



UNT HEALTH SCIENCE CENTER SAFETY MANUAL – August 2016 VERSION

This version contains an update on Safety Instructions.

UNIVERSITY OF NORTH TEXAS HEALTH SCIENCE CENTER AT FORT WORTH SAFETY MANUAL

Last major rewrite: April 2007

Previous Changes: June 1994, December 1994, August 1995, September and August 1996, August 1998, August 1999, July 2000, July 2001, July 2002, July 2004, July 2005, August 2006

October 2016: Procedures relating to violence in the workplace and classroom were added to the emergency procedures section.

Directions: Remove existing cover page with picture of CBH and replace with new cover

Removed existing title page and replace with this page

Removed page 0-0-1 dated August 2006 and replace with new page 1 dated August 2016.

Replace existing pages 0-1-2 through 0-1-15 various dates with new pages 1 through 16 dated August 2016.

SAFETY POLICY STATEMENT

A safety policy is hereby established for the University of North Texas Health Science Center at Fort Worth for the purpose of conserving and protecting human and material resources, and for maintaining a healthful and controlled environment conducive to the effective accomplishment of work and achievement of institutional goals.

The purpose of this policy is to authorize the development of safety procedures and safety awareness programs throughout the institution. Responsibility for the development of these procedures and programs is assigned to the Safety Committee, a standing committee of the health science center, having representation from all areas of the institution. Furthermore, it shall be the responsibility of this committee to develop and administer the safety program. The day-to-day administration of the safety program shall be delegated to the Safety Office.

The health science center has other standing committees that are assigned specific responsibilities with regard to safety. These committees include the Radiation Safety Committee, Biosafety Committee, Infection Control Committee and the Institutional Review Board for Human Subjects Research. Communication lines shall exist to keep the Safety Committee aware of issues in these specialized areas of safety.

Enforcement and monitoring of the Safety Program shall be the responsibility of the Safety Director, a standing member of the committee. The Safety Director shall periodically inspect all facilities for fire, safety and health hazards, recommend corrective actions to the Safety Committee and implement corrective measures and file reports as required.

Responsibility for the development and presentation of safety education programs shall be assigned to the Safety Director who shall be assisted by the committee education coordinator, an ex-officio member of the Safety Committee.

This policy establishes the practice of safety as an essential part of institutional operations. All employees and students shall conduct themselves and perform tasks in a manner that promotes personal safety. All employees, students and members of the public that may use health science center facilities shall perform work in accordance with the institutional Safety Manual.

Michael R. Williams, DO, MD, MBA
President

August 2016

Table of Contents

PART 1.....	25
CHAPTER 1	25
SAFETY ADMINISTRATION	25
PART 1.....	29
CHAPTER 2	29
ACCIDENT INVESTIGATIONS	29
PART 1.....	32
CHAPTER 3	32
SAFETY TRAINING	32
PART 1.....	35
CHAPTER 4	35
SAFETY INSPECTIONS.....	35
PART 1.....	39
CHAPTER 5	39
SAFETY AWARDS PROGRAM	39
PART 2.....	42
CHAPTER 1	42
SAFE WORKING PRACTICES FOR ALL AREAS.....	42
PART 2.....	45
CHAPTER 2	45
SAFE WORKING PRACTICES	45
FOR OFFICE AREAS.....	45
PART 2.....	48
CHAPTER 3	48

SAFE WORKING PRACTICES	48
FOR LABORATORY WORK AREAS.....	48
PART 2.....	51
CHAPTER 4	51
SAFE WORKING PRACTICES	51
FOR CLINICS AND CLINICAL LABORATORIES.....	51
PART 2.....	54
CHAPTER 5	54
CRIME PREVENTION	54
PART 2.....	58
CHAPTER 6	58
MATERIALS HANDLING	58
PART 2.....	65
CHAPTER 7	65
FIRE SAFETY	65
PART 2.....	73
CHAPTER 8	73
TOOLS AND MACHINERY	73
PART 2.....	87
CHAPTER 9	87
ELECTRICAL SAFETY	87
PART 2.....	95
CHAPTER 10	95
VEHICLE SAFETY	95
PART 2.....	97

CHAPTER 11	97
WASTE SEGREGATION	97
PART 3.....	102
CHAPTER 1	102
BLOOD-BORNE PATHOGENS & EXPOSURE CONTROL PLANS.....	102
PART 3.....	104
CHAPTER 2	104
CHEMICAL HYGIENE PROGRAM	104
SECTION 2	114
COMPONENTS OF THE CHEMICAL HYGIENE PROGRAM	114
SECTION 3.....	127
BASIC PROCEDURES FOR WORKING WITH CHEMICALS	127
PART 3.....	147
CHAPTER 3	147
BIOLOGICAL SAFETY	147
PART 3.....	150
CHAPTER 4	150
RADIATION SAFETY	150
PART 3.....	153
CHAPTER 5	153
CONSTRUCTION STANDARDS	153
PART 3.....	159
CHAPTER 6	159
TUBERCULOSIS PREVENTION	159
PART 3.....	160

CHAPTER 7	160
RISK MANAGEMENT PROGRAM	160
APPENDIX B	168
CHEMICAL WASTE MINIMIZATION	168
APPENDIX D	171
CARCINOGENS, SUSPECTED CARCINOGENS AND REPRODUCTIVE	171
APPENDIX E	179
APPENDIX F	180
CHEMICAL COMPATIBILITIES	180
APPENDIX G	184
HOUSEKEEPING IN WALK-IN COLD ROOMS AND FREEZERS	184
APPENDIX H	186
SAFETY OF INDOOR PUBLIC SPACES	186
APPENDIX I	188
UNDERSTANDING MEDICAL WASTES	188
APPENDIX J	190
POLICY AND PROCEDURE ON FIRST AID KITS	190
APPENDIX K	192
POLICY AND PROCEDURE	192
ON MAINTENANCE OF	192
EMERGENCY CONTACT INFORMATION	192
APPENDIX L	194
PROGRESSIVE DISCIPLINE POLICY for FOOD and DRINK	194
APPENDIX M	198
Controlled Precursor Chemicals and Laboratory Apparatus	198

EMERGENCY PROCEDURES

This plan was developed by the health science center Safety Committee and the Safety Office and adopted as policy by the institution in an attempt to minimize the extent of injury and/or death to health science center employees, students and clients during an emergency situation. Its effectiveness, and your own safety, is dependent upon how well everyone becomes acquainted with these emergency procedures.

EVERY HEALTH SCIENCE CENTER EMPLOYEE AND STUDENT should become familiar with the procedures described in this document. In case of a campus wide or community disaster, please consult the Emergency Preparedness Plan, a separate document maintained by the Safety Office and available on the Safety Office web server.

