder safety.</td>
<td>21</td>
</tr>
<tr>
<td>Appendix A</td>
<td>Definitions.</td>
<td>23</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Hazcom Program (Act 556).</td>
<td>26</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Example of Posted Emergency Telephone Numbers</td>
<td>30</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Laboratory-self inspection checklist.</td>
<td>31</td>
</tr>
</tbody>
</table>
PART II
CHEMICAL HYGIENE PLAN

This plan shall be readily available to laboratory workers and inspectors. **It represents minimum standards for the Public Health Laboratories.** Individual laboratories may supplement this plan for local conditions. Annual updates will be provided by the Data Automation, Quality Assurance, and Safety Section (DAQAS) with suggestions from the laboratories.

1. **General Principles for Working with Laboratory Chemicals.**

   a. It is prudent to minimize all chemical exposures. Because few laboratory chemicals are without hazards, general precautions for handling all laboratory chemicals will be adopted.

   b. Avoid underestimation of risk. Even for substances of no known significant hazard, exposure should be minimized; for work with substances that present special hazards, special precautions should be taken. Assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity are toxic.

   c. Provide adequate ventilation. The best way to prevent exposure to airborne substances is to prevent their escape into the working atmosphere by use of hoods and other ventilation devices.

   d. Institute a chemical hygiene program. A mandatory chemical hygiene program designed to minimize exposures. It should be a continual effort, not merely a standby or short-term activity.

   e. Observe recognized exposure limits. Chemical exposures should not routinely exceed the Permissible Exposure Limits (PEL) of OSHA and the Threshold Limit Values (TLV) of the American Conference of Governmental Industrial Hygienists.

2. **The Laboratory Facility.**

   a. **Design.** Each PHL laboratory should have:

      (1) An appropriate general ventilation system with air intakes and exhausts in a location that avoids the intake of contaminated air.
(2) Adequately well-ventilated stockrooms/storerooms.

(3) Laboratory hoods and sinks located where necessary for safe chemical hygiene practices.

(4) Eyewash fountains and drench showers with drains that are within the work area and 100 foot travel distance. Permanently plumbed eyewash stations connected to fresh tap water are preferred to portable stations.

(5) At least one portable fire extinguisher per work area.

(6) A conveniently located fire alarm and telephone for emergency use.

(7) Arrangements for waste disposal and proper spill containment/cleanup.

b. Maintenance. Laboratory safety equipment including permanently installed items should undergo continuing appraisal and modification if inadequate. Prior to repairs or routine maintenance, the user or department should relocate chemicals and clean the equipment (hoods, glove boxes, etc.).

c. Usage. The work conducted and its scale must be appropriate to the physical facilities available and especially to the quality of ventilation.

d. Ventilation.

(1) General laboratory ventilation. This system should provide a source for breathing air and for supply to local ventilation devices. Personnel should not rely on it for protection from toxic substances released into the laboratory.

It should continually replace laboratory air, preventing the increase of air concentrations of toxic substances during the working day. The system should direct air flow into the laboratory from non-laboratory areas and out to the exterior of the building.

(2) Hoods. A laboratory hood with 2.5 linear feet of hood space per person should be provided for every two workers if they spend most of their
time working with hazardous chemicals. Each hood should have a continuous monitoring device to allow convenient confirmation of adequate hood performance before use.

If this is not possible, work with substances of unknown toxicity should be avoided or other types of local ventilation devices should be provided. The physical plant tests hoods annually and when moved or modified.

(3) Biological Safety Cabinets. Biological safety cabinets are the most common and among the most effective primary containment devices used by laboratories working with infectious agents. OSHA and CDC guidelines require testing and certification at least annually and at the time of installation, or when moved. The PHL is responsible for certification. An outside contractor conducts the certification process.

(4) Other local ventilation devices. Ventilated storage cabinets, canopy hoods, movable exhaust ducts, etc. should be provided as needed.

(5) Special ventilation areas. If hazardous chemicals are used in glove boxes and isolation rooms the exhaust air should be passed through scrubbers or other treatment before release into the regular exhaust system. Cold rooms and warm rooms have closed air circulation systems with the potential for air contamination. Provisions for rapid escape are necessary.

(6) Modifications. Any alteration of the ventilation system should be made only if thorough testing shows that worker protection from airborne toxic substances will continue to be adequate.

(7) Performance. Rates from 4-12 room air changes per hour are normally adequate for general ventilation if local exhaust systems (hoods) serve as the primary method of chemical control.

(8) Quality. General air flow should not be turbulent and should be uniform throughout the laboratory, with no high velocity or static areas. Airflow into and within the hood should not be excessively turbulent. Hood face velocity should be adequate (typically 75-120 feet per minute (fpm) at a comfortable working sash height).