COMMUNICATIONS

The Campus Police department is the communications center for all life-and/or health-threatening emergency situations. The Campus Police **MUST** know what is going on and when an emergency exists. To report an emergency, call:

2600, if on the main campus telephone system **817-735-**

2600, if not on the main campus telephone system

Clinics off campus should dial 911 for emergency response. If time allows, also inform Campus Police by dialing 817- 735-2600.

Remember, the 2600 phone number is for **EMERGENCY USE ONLY!**

Communication to and from the Campus Police is an absolute necessity during an emergency. Therefore, please do not call the Campus Police for information during an emergency unless you are personally involved. In the event the regular telephone system is down, the telephones in the elevators may be used to contact the Campus Police.

POWER FAILURE

Failure, or interruption, of building power (voltage) is no cause for alarm. The Education and Administration building (EAD), Research and Education building (RES), the Library (LIB), the Patient Care Center (PCC) and the Center for Bio health building (CBH) are served by two power grids and when service is lost on one grid, the buildings can be switched to the other grid.

For personal comfort (remember, the air conditioning is affected, too), you should

move to an area lighted and ventilated from outside. Remember that most elevators will not work (they are electrically operated) during a power failure. If you have a computer in your work area, especially if it does not have a battery backup, you should immediately turn its power switch OFF, until the building power has been restored and stabilized. Discontinue operations that produce hazardous fumes and aerosols since the exhaust system will be off line.

MEDICAL EMERGENCY

1. On the main campus phone the EMERGENCY NUMBER, 2600 or 817-735-2600.
2. Give the following information:
 - a. Nature of medical emergency.
 - b. Location of emergency: building and room number.
 - c. Your name and phone number from which you are calling.
3. If possible, stay on the phone line until released by the Campus Police officer.

FIRE

1. On the main campus phone the EMERGENCY NUMBER, 2600 or 817-735-2600.
2. Give the following information:
 - a. Location of fire - building and room number.
 - b. Size of fire - one room, several rooms, etc.
 - c. Type of fire - trash, electrical, etc.
 - d. Are persons known to be trapped in the fire area?
 - e. Your name and location from where you are calling.
3. Activate the alarm system - pull boxes are located by the stairwells in each end of each building of the main campus.
4. Warn all others to evacuate the building. Enlist the aid of a helper, if possible.
5. Use fire extinguishers if the fire is small. Direct the spray at the base of the fire. Learn the location of the fire extinguishers nearest your work area.

6. **EVACUATE**, if the fire is out of control.
7. Close your work area door as you leave to help contain the fire.
8. Stay close to the floor to escape smoke, and to minimize smoke inhalation. Because heat rises, nearest the floor will also be the coolest area.
9. **DO NOT TRY TO USE THE ELEVATORS!** Use the stairs!
10. **DO NOT RE-ENTER A BURNING OR SMOKE-FILLED STRUCTURE!**
11. Unless in the immediate vicinity of a fire, gas cylinders should be turned off and all hazardous materials (including flammables) should be in safety storage cabinets. All safety storage cabinets should be closed **BEFORE** evacuating.

Clinics have individual fire plans to clear the clinics of patients and personnel. Clinical personnel should become familiar with their clinic's fire plan. In general, in case of fire: **RACE**

R: Remove all patients and personnel from immediate area.

A: Active nearest alarm & call emergency phone number

C: Confine the fire by closing the doors

E: Extinguish the fire if possible. If not, evacuate everyone to a safe area.

BIOHAZARDOUS MATERIAL

(Unknown danger/threat)

1. Phone the EMERGENCY NUMBER, 2600 or 817-735-2600.
2. Give the following information:
 - a. Location of accident/incident - building and room number.
 - b. Type of material involved - liquid or powder/crystalline (wet or dry).
 - c. Name of material involved, if known.
 - d. Quantity involved.
 - e. Will outside assistance be required?
 - f. Should the building be evacuated?
3. Isolate the accident area and prevent others from entering or leaving the area.

RADIOACTIVE SPILL

(No bodily contact)

1. Phone the EMERGENCY NUMBER, 2600 or 817-735-2600.
2. Give the following information:
 - a. Location of accident/incident - building and room number.
 - b. Type of material involved - liquid or powder/crystalline (wet or dry).
 - c. Name of material involved - if known.
 - d. Quantity involved.
 - e. Wait for arrival of health science center Radiation Safety Officer.
3. Isolate the contaminated area. A determination must be made if it is hazardous to remain in the room where the spill occurred. If the isotope is a low energy beta emitter (ex. tritium, carbon fourteen, sulfur thirty-five) it is safe to remain in the room if you can stand 6 feet from the spill and the spilled material is not likely to become airborne (dust). For high energy beta emitters like phosphorous thirty-two or for gamma emitting materials or for airborne particles, remain outside the door of the area with the door closed until the Radiation Safety Officer arrives. Prevent others from entering or leaving the accident/incident area.
4. Perform/assist in clean-up of the radioactive material, as directed by the Radiation Safety Officer.

RADIOACTIVE EXPOSURE (Direct bodily contact)

1. Immediately remove all contaminated clothing/articles.
2. Wash the affected skin area with great amounts of water.
3. Phone the EMERGENCY NUMBER, 2600 or 817-735-2600.

4. Give the following information:
 - a. Location of accident/incident - building and room number.
 - b. Type of material involved - liquid or powder/crystalline (wet or dry).
 - c. Name of material involved if known.
 - d. Quantity involved.
 - e. Number of people/animals exposed.
5. Place all contaminated clothing/articles in a plastic bag, and label the bag as:
 - a. Radioactive
 - b. Name of owner of contaminated clothing
 - c. Health science center phone number of owner
6. Wait for arrival of health science center Radiation Safety Officer.
7. Isolate the contaminated area. Prevent others from entering or leaving the accident/incident area. **DO NOT LEAVE THE AREA and REMAIN CALM.**

FIRST AID FOR CHEMICAL EXPOSURES

Render **FIRST AID** as follows:

SKIN CONTACT

Remove contaminated clothing.

Immediately flush the affected skin area with large amounts of clean water for at least 15 minutes.

If symptoms persist after washing, seek medical attention.

EYE CONTACT

Promptly flush eyes with water for a prolonged period (15 minutes).

Seek medical attention.

INHALATION

Remove individual to fresh air.

Seek medical attention.

INGESTION

Encourage the victim to drink large amounts of water. **DO NOT** force fluids on an unconscious individual.

DO NOT induce vomiting except on the advice of a physician.

Seek medical attention.

IN ALL CASES

If injury is severe or the person is unconscious, treat as a Medical Emergency. Call the EMERGENCY NUMBER, 2600 or 817-735-2600 and give the following information:

- a. Location of accident/incident - building and room number.
- b. Type of material involved - liquid or solid (wet or dry).
- c. Name of material involved if known.
- d. Quantity involved.
- e. Severity of injury.
- f. Is an ambulance and/or physician required?

Proceed with the necessary spill containment and clean-up procedures after rendering first aid.