(9) Evaluation. Quality and quantity of ventilation should be evaluated on initial installation, regularly monitored and reevaluated whenever a change in local ventilation devices occurs.
Maintenance monitors the performance of major HVAC components by remote sensors. The physical plant changes system filters on a monthly to quarterly basis, depending on location. Air quality/HVAC problems should be reported to Maintenance Control at extension 2103.


The following should be used for essentially all laboratory work with chemicals.

a. **Accidents and spills -Eye contact:** Promptly flush eyes with water for a prolonged period (15 minutes) using fingers to separate eyelids. Seek medical attention. **Ingestion:** Comply with the emergency instructions on the product label/MSDS and seek medical attention. **Skin contact:** Promptly flush the affected area with water for at least 15 minutes, remove any contaminated clothing, and seek medical attention.

b. **Clean-up.** Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal procedures.

c. **Avoidance of "routine exposure".** Develop and encourage safe habits. Avoid unnecessary exposure to chemicals by any route.

d. **Do not smell or taste chemicals.**

e. **Vent or install filters on any apparatus that may discharge toxic chemicals** (vacuum pumps, distillation columns, etc.) into local exhaust devices.

f. **Gloves.** Inspect gloves and test glove boxes before use.

g. **Do not allow the release of toxic substances** in cold rooms and warm rooms, since these have contained recirculated atmospheres.

h. **Choice of chemicals.** Use only those chemicals for which the quality of the available ventilation system is appropriate.

i. **Eating, drinking, smoking, etc.:**

   The following statement is the accepted practice on food and drink in laboratories and should be followed at all times:

   "There shall be no food, drink, smoking or applying cosmetics in laboratories which have radioactive materials, biohazardous materials or hazardous chemicals present. Rooms which are adjacent, but separated by floor to ceiling walls, and do not have any chemical, radioactive or biohazardous agents,
present, may be used for food consumption, preparation, or applying cosmetics at the discretion of the supervisor responsible for the areas.” You must always wash your hands thoroughly prior to leaving the laboratory.

j. There shall be no storage, use or disposal of the above 'consumable' items in laboratories (including refrigerators within laboratories).

k. **Equipment and Glassware.** Handle and store laboratory glassware with care to avoid damage. Do not use damaged glassware. Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur. Use equipment only for its designed purpose.

l. **Exiting.** Before leaving the laboratory, workers will wash gloves and remove. Remove aprons or lab coats and wash areas of exposed skin.

m. **Horseplay.** Avoid practical jokes or other behavior that might confuse, startle, or distract another worker.

n. **Mouth suction.** Do not use mouth suction for pipetting or siphoning.

o. **Personal apparel.** Confine long hair and loose clothing. Shorts are not appropriate due to the potential for chemical exposure to the skin. Wear shoes at all times in the laboratory but do not wear shoes that expose any part of the foot, e.g., sandals, open toed shoes, shoes with no heels, etc.

p. **Personal housekeeping.** Keep the work area clean and uncluttered, with chemicals and equipment properly labeled and stored. Clean the work area upon completion of an operation or at the end of each day.

q. **Eye protection.** Assure that all persons, even visitors, wear appropriate eye protection in the lab and in chemical storage areas. Avoid use of contact lenses in the laboratory unless necessary. If prescription lenses are required to perform work safely, notify the laboratory supervisor.

r. **Gloves.** Wear appropriate gloves when the potential for contact with toxic materials exists. Inspect the gloves before each use, wash them before removal, and replace them periodically. Use caution so as not to spread contamination within the lab and do not wear potentially contaminated gloves outside the lab.
s. **Respirators.** Use appropriate respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls, inspecting the respirator before use.

t. Use any other protective and emergency apparel and equipment as appropriate.

u. Remove contaminated laboratory coats immediately.

t. **Planning.** Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation.

w. **Unattended operations.** Leave lights on, place an appropriate sign on the door, and provide for containment of toxic substances in case a utility service (such as cooling water) fails.

v. **Use of hood.** Use the hood for operations that might result in release of toxic chemical vapors or dust.

   (1) As a rule of thumb, use a hood or local ventilation device when working with any appreciably volatile substance *with a PEL or TLV of less than 50 ppm*.

   (2) Confirm adequate hood performance before use. Keep hood sash height to a minimum unless making adjustments within the hood. Work six inches inside of the face of the hood to maximize protection. Keep materials stored in hoods to a minimum and do not allow them to block vents or air flow. Elevate large equipment at least one inch above the floor of the hood with blocks.

   (3) Leave the hood "on" when it is not in active use but contains toxic substances or if it is uncertain whether adequate general laboratory ventilation will be maintained.

y. **Vigilance.** Be alert to unsafe conditions and see to their correction.

z. **Waste disposal.** Assure that the plan for each laboratory operation includes procedures, plans and training for waste disposal.

   (1) Deposit chemical waste in appropriately labeled containers.
(2) **Do not discharge to the sewer:** concentrated acids or bases; highly toxic, malodorous, or lachrymatory (tear producing) substances; any substances that might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow.

aa. **Working alone.** Avoid working alone in a building. Do not work alone in a laboratory where hazardous procedures are in progress.

4. **Chemical Procurement, Distribution and Storage.**

   a. **Procurement.** Before receiving a substance, information on proper handling, storage, and disposal should be known to those who will be involved. No container will be accepted without an adequate identifying label. Preferably, all substances should be received in a central location.

   b. **Stockrooms/storerooms.** Stockrooms are open during the hours designated by PHL policy, and should be controlled by one person. These rooms are not for preparing or repackaging chemicals. Examine stored chemicals periodically (at least annually) for replacement, deterioration, and container integrity.

   Toxic substances should be segregated into a well identified area with local exhaust ventilation. Opened containers of highly toxic chemicals, including classified carcinogens, should be stored in sealed, unbreakable secondary containers.

   c. **Distribution.** When hand carrying chemicals, the container shall be placed in an outside container or bucket. **Freight-only elevators** should be used to transport hazardous chemicals.

   d. **Laboratory storage.** Amounts permitted shall be as small as practical. Storage on bench tops and in hoods is inadvisable. Exposure to heat or direct sunlight should be avoided. Periodic inventories will be conducted, returning unneeded and expired chemicals to the store-room/stockroom for disposal.

5. **Environmental Monitoring.**

   a. Regular instrumental monitoring of airborne concentrations is not usually justified or practical in laboratories. However, it may be
appropriate when testing or redesigning hoods or other ventilation devices or when using or storing a highly toxic substance.

b. DAQAS will arrange for the measurement of an employee's exposure to any substance regulated by a standard that requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level or the PEL. Some guidelines for determining the need for monitoring of a particular substance include:

(1) Evaluation of the procedure in which the substance is used.

(a) What quantities are used? Is this a prolonged procedure, will it be repeated several times? Is it a small amount used as a catalyst, preservative? Reference standard? Or is it used as a bulk extraction solvent? In the routine preparation of compounds under study?

(b) Is the open container of the substance exposed to ambient air? If so, does it have a high vapor pressure or will it be used at an elevated temperature?

(c) Does the process create a dust, mist, fume, or splash? Will the substance be sprayed or used in a pressurized operation?

(2) Information cited from the literature, or data collected from previous monitoring indicates excessive exposures when used similarly.

(3) Signs or symptoms experienced by employees who use the substance that may be related to exposure. Questions such as: When are symptoms first noticed? When do they get better? Do fellow workers experience similar symptoms when performing the same task? How do the symptoms of the employee compare to symptoms documented in the Material Safety Data Sheet or other reference?

This approach to determining if monitoring based on symptoms is necessary should be used with some prudence. Some exposure related illness do not correspond to typical overexposure symptoms or exposure periods. If an overexposure is suspected then a medical exam must be offered to the employee. See section 8 entitled Medical Program.
c. For laboratory uses of OSHA regulated substances, the PHL will assure that laboratory employees’ exposures do not routinely exceed the OSHA PEL.

d. If initial monitoring reveals employee exposure over the action level (or the PEL, if an action level is not available), the PHL will immediately comply with the exposure monitoring provisions of the relevant standard.

e. Employee notification of monitoring results. Within fifteen (15) working days after the receipt of any monitoring results, the PHL shall notify the employee of these results. It will either be in writing to the individual or by posting results in an appropriate location that is accessible to employees.

6. **Housekeeping and Maintenance.**

   a. **Passageways.** Stairways and hallways will not be used as storage areas. Access to exits, emergency equipment, and utility controls is never to be blocked.

   b. **Cleaning.** The custodial contractor’s cleaning and custodial work should not involve the handling of hazardous chemicals.

   c. **Maintenance.** ADH Maintenance performs the following maintenance checks: safety showers quarterly; fire extinguishers checked monthly.

   d. **Lockout/tagout.** Procedures to prevent restarting of out of service equipment should be established. Physical plant will comply with OSHA lockout/ tagout procedures for unsafe items or equipment deactivated for maintenance.

7. **Inspections.**

   Informal inspections should be continual. The lab supervisor will insure the annual inspection of labs and will forward a copy of its documentation to DAQAS. The CHO will make inspections six months between the internal inspections.

8. **Medical Program.**

   a. **Medical consultation and medical examinations.** All medical examinations and consultations will be done by or under the direct
supervision of a licensed physician. These will be provided without cost to the employee, without loss of compensation, and at a reasonable time and place. This will be available under at least one of these circumstances:

(1) Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may be exposed in the laboratory.