CLEAN-UP OF CHEMICAL SPILLS

MINOR SPILLS WITHIN THE WORK AREA

1. Confine liquids with paper towels.
2. Notify other workers of spill.
3. Clean up spills as soon as possible.

Sample clean-up procedures are described below.

Use the necessary personal protection apparel and equipment.

Avoid producing dust or aerosols.

Contact the Chemical Hygiene Officer at 2697 or 817-735-2697 for assistance if necessary.

4. Properly dispose of contaminated materials. Contact the Chemical Hygiene Officer, 2697 or 817-735-2697, for assistance.
5. Report **ALL** spills of unusually hazardous materials to your supervisor.

LARGE SPILLS - NO IMMEDIATE LIFE/HEALTH THREAT

1. Use paper towels or other absorbent to confine the chemical to the smallest possible area.
2. Phone the EMERGENCY NUMBER, 2600 or 817-735-2600. Report **ALL** spills that occur outside the work area.
3. Give the following information:
 - a. Location of accident/incident - building and room number.
 - b. Type of material involved - liquid or powder/crystalline (wet, dry).
 - c. Name of material involved if known.
 - d. Quantity involved.
4. Notify your immediate supervisor.
5. The Safety Office or Campus Police will decide if the building is to be evacuated.
6. Begin clean-up procedures.

Sample clean-up procedures are described below.
Use the necessary personal protection apparel and equipment.
Avoid producing dust or aerosols.
Contact the Chemical Hygiene Officer at 2697 or 817-735-2697 for assistance if necessary.
7. Properly dispose of contaminated materials. Contact the Chemical Hygiene Officer for assistance by dialing 2697.

POSSIBLE LIFE/HEALTH THREAT

1. Phone the EMERGENCY NUMBER, 2600 or 817-735-2600.

2. Give the following information:
 - a. Location of accident/incident - building and room number.
 - b. Type of material involved - liquid or powder/crystalline (wet, dry).
 - c. Name of material involved if known.
 - d. Quantity involved.
 - e. Your name and phone number where you are now.
 - f. Whether clean-up assistance is required.
3. The Safety Office or Campus Police will decide if the building is to be evacuated.
4. Alert other workers in the immediate area.
5. Prevent other people from entering the area until the Campus Police arrive.
6. Contain the spill if possible using paper towels or other absorbents.
7. Begin clean-up procedures.

Sample clean-up procedures are described below.
Use the necessary personal protection apparel and equipment.
Avoid producing dust or aerosols.
Contact the Chemical Hygiene Officer at 2697 or 817-735-2697 for assistance if necessary.
8. Properly dispose of contaminated materials. Contact the Chemical Hygiene Officer for assistance by dialing 2697.

CHEMICAL SPILL

CLEAN-UP PROCEDURES

All areas that contain chemicals should be equipped with a “Chemical Spill Control Kit.” Follow directions as given on the kit. *Wear appropriate personal safety apparel and equipment including gloves, face shield, apron and respirator, if necessary.*

In the absence of a kit, use the following procedures.

ACIDS

Neutralize with dry sodium bicarbonate and absorb with paper towels or other absorbent.

Collect absorbent into a plastic bag or pail.

Rinse and mop the affected area using large amounts of water.

BASES

Neutralize with acetic acid and absorb with paper towels or other absorbent.

Collect absorbent into a plastic bag or pail.

Rinse and mop the affected area using large amounts of water.

SOLVENTS

Wear solvent resistant gloves and apron and respirator if necessary.

Absorb spill with vermiculite paper towels or other absorbent.

Collect absorbent into a solvent resistant plastic bag or pail.

Properly dispose of contaminated materials. Contact the Chemical Hygiene Officer for assistance.

TORNADO

TORNADO WATCH

A tornado watch means that conditions are favorable for tornado formation. You should remain alert and do the following:

Review actions to take should the situation change to a TORNADO WARNING, or if a tornado funnel is sighted.

Ensure no physical restrictions exist that would prevent free movement to your nearest “safe” area (clear any blocked doors, aisles, etc.).

Monitor a radio, TV or internet web site or watch the sky for worsening weather conditions.

Do not phone the Campus Police or the Operator for information. Keep telephone lines clear for emergency messages.

TORNADO WARNING

A tornado warning means that a tornado has been sighted.

Take cover. Preferably, proceed to the nearest “safe” area or shelter. Because of possible electrical failures, you should use the stairs, NOT the elevator. **REMAIN WELL CLEAR OF WINDOWS AND OTHER GLASS.**

NOTE: In multi-story buildings, you should move to the basement or first floor.

Inner hallways are usually “safe” areas. If possible, move to the ground level. If you are in a frame or sheet metal building and weather conditions permit, move to a brick or stone building for added protection.

RECOMMENDED “SAFE” AREAS

EDUCATION AND ADMINISTRATION BUILDING (EAD formerly ME1)

Go to the lower levels. Take shelter in small interior rooms. Do *not* use the Atrium or the auditorium or hallway areas with glass storefronts. Restrooms in this building also provide additional protection even on upper floors. Research labs are not considered safe areas during a tornado.

RESEARCH AND EDUCATION BUILDING (RES formerly ME2)

Go to the level -zero hallway, west end; OR to interior south hallways away from glass on levels 2 through 4; OR restrooms

LIBRARY (LIB formerly ME3)

(Gibson D. Lewis Health Science Library)

Go to the level-one inner hallway, away from glass windows and doors; OR use small interior rooms.

Patient Care Center (PCC formerly ME4)

Move to lowest level possible (not the parking level) and take cover in small interior rooms. Patient waiting areas have glass brick walls and high ceilings and are not as safe as other areas.

Center for Bio health (CBH)

Move to the lowest level possible. Because restrooms are on exterior walls, they do not afford as much protection as in some other buildings. Consider moving to

Classrooms on level 2 from upper floors. Laboratories are not considered safe in tornados.

FOUNDERS' ACTIVITY CENTER

Go to the locker rooms or, if time permits, move to hallway level 1 of the Patient Care Center

SINGLE STORY BUILDINGS ALONG CAMP BOWIE

Move to small interior rooms or if time permits move to the Research and Education Building or Education and Administration Building.

SINGLE STORY BUILDINGS ALONG MONTGOMERY

Move to small interior rooms. If time permits, move to basement OR one of the other large buildings on campus

REMOTE CLINICS

Go to the center of the building, take cover in small interior rooms. If time permits, move to a nearby larger building.

3501 7th Street (at Clifton Street)

Go to the small interior rooms.