(2) Exposure monitoring reveals an exposure level routinely above the action level (or the PEL if an action level is not available) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements.

b. **Medical Surveillance.** Medical surveillance shall be established for the affected employee as prescribed by the particular standard. OSHA has established mandatory medical surveillance programs for individuals whose exposure to the following substances exceeds established limits.

- 2-Acetylaminofluorene
- Acrylonitrile
- 4-Aminodiphenyl
- Inorganic arsenic
- Asbestos
- Benzene
- Benzidine
- Bis-chloromethyl ether
- Coke oven emissions
- Cotton dust
- 1,2-Dibromo-3-chloropropane
- 3,3’-Dichlorobenzidine (& salts of)
- 4-Dimethylaminoszobenzene
- Ethylene oxide
- Ethyleneimine
- Formaldehyde
- Lead
- Methyl chloromethyl ether
- alpha-Naphthylamine
- beta -Naphthylamine
- 4-Nitrobiphenyl
- n-Nitrosodimethylamine
- beta-Propiolactone
- Vinyl chloride

c. **First aid.** First aid kits are available in each workarea. Make certain that the kits are fully stocked. If the injury is serious and immediate medical attention is required:

*Call 2136 speak clearly and state:*
(1) Ambulance requested—Communications will patch you to immediately to the 911 operator. Note: This number also applies to large or toxic spills, fire and police calls.

(2) Location of the injured party and room number.

(3) Stay on the line do not hang up. Have another party notify the Lab Director at 2183 and CHO at 1491 or 1-800-264-2535, Pager Number 4807 (Mike) and 9644 (Stan).

9. **Protective apparel and equipment.** The following should be included for each laboratory:

   a. Protective apparel compatible with the required degree of protection for substances in use. Personal protective equipment (PPE) includes aprons, lab coats, gloves, safety glasses, face shields, etc.

   b. Respiratory protection, if work practices and engineering controls are inadequate to reduce chemical exposures.

   c. Respirators for routine use should be inspected periodically by the laboratory supervisor. Employees wearing respirators must have a current respirator physical and must have passed a qualitative fit test for the specific model respirator.

10. **Records.**

    a. The PHL shall write and retain accident reports per Agency policy.

    b. Chemical Hygiene Plan records shall document that the facilities and precautions are compatible with current knowledge and regulations.

    c. The Agency QA Office will keep employee medical records related to on the job injury according to the requirements of state and federal regulations.

11. **Signs and Labels.** Prominent signs and labels of the following types should be posted:

    a. Emergency telephone numbers of emergency personnel/facilities, supervisors, and laboratory workers.
b. Identity labels, showing contents of containers (including waste receptacles), associated hazards, and other information required to meet certifications.

c. Location signs for safety showers, eyewash stations, other safety and first aid equipment, exits, and areas where food and beverage consumption are permitted.

d. Warnings at areas or equipment where special or unusual hazards exist.

12. Spills and Accidents.

a. Each lab worker is expected to be familiar with exits and evacuation routes, participate in emergency drills, and know the procedures for anticipated emergencies such as injuries, fires, chemical spills.

b. Fire Safety. DAQAS provides general fire safety training and copies of the Agency Evacuation Plan during new employee orientation.

c. Alarm systems. Each laboratory building contains an emergency alarm system that can be activated by pull stations in the corridors or remotely activated at Central Control. While primarily intended as a fire alarm, it also may be used to signal building evacuation for other emergencies. Constant alarm = building evacuation; Wavering alarm = relocation within the building. Supervisors must assure that staff members know their evacuation routes and relocation sites.

d. Chemical spills. Lab workers experiencing a chemical spill can usually perform clean up procedures with little or no outside help. If additional assistance is required, consult the MSDS or call DAQAS. You must consider the size of the spill and the toxicity of the chemical(s) when deciding on the proper approach for cleanup. See part g (Spill Response) of this section in the event the spill cannot be controlled by laboratory personnel.

e. Spill prevention. Proper storage, standard operating procedures, and personnel training will prevent many spills or reduce their size.
f. Large Scale Storage and Containment. Authorized chemical storage facilities are designed to safely contain chemical spills and reduce danger to building occupants and the environment.

These facilities include the first and second floor stockrooms and the cutoff room at the rear of the South Building which is used for bulk storage of flammable materials. These storerooms are subject to internal audits plus annual inspections by the Little Rock Fire Department and the Little Rock Wastewater Utility District.

g. Spill Response. Remember: A one gallon spill can cover an area of 20 square feet. In the event of a spill of a hazardous chemical in the laboratory:

(1) Notify persons in the immediate area about the spill and have lab personnel obtain an MSDS for the chemical.

(2) Evacuate all nonessential personnel (those persons not involved in the cleanup) from the spill area.

(3) Determine, if possible, the chemical spilled, the toxicity, and estimate the quantity.

(4) If the spilled material is flammable turn off ignition and heat sources, as well as ventilation systems (if possible). To prevent electric sparks, leave lights on if they are on. If the lights or any electrical apparatus are off, DO NOT TURN THEM ON.

(5) If spill control/cleanup is beyond departmental capability activate the fire alarm, then notify Communications at (2136) as described above (Page 14; Section 8.c). Have a second party notify the Lab Director (2183) and the CHO (1491).

(6) Attend to any person(s) who have been contaminated or injured and give first aid, if necessary and appropriate.

(7) Persons with chemicals on their skin or eyes will immediately be assisted by lab personnel in using an emergency shower or eye wash (for a period of 15 minutes). Remove contaminated clothing immediately.

(8) Escort exposed/injured employees to the closest Emergency Room.

CLEANUP
(9) Individuals working directly with the spill shall don all appropriate personal protective equipment (respirator, gloves, coveralls, etc.) Refer to the MSDS.

(10) Confine or contain the spill to a small area. Do not let it spread. Work the spill from outside edges toward the center.

(11) Use designated spill kits including spill containment materials such as vermiculite, sand, or spill pillows. For inorganic acids or bases, use neutralizing agents or an absorbent mixture.

(12) Carefully remove and clean everything contaminated. Use a broom and dust pan to pick up or to move broken glass or other sharps.

(13) Sweep up moisture absorbent material or remove spill pillows and place them in a clearly marked leak proof bag or other disposable container. Contact DAQAS for assistance with final disposition of hazardous waste.

(14) Dispose of uncleanable contaminated items similarly and adequately ventilate the area before allowing employees to return.

(15) Notify DAQAS if the approximate quantity of material released to the atmosphere was over one pound or spilled material reached a sanitary or storm sewer. This is important even if assistance was not required to insure notification to outside agencies notification, when necessary.

h. Accidents. Employees injured at the PHL may receive medical attention at the closest Hospital Emergency Room or physician of choice (whenever possible supply the physician with the MSDS). An ADH Employee Incident Report Form must be completed as per Agency policy and procedure. All accidents or near accidents should be carefully analyzed with the results distributed to all who might benefit.

13. Information and Training Program. The aim is to assure that all individuals at risk are adequately informed about the work in the laboratory, its risks, and what to do if an accident occurs.

a. Emergency and Personal Protection Training: Every laboratory worker should know the location and proper use of available protective apparel and equipment. For employees working with potential bloodborne pathogens, the OSHA Bloodborne Pathogen Standard
must be followed in the selection of appropriate PPE. Additionally, each laboratory analyzing blood, bodily fluids, or other potentially infectious materials must have a completed Exposure Control Plan that is signed and dated by the testing staff and CHO.

b. Some full-time laboratory personnel should be trained in the proper use of emergency equipment and procedures.

c. This training and some first aid instruction should be available and encouraged for anyone who might need it.

d. Receiving and stockroom/storeroom personnel should know about hazards, handling equipment, protective apparel, and relevant regulations.

e. Frequency of Training: The training and education program should be a regular, continuing activity not simply an annual presentation.

f. Literature/Consultation. Literature and consulting advice concerning chemical hygiene should be readily available to laboratory personnel, who should be encouraged to use these information resources. DAQAS maintains a reference library. It has texts on lab safety and design, chemical safety, chemical disposal, current OSHA and USEPA regulations, and the master MSDS library. The DAQAS staff is available for consultation. DAQAS will also arrange for consultation with industrial or occupational hygienists when required.

14. Waste Disposal Program. The PHL is committed to a formal laboratory waste disposal program that assures minimal effect on people and the environment. The following general guidance will not cover every situation. Contact DAQAS at extension 1491 for additional information.

a. Under the provisions of the Resource Conservation and Recovery Act of 1976 (RCRA), the ADH-PHL is licensed by the USEPA (ID Number ARD982553810) as a "small quantity generator." A small quantity generator produces less than 2200 pounds of chemical hazardous waste each month. Each laboratory may be considered as a satellite generator contributing to this total. The USEPA has listed several hundred substances as hazardous waste.

In addition, any substance possessing one or more of the following characteristics is also a USEPA hazardous waste.

- Ignitability
- Corrosivity
Reactivity
Toxicity

b. It is a violation of federal law (RCRA) to dispose of a USEPA hazardous waste improperly by throwing the substance in the trash or pouring it on the ground. (Residues of hazardous waste in empty containers may be discarded if the substance is not a USEPA Acute Hazardous Waste.)

c. Drain (sanitary sewer) disposal of chemicals is regulated by the USEPA Clean Water Act and Little Rock Wastewater Utility District regulations. SMALL amounts of certain chemicals are permissible for drain disposal if there are:

(1) No hazards of fire, explosion, or violent interaction

(2) No interference with the sewage treatment process

(3) Temperatures less than 150°F /65°C

(4) pH values between 5.0 and 11.0

(5) Not a corrosive hazard to personnel or the sewage works.