BOMB THREAT

1. Any person receiving a phone call in which the caller states that a bomb has been placed in any health science center building should make every effort to obtain as much information as possible. The following questions should be asked, if possible:
 - a. Where is the bomb located?
 - b. When is it set to explode?
 - c. Is the bomb contained in a box, briefcase, etc.?
 - d. Why did the caller place the bomb at that location?
 - e. Would the caller like to speak to someone about correcting a “wrong” done to them?
2. Phone the EMERGENCY NUMBER, ext. 2600 or 817-735-2600 and give them the information you were able to obtain.
3. Notify your immediate supervisor of the threat, and let them discuss the situation with the department head or other management source to determine if the immediate area should be evacuated. Or, wait until the Campus Police arrive. Do not alarm your fellow coworkers unnecessarily, which could result in mass hysteria. Don’t panic and don’t spread rumors.
4. The Campus Police officer in charge of the scene will probably request assistance from the Fort Worth Police Department to assist in searching for the explosives.
5. Under no circumstances will any health science center employee attempt to move, disarm, or otherwise neutralize a suspected explosive device. Leave that dangerous job to the experts.

EARTHQUAKE

Earthquakes occur suddenly and without warning. In multi -floor buildings, it is safer to remain in the building until the tremor has passed than it is to attempt to evacuate during

the earthquake itself. Do NOT use the elevator during or after an earthquake. Stay away from glass doors and windows. Don't panic.

SUSPICIOUS MAIL

As a result of the October 2001 anthrax letters, a terroristic act in the USA, the following procedures were adopted to deal with this type of threat. Effective October 25, 2001. Issued by Safety Office in consultation with Infection Control Coordinator, Campus Police and Quality Management.

Part One

Employee and Office Worker Response Protocol

A person who becomes suspicious of mail or a package must do the following things in this order:

1. **Do not panic.** Try to avoid bring your hands close to your mouth or nose as part of your initial reaction. Do not sniff or smell the item or your hands once you have touched the item. Remember, even if you are exposed to anthrax, it is relatively easy to treat when reported immediately. Go to step 2.
2. If you have not yet touched the suspicious item, do not handle it...Go to step 3 if you are working alone and no other co-workers are with you, otherwise go to step 4.

OR,

If the package or envelop is unopened and you have touched it, gently place the envelope or package back on the working surface (desk, counter). Do not sniff or smell the item or your hands once you have touched the item. Go to step 3 if you are working alone and no other co-workers are with you, otherwise go to step 4.

3. **If you are working alone** and no one else is around your area, go ahead and call Campus Police, ext. 2600 immediately as you prepare to leave the room. If you have not touched the suspicious item, remain immediately outside the office or work area and wait for the Campus Police to arrive. **Remain calm.**

OR

If you touched the suspicious item, remain outside the office or room until Campus Police arrive, and then let an officer escort you to a nearby toilet to wash your hands. Wash your hands with soap and water. Do not use harsh

cleaners, or brush that might scratch the skin. **Remain calm.**

OR

If you know that your clothes have been contaminated, tell this to the Police Officer as you are escorted to the toilet to wash your hands. **Remain calm.**

Take your directions from the Police Officer who has assisted you.

4. **If co-workers are in the area, calmly alert all persons** in the office or room that there is a suspicious item. All persons in the room are to immediately, but calmly leave the room where the suspicious item is located.

Ask a co-worker to have all persons who were in the room gather immediately outside in the hallway. Persons involved in the incident should **remain immediately outside of the room** where the incident has occurred.

One of the co-workers should make sure no one enters the room with the suspicious item.

Once outside of the room, ask a co-worker to call the Campus Police, x2600 immediately to report the incident.

If you touched the suspicious item, ask one (1) co-worker to assist you to the nearest toilet, opening the door for you so that you don't touch the door, doorknob, etc. **Remain calm.**

Wash your hands with soap and water. Do not use harsh cleaners, or brush that might scratch the skin.

If you know your clothing has been contaminated with a powder or other visible material, tell this to the person who assists you to the toilet.

If there is a clothing contamination issue, please remain in the toilet until Campus Police arrive and you are directed to take further action by the officer(s) who responds. **Remain calm.**

Otherwise, proceed back to the area where the other persons are waiting.

Follow the directions of the Campus Police. **Remain calm.**

5. Potential exposures will be referred to the Harris ER.

Suspicious Mail Protocol (Possible Anthrax Exposure)

Part Two

Campus Police Response Protocol

1. Dispatcher takes call from person with suspicious mail, possible anthrax exposure or from someone assisting such a person. Dispatcher takes the following information:

Time of call
Name of caller

Obtain name of person who initiated the concern. How long ago did the incident begin?

Room number where incident occurred. Number of people in room at time of incident. Asks if the item has been opened or not.

Has everyone in the room left the room and are they now standing by for Campus Police to assist?

If no, instruct caller to tell staff in room to leave room and gather in hallway nearby

At this point, the dispatcher may want to walk the caller through the employee portion of the response.

2. Dispatcher dispatches at least two officers to the scene.

If it is indicated:

One officer will take notes outside the incident area:

Take notes describing the concern/incident

Name, home address, DOB of each person at the scene

Names of any people not currently at the scene

Narrative of incident

The other police officer will: Secure the scene

Assist a person at the toilet with suspected contamination of clothing. Make a determination to escalate response or not after inspecting the item.

If item is unopened & not stained or oddly shaped, Fort Worth Hazmat does not want this material. Secure in biohazard bags and call the Safety Office for holding/disposal.

If the item is open, & stained &/or powder if visible, cover gently with paper or other object to prevent spread of powder, if not already covered. Secure scene and call Fort

Worth Hazmat.

3. Dispatch places call to VP for Finance and Administration to inform of non-escalated event, OR in case of escalated event, ask VP for Finance and Administration if EOC should be activated.
4. All persons including officers should be instructed to wash hands before either continuing work or leaving the building.
5. Campus Police should inform the Infection Control Coordinator of the circumstances of the incident, provide written report as soon as available, names of persons involved.

Incident Response Kit:

Copy of this protocol and the employee protocol. Two pairs disposable gloves
Two masks

Five biohazard bags: 3 for item, 2 for street clothes if required

VIOLENCE IN THE WORKPLACE & CLASSROOM

With the understanding that each person will act in a manner they believe to be congruent with their own personal safety, some things you can do during a violent event are:

- remain calm,
- if you are reporting the incident, call the Campus Police emergency number, 2600 on the main campus or 911 if you are located elsewhere in the community. If time allows and you are not on the main campus, please call the Campus Police at 817-735-2600,
- remember the methods the organization will use to communicate during a violent incident,
- keep your text message device with you while on campus, in the clinic and in class (on vibrate so you can be notified of a message without causing confusion that may result from an audible ringtone),
- Follow directions you may be given by a police officer responding to the incident and that you may receive via the official communication methods listed below.

Communication during violent incidents and in their aftermath is an important part of the institutional response to such events. Because no one communication system can be completely reliable and available all the time and because each situation varies as to time, place and duration, it is the policy of the health science center to communicate by a variety of means in an attempt to get important personal security messages to those who need them. Depending on the situation, the health science center will:

- use electronic means of notification including GroupWise groups,
- text messages,
- voice messages over the fire alarm system in major buildings,
- post the status of the organization and its facilities on the center's internet site,
- And update public media as needed.