(6) No unusual concentrations of inert suspended solids

(7) No excessive discoloration, such as large amounts of stains

(8) No toxic effects or public nuisance (No highly toxic/acute hazardous wastes, no malodorous or lachrymatory substances)

d. Concentration limits currently exist for sanitary sewer discharges containing the following constituents:

<table>
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<tr>
<th>Arsenic</th>
<th>Copper</th>
<th>Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barium</td>
<td>Lead</td>
<td>Zinc</td>
</tr>
<tr>
<td>Boron</td>
<td>Manganese</td>
<td>Cyanide</td>
</tr>
<tr>
<td>Cadmium</td>
<td>Mercury</td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td>Nickel</td>
<td></td>
</tr>
</tbody>
</table>

e. Sanitary Sewer Discharge limits are under consideration for the following substances:

<table>
<thead>
<tr>
<th>Antimony</th>
<th>Molybdenum</th>
<th>Strontium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beryllium</td>
<td>Organic Solvents</td>
<td>Tellurium</td>
</tr>
<tr>
<td>Bismuth</td>
<td>Pesticides</td>
<td>Tin</td>
</tr>
</tbody>
</table>
f. Prudent Practice and drain disposal. Only water soluble chemicals (at least three (3) percent Solubility) are suitable for drain disposal, and then subject to the previous limitations. These permissible chemicals must be flushed in SMALL amounts with at least 100 volumes of water. If in doubt, call DAQAS.

g. Storm sewer disposal is prohibited by the Clean Water Act because these discharges flow directly to waterways with no intervening treatment.

h. DAQAS provides hazardous waste disposal services by arranging for contractor services for all categories of chemical waste.

15. Particularly Hazardous substances. These include "select carcinogens," reproductive toxins and substances that have a high degree of acute toxicity. Appendix D contains a list of OSHA Select Carcinogens. Implement the following provisions when working with a particularly hazardous substance where appropriate:

a. Establish a designated area.

b. Use containment devices such as fume hoods or glove boxes.

c. Develop procedures for safe removal of contaminated waste.

d. Establish decontamination procedures.

16. Prior Approval. The lab supervisor will determine circumstances that a particular laboratory operation, procedure or activity will require approval before implementation.

17. Compressed Gas cylinder safety. These are procedures for handling and using compressed gas cylinders:

a. Accept only cylinders with contents clearly identified.

b. Do not mutilate cylinders.

c. Always keep cylinders chained.

d. Transport cylinders only on a cart with a tie-down chain.
e. When storing or moving a cylinder keep protective metal top in place.

f. Do not grease or oil regulators.

g. Store in clean, dry, cool, well ventilated area. Temperature should not exceed 50°C.

h. Separate flammables from oxidizers.

i. Do not attempt to adjust or repair safety devices or valves.

j. Cylinders in the lab should be kept to a minimum.

k. Clearly mark "empty" cylinders and then store separately from filled cylinders.

l. Use shut-off and check valves.

m. Keep the main valve closed when not in use.

n. Cylinders of flammable, toxic or reactive gases should be used in a hood when possible.

o. Do not "crack" the cylinder to clean out the fitting.

p. Rapid release of a compressed gas can cause a static charge that could ignite a combustible gas.

q. Always wear safety glasses when handling and using compressed gases.

r. A gas source should be shut off before a flame is extinguished to prevent reignition and explosion.

s. Do not completely empty a cylinder. Leave a slight pressure to keep contaminants out.

t. Check for leaks after attaching the cylinder valve to the distribution line.
APPENDIX A - DEFINITIONS

**Action Level.** A concentration for a specific substance (designated in 29 CFR part 1910), calculated as an eight hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance. If an action level is specified, it is usually one half the PEL.

**Ceiling.** The value that an employee's exposure shall not exceed during any part of the work day.

**Chemical Hygiene Officer.** An employee designated in writing by the PHL, who is qualified by training or experience, to provide technical guidance in the development and implementation of the Provisions of the Chemical Hygiene Plan.

**Chemical Hygiene Plan.** A written program developed and implemented by the PHL. It sets forth procedures, equipment, and work practices that can protect employees from the hazards presented by chemicals used in the laboratory.

**Designated Area.** An area that may be used for work with "select carcinogens," reproductive toxins or substances that have a high degree of acute toxicity. A designated area may be the entire laboratory, an area of the laboratory or a device such as a laboratory hood.

**Hazardous Chemical.** A chemical for which there is statistically significant evidence based on at least one study conducted according to established scientific principles that acute or chronic health effects may occur in exposed employees. These may be health hazards or physical hazards.

**Health Hazard.** Chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, sensitizers, and substances that display target organ effects.
Laboratory. A facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis. Such a facility may be a building, space, room, or group of contiguous rooms.

Laboratory Use of Hazardous Chemicals. Handling or using of such chemicals in which all the following conditions are met:

1. Chemical manipulations are carried out on a "laboratory scale";

2. Multiple chemical procedures or chemicals are used;

3. The procedures involved are not parts of a production process, nor in any way simulate a production process; and

4. "Protective lab practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Medical Consultation. A consultation between an employee and a licensed physician. The purpose is to determine what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

Physical Hazard. A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Permissible Exposure Limit (PEL). An exposure limit that is published and enforced by OSHA as a legal standard. Most of these were adopted from ACGIH's 1968 TLV list. Updates and additions are not made annually.

Protective laboratory practices and equipment. Those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Reproductive toxins. Chemicals that affect the reproductive capabilities including chromosomal damage (mutations) and effects on the fetus (teratogens).

Select carcinogen. Any substance that meets one of the following criteria:
1. It is regulated by OSHA as a carcinogen; or

2. It **is listed under** the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP); or

3. It is listed under Group 1 "carcinogenic to humans" by the International Agency for Research on Cancer Monographs (IARC); or

4. It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals.

**Short Term Exposure Limit (STEL).** The employee's 15-minute time weighted average exposure which shall not be exceeded at any time during a work day unless another time limit is specified for that substance.

**Threshold Limit Value (TLV).** The airborne concentration of a substance under certain conditions which is believed to pose no adverse health effects to most workers even with repeated daily exposure. TLV values may apply to TWA, STEL or Ceiling categories. These values are published annually by the American Conference of Governmental Industrial Hygienists (ACGIH).

**Time Weighted Average.** An employee's average exposure to a substance or physical agent in an 8-hour work shift of a 40-hour work week which shall not be exceeded. This may also apply for another specified length of time.
APPENDIX B - HAZCOM PROGRAM

Public Health Laboratories Written Hazard Communication Program
As Required By (Act 556-Code 12)

The purpose of this program is to establish uniform guidelines that will ensure the hazards of all chemicals used within the Arkansas Department of Health, Division of Public Health Laboratories are evaluated and that this hazard information is transmitted to all affected employees.

A list of the hazardous chemicals, regardless of quantity, using an identity (name) that is referenced on the appropriate material safety data sheet (MSDS) will be compiled. In addition, any chemical present in the Laboratory in combined quantities of 55 gallons or 500 pounds will be reported to the Arkansas Department of Labor.

The Written Hazard Communication Program (Chemical Hygiene Plan) will be implemented such that employees at a site, as well as employees coming in from another site, will receive information as needed for each hazardous chemical the employees may be exposed to while working during normal operating conditions and in foreseeable emergencies.

The written Hazard Communication Program is available, upon request, to employees, their designated representative, and the Director of the Arkansas Department of Labor.

Chemical manufacturers and distributors are required to label each container of hazardous chemicals. Laboratory employees must not remove these labels. If the hazardous chemical is placed into another container, then the new container must be properly labeled including appropriate hazard warning. The only exception is the use of a portable container by one employee for the immediate use of the product. The original label or the reproduced label on a secondary container must be legible, in English, and prominently displayed on the container. If the Laboratory has an employee who reads only another language, it will add the information in their language.

Any hazardous chemical purchased by the Public Health Laboratories must have an MSDS from the manufacturer. The Laboratory must obtain or develop an MSDS for each hazardous chemical they reproduce or generate (example: welding gases or
chemical reactions in science labs). All MSDS's will be in English and contain the identity used on the label and except as provided on trade secrets shall contain:

1. Its chemical and common name or names if a mixture.
2. Any carcinogens over 0.1%.
3. Physical and chemical characteristics.
4. Physical hazards.
5. Health hazards.
6. Primary routes of entry.
7. The permissible exposure limit.
8. General applicable precautions.
9. General applicable control measures.
11. Date of MSDS or date of last change to it.
12. Name, address, and phone number of manufacturer or other responsible party who can provide additional information on the chemical and emergency procedures.
13. Other relevant information or explanation if lack of information.

MSDS's will be maintained at the site of the hazardous chemical. Copies MSDS's will be located in Laboratory administration in the MSDS master file. Maintenance of the MSDS master file is the responsibility of the safety officer and the laboratory purchasing agent. A group of MSDS’s may also be maintained by the laboratory supervisor for each laboratory if desired. Additionally, the Safety Office (Room 2106) in the PHL administrative area maintains approximately 70,000 MSDS's on CD-ROM. The MSDS's can be printed for inclusion in the PHL MSDS master file.