From a historical perspective, the health science center has experienced very little physical violence in its owned and leased facilities. We need to be mindful that our workplace is a microcosm of our society. We need to recognize that we have faculty, staff, students and patients in our facilities every day who have diagnoses that require counseling, psychotherapy and medications to manage stress, mood and behavioral disorders. We can do much to reduce the potential for violence in our workplace and in our classrooms, but history also shows we cannot prevent it all the time under current law.

Each of us can take personal responsibility to help minimize violence in the workplace and classroom and to mitigate it. First, as individuals, we can seek medical help and take the medications as directed by our personal physician to manage behavioral issues of clinical significance. Second, we can inform our Campus Police if we have restraining orders in place against individuals who have been abusive or have threatened violence.

Third, we can make ourselves available for training on how to defuse potentially hostile situations and avail ourselves of mediation services that are offered at the health science center when personal conflicts arise. Fourth, we can promptly notify Campus Police of a developing situation before it actually turns violent. Fifth, we can avail ourselves of the various communication modes offered to us by the organization to stay informed.

For its' part, the Health Science Center has progressive discipline policies to deal with misbehavior and inadequate performance in the workplace and among students, and it is management's responsibility to use this tool to deal with situations so that they do not fester for long periods of time. The institution has a drug free workplace policy and weapons are prohibited in our facilities. Policy 5.14 titled Violence in the Workplace located in the UNTHSC Policies and Procedures Manual establishes a zero tolerance policy toward violence. It is management's responsibility to use these policies promptly to deal with dangerous and potentially dangerous behavior, and to provide appropriate training opportunities to reduce violence in the workplace.

The health science center employs a number of licensed Texas Peace Officers and additional public service officers to provide assistance and security in our owned facilities on the main campus and some patrols and some police response to our owned and leased facilities elsewhere in the community on a 24/7 basis.

Campus Police and their law enforcement partners in Fort Worth and Tarrant County will use various tactical options open to them, as appropriate, to deal with violent situations. The health science center and the Campus Police are committed to communicating effectively, efficiently, and in a timely manner with faculty, staff and students concerning violent situations in health science center facilities.

PART 1

CHAPTER 1

SAFETY ADMINISTRATION

SAFETY RESPONSIBILITIES

PRESIDENT

The President of the health science center has the ultimate responsibility for safety at the institution.

DEANS AND VICE PRESIDENTS

The deans and vice presidents are responsible for safety in the areas that report to them.

DIVISION AND DEPARTMENT HEADS

Department heads are responsible for safety within their department.

SUPERVISORS

Supervisors are responsible for the safety of those they supervise.

ALL EMPLOYEES

All employees shall conduct themselves and perform their tasks in a safe and courteous manner. Work practices outlined in this safety manual shall be followed.

STUDENTS AND INVITEES

All students and invitees shall abide by the safety policies, procedures and work practices as outlined in this manual.

COMMITTEES, UNITS AND GROUPS WITH SAFETY RESPONSIBILITIES

SAFETY COMMITTEE

The institutional Safety Committee is a free standing committee composed of members from all areas of the college and is charged with developing safety awareness and education programs. This committee is appointed by the President. The current membership of this committee is posted on the HSC web server.

RADIATION SAFETY COMMITTEE

The Radiation Safety Committee is a free standing committee composed of one authorized user of radioactive materials from each department that uses such materials. This committee sets policies and establishes all procedures for the receipt, use and disposal of radioactive materials and x-ray and laser devices. These policies and procedures are part of

the institutional license and registrations from the Texas Department of Health, Bureau of Radiation Control. These policies and procedures are contained in a document entitled *Radiation Safety Manual of University of North Texas Health Science Center*. An electronic copy of this manual is available from the Safety Office web server. The current membership of this committee is posted on the HSC web server.

INFECTION CONTROL COMMITTEE

The Infection Control Committee is a free standing committee, appointed by the president that is charged with establishing policies and procedures for preventing exposure and the spread of communicable disease at the institution. This committee has the authority to restrict employees and students from duties when medical conditions warrant. This committee delegates the day to day administration of the infection control program to the infection control practitioner, who is a registered nurse. Policies and procedures on infection control are located in the Infection Control Manual. The department that lends administrative support to this committee is the Department of Quality and Patient Safety. The current membership of this committee is posted on the HSC web server.

BIOSAFETY COMMITTEE

The Biosafety Committee is free standing committee, appointed by the president, that oversees all use of biological agents and recombinant DNA in research and clinical laboratories. The Office of Research is the administrative unit that supports the Biosafety Committee. The current membership of this committee is posted on the HSC web server.

INSTITUTIONAL REVIEW BOARD FOR HUMAN SUBJECTS RESEARCH

The Institutional Review Board for the Protection of Human Subjects (IRB) is charged with the responsibility of protecting the rights of individuals who are subjects of any research, whether funded or not, whether on or off campus, conducted by faculty, staff, and/or students. The Code of Federal Regulations (45 CFR 46) mandate the formulation of guidelines in regard to the research on human subjects. These guidelines shall be adequate to protect the human subject, the researcher, and the researcher's staff and the health science center. This board is a free standing faculty committee. The Office of Research is the administrative unit that supports IRB.

Point your web browser to

<http://www.hhs.gov/ohrp/regulations-and-policy/regulations/45-cfr-46/>

SAFETY OFFICE

The Safety Office is an administrative unit that supports the activities of the Safety Committee and Radiation Safety Committee. The Safety Officer, who is the department head, is charged with specific responsibilities as outlined in the president's safety policy statement.

This office provides safety services to the institution. These include accident prevention and investigation, fire safety, radiation safety, chemical and biological safety and certain

aspects of risk management. The Radiation Safety Committee delegates the day-to-day administration of the radiation safety program to the Radiation Safety Officer who is a member of this department.

This office serves as liaison between the institution and the Texas Department of State Health Services, Bureau of Radiation Control, Texas Commission on Environmental Quality and Risk Management Division of the State Office of Risk Management.

DEPARTMENT OF QUALITY AND PATIENT SAFETY

The Department of Quality and Patient Safety provides administrative support to the clinical operations of the institution in the areas of risk management, patient care standards and utilization review, and accreditation of ambulatory care clinics. Additionally, the infection control practitioner (a nurse) in this office is delegated the day to day responsibility for infection control by the Infection Control Committee.

DEPARTMENT SAFETY COORDINATORS

Department safety coordinators (additional duty safety officers) are appointed by each department head. They assist the department head with safety management at the department level. Their responsibilities include the following:

GENERAL

Safety coordinators shall assist department chairmen to administer and manage safety within the department. Safety coordinators also serve as an information conduit to the Safety Office to alert the Safety Office to safety issues at the department level.