MSDS's must be available to any employee during any work shift. MSDS’s will also be available to any designated representative for any employee group.

In the absence of an MSDS, if an employee declines to work with a hazardous chemical as authorized by this regulation, he shall not be penalized. Reassignment of an employee to other work, at equal pay and benefits, shall not be considered a penalty under the regulation.

Employees will have access to the Written Hazard Communication Program (Chemical Hygiene Plan) and will have access to a copy of the law requiring this program. They will be made aware of hazardous materials in their work area, location of copies of Written Hazard Communication Program, copy of the law, lists of chemicals, and location of MSDS's.

Employee training will include (all technicians and microbiologists):
1. Methods to detect the presence or release of hazardous chemicals in their work area.
2. Physical and health hazards of chemicals.
3. Measures employees can take to protect themselves.
4. Details of Written Hazard Communication Program.
5. General safety instruction on handling, cleanup, and disposal of hazardous chemicals. Employees are also required to view the following training videos: MSDS--Cornerstone of Chemical Safety, Lab Hood Safety, OSHA's Laboratory Standard, and Hazard Communication Plans. In addition, Microbiologists which may be exposed to blood borne pathogens will view the Universal Precautions video.
6. Employees will be trained before beginning a new analysis.
7. Employees will be trained whenever a new hazardous chemical is introduced into the work area or whenever new information is received on an existing hazardous chemical.
8. Refresher training will be provided every year.
9. Employees trained will sign a form attesting to receiving such training.

Trade secrets may be justification for a manufacturer to withhold some information from employees, but basic safety data will be present and methods exist to obtain other information through health professionals and hearings. However, some information is not required to be released. Therefore, the Laboratory’s policy will be to avoid hazardous chemicals where trade secrets may pose a problem and alternate products are available.

All Written Hazard Communication Program information including MSDS's, notifications, and training records will be kept for 30 years by the Laboratory.

Employees assigned to more than one work site will be trained at their home site. If needs dictate, training at other sites will be arranged.

**Responsible Persons**

The Laboratory will maintain records for the Written Hazard Communication Program. The Director of Quality Assurance and Safety will be responsible for initial and ongoing activities in the program as well as the caretaker of all records.

The Purchasing Agent will implement procedures to identify any product purchased with a MSDS. The purchase order will say "MSDS Required". Any MSDS's obtained will be furnished to the Laboratory Safety Officer or their designated caretaker.
Each laboratory supervisor is the responsible person for their work areas. The supervisor will notify the Laboratory Safety Officer immediately when new chemicals are to be used in their workplace.

The Laboratory Safety Officer will arrange for training of supervisors and selected employees who may assist them in training.

The Laboratory Safety Officer will inspect the Written Hazard Communication Program records annually to ensure compliance with Act 556.

The Laboratory Safety Officer and laboratory supervisors are responsible for:

* Training employees in their workplace
* Documentation
* Hazard Chemicals inventory with MSDS for each workplace.
* Proper labeling

THIS PLAN WAS REVISED AND DISTRIBUTED TO THE SUPERVISORS ON

June 22, 1998 _________________________

Stan Falk, Ph.D., CHO
APPENDIX C - EXAMPLE OF POSTED EMERGENCY TELEPHONE NUMBERS

IN CASE OF EMERGENCY

CONTACT:

<table>
<thead>
<tr>
<th>LABORATORY SUPERVISOR</th>
<th>HOME PHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAINTENANCE</td>
<td>2103</td>
</tr>
<tr>
<td>FIRE</td>
<td>2136</td>
</tr>
<tr>
<td>EMERGENCY RESPONSE TEAM</td>
<td>2136*</td>
</tr>
<tr>
<td>LABORATORY DIRECTOR</td>
<td>2183</td>
</tr>
<tr>
<td>DAQAS SECTION</td>
<td>1491/1490**</td>
</tr>
<tr>
<td>POISON CONTROL (UAMS)</td>
<td>686-6161</td>
</tr>
</tbody>
</table>

*To contact Emergency Medical Services for injuries or the HAZMAT Team for spills (only if spill is too large or hazardous to contain; in this situation, pull the fire alarm first, then-), call 2136. Speak clearly and state:

1. Location of patient, fire, or spill (chemical involved) and room number.

2. Have a second party notify the Laboratory Director (2813) and Laboratory Safety Officer (1491/1490**)

NOTE: If a large spill is involved, use the buddy system to evacuate injured personnel to safety, do not attempt to do this alone. Due to the toxicity and/or explosion hazard of some chemicals that endanger the lives of both the injured and the rescuers, it will not be possible to use the emergency eyewash or shower. In these cases, immediately evacuate the injured personnel to fresh air.

**PAGER NUMBER (1-800-264-2535, Enter Pager #9644 (Stan), #4807
(Mike), enter your extension number, hit # key and hang-up)