ACCIDENT REPORTS

Safety coordinators shall review all accident reports for accidents occurring within their department. This review takes place after the initial fact finding by the supervisor of the injured person. Safety coordinators forward the accident report to the department head for review and signature.

SAFETY DATA SHEETS (SDS)

Safety coordinators shall maintain the department SDS files. SDSs are sent by the Safety Office to safety coordinators so that they may be available to department personnel **during normal business hours**. This is a very important element in hazard communication and the management of chemical exposures.

COORDINATION OF ANNUAL CHEMICAL INVENTORY

The Safety Office utilizes the services of safety coordinators to organize and report the annual chemical inventory of the institution, as required by the Texas Hazard Communication Act. Coordinators are not themselves required to perform the

inventory, rather they organize the activities of supervisors and line employees to accomplish this task.

COORDINATION OF HAZARD COMMUNICATION TRAINING

Safety coordinators organize hazard communication training for department personnel. Coordinators may perform the general training sessions to make department personnel aware of the provisions of the Texas Hazard Communication Act, the location of notice to employees and the location of the department SDS files. Alternatively, department heads may wish to assign this task to others. Safety coordinators are not responsible for chemical specific training, which is a task for each supervisor. Safety coordinators are responsible for forwarding training certificates and rosters to the Safety Office on a timely basis.

INSPECTIONS

Safety coordinators accompany Safety Office personnel when inspections are conducted and receive copies of inspection reports.

LIST OF COORDINATORS

A current list of department safety coordinators can be found on the Safety Office web server. Point your web browser to <http://safety.hsc.unt.edu/office/database/databases.html>.

EMERGENCY CONTACT MANAGEMENT

Safety coordinators have a responsibility to update the emergency contact list for their department on a quarterly basis. See Appendix K of this manual.

PART 1

CHAPTER 2

ACCIDENT INVESTIGATIONS

All accidents and incidents occurring throughout the health science center shall be reported and investigated.

DUTIES OF THE INJURED EMPLOYEE

When an accident/incident occurs, the **EMPLOYEE** shall immediately follow the procedures outlined in the Emergency Procedure Plan, to include:

1. Notify the immediate supervisor.
2. If the incident is serious and assistance is required or if the supervisor cannot be contacted, notify the Campus Police by dialing ext. 2600.
3. Remain at the scene.
4. Protect the scene so that other health science center employees are not endangered/involved.

If employees wait more than 30 days to report an injury to their supervisor, they may lose the ability to collect workers' compensation for the injury under Texas law.

An employee who is absent from work because of an occupational accident or illness shall remain in WEEKLY contact with the supervisor. Communication is vital. Failure to keep in touch may be interpreted as job abandonment.

DUTIES OF THE SUPERVISOR

The immediate **SUPERVISOR** of the employee, in coordination with the Safety Officer, will immediately investigate the accident/incident and complete the accident investigation form. Employees may not be eligible for benefits from the Texas Workers' Compensation Commission without a completed accident investigation form on file.

1. Only the approved health science center reporting form will be used during the investigation.
2. Investigations will be thorough, the causes determined (if possible), and a recommended action to be taken to prevent recurrence of similar accidents/incidents in the future will be made. Reports indicating that no unsafe acts were committed and that no unsafe conditions existed will not be

acceptable.

3. Supervisors will request assistance from the Safety Officer and other health science center specialists, as needed.

DUTIES OF THE DEPARTMENT SAFETY COORDINATOR

The **DEPARTMENT SAFETY COORDINATOR** will review the supervisor's report for accuracy, date and sign the report and then forward it to the department head for signature.

DUTIES OF THE DEPARTMENT HEAD

The employee's **DEPARTMENT HEAD** will immediately further investigate the accident/incident (or direct the department safety coordinator) to further determine whether:

1. The injured employee had previously been trained adequately to recognize the specific cause of the accident.
2. The injured employee failed to comply with instructions previously received during their training/orientation.
3. A direct, established safety rule was flagrantly violated by the employee.
4. The employee had been directly instructed to disregard a specific rule, regulation or established procedure.
5. Supervisor failure caused or contributed to the accident/incident.

After an accident/incident has been reported and investigated, the employee's immediate supervisor and the department head will take action to prevent recurrence of similar accidents/incidents, to include:

1. Correction of any physical hazard or unsafe condition that caused/contributed to the accident/incident.
2. Enforcement of safety rules, regulations or procedures, as currently established.
3. Training of the employee (initial, refresher or remedial) as required.
4. Revision of safety rules, regulations or established procedures that were found

to be inadequate.

5. Preparation of new safety rules, regulations or procedures, if needed.
6. Administrative or other action against the employee responsible for the accident/incident if they violated safety rules, regulations, established procedures or direct instructions.
7. Notification of top management if someone had ordered the employee to disregard the rules, regulations, procedures, etc.
8. Other action as necessary to prevent recurrence of similar accidents/incidents.

DUTIES OF THE ACCIDENT CLAIMS COORDINATOR AND SAFETY OFFICER

Each accident/incident report will be reviewed individually to determine adequacy of the report and adequacy of the action taken to prevent recurrence. Ideally, each report should be reviewed at each echelon of supervision/management, but under no circumstances will the report be reviewed by fewer than:

1. Accident Claims Coordinator
2. Safety Officer
3. Safety Committee, during its scheduled quarterly meeting, and collectively with all other similar reports of that quarter.

The **SAFETY OFFICER** will review all accident/incident reports to determine if a trend can be recognized. If such a trend is identified, the Safety Officer will coordinate with department head(s) to take corrective actions. To enable this review to be more effective, the following data shall be collectively reviewed:

1. Major cause(s)
2. Supervisor failures that may have contributed
3. Other causes
4. Time, day of week
5. Employee category/classification
6. Tenure with health science center, with department
7. Department, immediate supervisor
8. Location of accident/incident
9. Other contributing factors.

PART 1

CHAPTER 3

SAFETY TRAINING

Safety training is provided at the health science center in an effort to protect students, employees and the community. Through its policy statements and actions, the health science center is committed to providing as safe a work place as is possible given the role and scope of the institution. Some activities at the health science center have inherent health risks. The administration seeks to maximize the benefits to the institution, the state and society when potentially dangerous activities are undertaken. The administration also seeks to reduce the risks associated with those tasks to an absolute minimum through employee awareness and education.

SAFETY TRAINING IN NEW EMPLOYEE ORIENTATION

Employees shall have an online Workplace Safety and Health module during the new employee orientation process. This briefing shall include, but is not limited to, a general orientation to the safety program, fire safety, office safety, back injury prevention, hazard communication (chemical safety) and AIDS awareness. Persons with occupational exposure to blood-borne pathogens shall review standard precautions and be given an opportunity to participate in the voluntary Hepatitis B vaccination program.

SAFETY TRAINING CONDUCTED IN DEPARTMENTS

Basic safety training at the health science center is organized by department. Department heads will be assisted in the organization of departmental programs by a department safety coordinator. This coordinator shall be appointed by the department head.

SAFETY COORDINATOR'S TRAINING RESPONSIBILITIES

The DEPARTMENT SAFETY COORDINATOR in consultation with the Safety Officer and the department head will have the responsibility to see that all members of the department receive the following training:

GENERAL CORE SAFETY TRAINING

This training consists of basic information on the location of safety devices and manuals, and in basic procedures to follow in the event of emergencies, especially fires, chemical spills and medical emergencies.

DEPARTMENT SPECIFIC TRAINING

This training will vary from department to department but shall include a general awareness of the types of chemicals in use and the need for special precautions, if any. Each department shall keep a list of current topics discussed at department training sessions in their safety manual and shall provide a copy of this information to the Safety Officer.

SUPERVISOR'S TRAINING RESPONSIBILITIES

Each SUPERVISOR has the responsibility and obligation to provide safety training to each employee. This training shall cover the specific hazards associated with each job including chemical specific training as required by the Texas Hazard Communication Act.

The SUPERVISOR shall provide or request special training for employees when appropriate. Instances where specialized training may be appropriate include:

1. Instruction in the safe use and disposal of hazardous chemicals, radioactive materials, microorganisms, viruses and recombinant DNA materials.
2. Instruction in the safe use of LASER devices as well other equipment when a mechanical, electrical or radiation hazard exists.

EMPLOYEE TRAINING RESPONSIBILITIES

EMPLOYEES shall attend safety training sessions which address job hazards.

SAFETY TRAINING CONDUCTED BY SAFETY OFFICE

The SAFETY OFFICE provides online Workplace Safety and Health Module during new employee orientation.

The SAFETY OFFICE maintains a self-paced, web-based training program for radiation workers. Point your web browser to <http://safety.hsc.unt.edu/office/rad/radiation.html> and click on the link to radiation training.

Training sessions conducted by the Radiation Safety Officer may be arranged on an as needed basis by calling the Safety Office, ext. 2697.

SAFETY TRAINING CONDUCTED BY ORGANIZATIONAL DEVELOPMENT AND TRAINING

Employees may obtain CPR training by scheduling a class through Facilities and UNT health Science Center

SAFETY TRAINING CONDUCTED BY STUDENT/EMPLOYEE HEALTH

A Chief Nursing Officer is responsible for providing training on blood-borne pathogens, tuberculosis prevention and on policies and procedures related to infection control.

PART 1

CHAPTER 4

SAFETY INSPECTIONS

INSPECTIONS PERFORMED BY EMPLOYEES AND SUPERVISORS

All employees shall perform periodic self-inspections of their work areas and report safety hazards and concerns to their supervisor. Supervisors shall take appropriate actions to correct hazards. Supervisors may consult with the Safety Officer by calling ext. 2697.

HOUSEKEEPING

Work areas shall be kept free of litter that may be a fire hazard and free of trip hazards. The following items should be checked by employees and supervisors periodically:

1. Isles must be free of obstructions which might block egress during an emergency.
2. Cords must not be frayed and must be out of the way so that they are not a trip hazard. Molding should be used to secure cords when necessary.
3. Fire extinguishers located inside the work area must not be obstructed.
4. Access to circuit breaker boxes must be easy and unobstructed.
5. Items must not be stacked above the level of the sprinkler heads.
6. Items must not be stored within 18 inches of the sprinkler heads.

MOTOR VEHICLE INSPECTION

Drivers of agency-owned vehicles shall perform a visual inspection of the vehicle daily. Defects shall be reported to the auto shop for immediate attention. No agency vehicle shall be driven if defects are serious and would compromise the safety of occupants.

BIOSAFETY

Departments possessing Type II biological safety cabinets which exhaust air into the room air shall have each cabinet certified annually by licensed personnel. When cabinets are moved or opened for repairs, they shall be re-certified before being placed back into service.

RADIATION SAFETY

Authorized users of radioactive materials shall perform all surveys and inspections as required by the institutional radiation safety manual.

All X-ray producing devices shall have performance testing and preventive maintenance according to the current schedule as published in the Texas Regulations for Control of Radiation

INSPECTIONS PERFORMED OR ARRANGED BY PHYSICAL PLANT

FIRE SAFETY

The Facilities Management shall quarterly inspect and test all elements of automatic and supervised fire and smoke detection systems and shall make timely repairs to ensure proper operation of these systems. Facilities Management shall let contracts with licensed vendors as necessary for inspection of sprinkler systems, fire panels and elevators. Exit lights and emergency lighting fixtures shall be tested monthly and annually as required by the Life Safety Code. **Portable fire extinguishers shall be checked monthly and serviced at appropriate intervals by type and age of device.** Copies of all inspections and repairs shall be maintained by the Facilities Management for inspection as needed.

BOILERS

All regulated boilers and pressure vessels shall be inspected at the required intervals by licensed personnel to insure safety of the equipment, maintain currency of insurance and comply with state rules and regulations.

MOTOR VEHICLES

All motor vehicles shall be inspected annually by the auto shop and shall include a state safety inspection by licensed personnel.

SHOPS, CHASES, UTILITY AREAS AND OTHER PUBLIC AREAS

The safety coordinator(s) of Facilities Management shall conduct quarterly inspections in Q2, Q3 and Q4 of each fiscal year for all areas under the department control including indoor public areas as defined in Appendix H of this manual. A written check list shall be used and be maintained in the Facilities Management's administrative offices for review as needed.

SPRINKLER SYSTEMS

Sprinkler systems in high rise buildings at the health science center shall be inspected at the interval specified by local fire code. Inspections shall be performed by licensed personnel. This inspection shall include, but is not limited to:

1. Proper number and location of sprinkler heads
2. Proper function of flow and tamper switches
3. Performance test of fire pumps

Copies of all inspection reports shall be maintained by the Facilities Management for inspection as needed.

ELECTRICAL SAFETY

At the conclusion of a renovation project, all electrical plugs shall be checked to assure proper polarity and grounding. Defects shall be reported to Construction and Renovations for immediate corrective action.

INSPECTIONS PERFORMED OR ARRANGED BY THE SAFETY OFFICE

FIRE SAFETY

Standpipes in high rise structures at the health science center shall be inspected by the Fort Worth Fire Department at intervals specified by that department. The Safety Office shall coordinate such testing with Utilities and work with Renovations and Construction and with the Facilities Management to immediately correct any deficiencies.

Annually, all areas shall receive a fire inspection including, but not limited to:

1. Worn cords
2. Overloaded power strips
3. Proper storage of flammable materials and general housekeeping
4. Proximity of items to sprinkler heads

Annually, all labs shall receive a fire safety inspection including but not limited to:

1. Fire extinguisher is present, has a current inspection and is accessible. In addition to annual inspection, extinguishers are checked quarterly.
2. Only appropriate quantities of solvents are present to maintain a Type C fire rating.
3. Circuit breaker boxes are clear and unobstructed.
4. Cords, extension boxes, etc. are not on the floor where they may become submerged in case of water leaks.
5. Compliance with the Life Safety Code requirement that laboratory doors be kept closed shall be assessed. This shall be a statistical sampling rather than a spot inspection.
6. Direction of air flow shall be assessed. All laboratories shall be under negative pressure.

CHEMICAL SAFETY

Annually, all laboratories shall be inspected to determine compliance with the provisions of the agency chemical hygiene plan.

Eye wash and drench showers are inspected annually. Defects are reported to Facilities Management for immediate correction.

Chemical fume hoods are inspected annually by safety office staff. Face velocities are indicated with sash heights on a sticker which is dated and initialed.

RADIATION SAFETY

All areas that use radioactive materials are inspected annually by the Safety Office as

required by the institution's radiation safety manual. These inspections are in addition to the monthly inspections performed by laboratory personnel for areas that use radioactive materials.

Leak tests for certain sealed sources shall be performed by the Safety Office every six months in accordance with the agency radiation safety manual and provisions of the Texas Regulations for Control of Radiation.

SHOPS, CHASES, UTILITY AREAS AND OTHER PUBLIC AREAS

During Q1 of each fiscal year, safety office staff, accompanied by the department safety coordinator(s) for Facilities Management, shall inspect all indoor areas under the administrative control of the Facilities Management. A check list shall be used.

PART 1

CHAPTER 5

SAFETY AWARDS PROGRAM

GENERAL

The purpose of the health science center Safety Awards Program is to give recognition to departments, supervisors and employees whose achievements, contributions and other efforts have significantly improved health science center employee job safety and health. In addition, this program should increase safety awareness among health science center employees, motivating them to participate in the health science center safety program.

SAFETY ACHIEVEMENT AWARD

To be considered eligible for this award, departments, supervisors, and individual employees must meet all below:

- a. Develop a written and functional safety program.
- b. Conduct effective safety training for present employees and/or new employees (may be refresher training, or special training).
- c. Maintain accident records that accurately depict accident experience for a minimum of six months.
- d. Achieve a 10 percent reduction in reportable accident/injuries during one fiscal year.

SAFETY CONTRIBUTION AWARD

To be considered eligible for this award, departments, supervisors, and individual employees must meet the following:

- a. Develop or modify a safety program that improves effectiveness by controlling, reducing or eliminating accident/injuries (minimum of 10 percent reduction in six months).
- b. Assist other department(s) in the development of a safety program that has resulted in greater safety awareness and a 10 percent reduction in injuries/accidents within a six-month period.

- c. Develop a departmental employee safety incentive or suggestion program and have it in effect for at least six months.

SAFETY INITIATIVE CERTIFICATE

To be considered eligible for this award, a supervisor or individual employee must meet at least two of the following:

- a. Assist in the development of a written and functional safety program that results in a minimum of 10 percent reduction in accidents/injuries within a six-month period.
- b. Assist in the development of a departmental employee safety incentive or suggestion program that results in a reduction of accidents/injuries within a six-month period.
- c. Make a recommendation to the health science center safety suggestion program that results in at least a very significant reduction in the accidents/injuries within a six-month period.
- d. Assist in the teaching/presentation of safety training courses within the department, or within the health science center safety training program, for a minimum of one fiscal year.

INDIVIDUAL SAFETY CERTIFICATE

To be considered eligible for this award, an individual employee must meet at least two of the following:

- a. Develop or contribute to the development of an effective safety program or course for the employee's department or for the health science center.
- b. Conduct effective safety training classes or safety awareness programs for the employee's department or for the health science center.
- c. Promote safety awareness programs through guest speaking before other department meetings, through written articles, by conducting safety contests, or by providing a series of meaningful photographs or news items for a public bulletin board on safety.
- d. Keep personal areas of responsibility (must include personal work area) clean and neat, and maintain good housekeeping of these areas.
- e. Correctly post all safety signs required to warn of hazards in employee's work area and other areas of employee's responsibility, and safety signs informing others of personal safety equipment required in those areas.

- f. Display a safety exhibit in a public area that directly relates to the work procedures or environment of employees.
- g. Serve on the health science center Safety Committee in an active role for a minimum of one fiscal year. (**NOTE:** Active is defined as not missing any of the quarterly-held meetings.)

MERITORIOUS SERVICE CERTIFICATE

To be considered eligible for this award, an individual employee must have made an outstanding contribution to the health science center accident prevention programs by an exceptional accomplishment. This award must be in recognition of a specific achievement relating to employee safety or the health science center safety program. A recommendation for this award can be submitted at any time.

To submit a nomination for any of the above awards, a department head, supervisor or health science center employee must submit an application in writing to the health science center Safety Committee. Complete documentation of eligibility for the award must accompany the application. The Safety Committee shall assign a member of the committee to investigate the application and verify eligibility. The Safety Committee chairman will then submit the committee's recommendation to the health science center president for approval.

PART 2

CHAPTER 1

SAFE WORKING PRACTICES FOR ALL AREAS

INTRODUCTION

The safety practices set forth in this manual are designed to establish an accident-free working environment for all health science center employees. Department heads, managers and supervisors are responsible for implementing these practices and for encouraging all employees to make them a routine part of their daily work activities. The safety and health of all health science center employees will be given priority over all other activities. Nothing is more important than a human life.

These safe work practices are not to be viewed simply as measures to avoid legal liability. In fact, many go beyond the minimum requirements of the law, as well they should. Nothing is gained from individuals endangering themselves and others through careless work habits. The surest safety is prevention; the best precaution is awareness of hazards and how to avoid them. Accidents do not just happen. There are only two causes - unsafe acts and unsafe conditions. Some accidents involve both of these causes. Since the causes are known, accidents can be prevented.

All personnel must know the location of the department safety manual, the department inventory of hazardous or potentially hazardous chemicals and the department Safety Data Sheets (SDS). They must also know the health science center emergency telephone number which is **ext. 2600** or **817-735-2600**.

SAFE WORKING PRACTICES

PERSONAL CONDUCT

All health science center employees will conduct themselves in a safe and courteous manner while on health science center property, while using health science center vehicles and while officially representing the health science center.

Employees shall not possess or use illicit drugs at the health science center or while

using health science center vehicles. Employees shall not work under the influence of illicit drugs or alcohol. The use or possession of alcoholic beverages at the health science center is expressly forbidden except for special functions approved on a case-by-case basis in advance by the president.

Smoking is not allowed in health science center-owned vehicles. Smoking in or on HSC owned or leased facilities and grounds is restricted to designated areas.

Employees will not “baby-sit” their children or pets in health science center facilities.

Do not run in corridors, hallways, passageways, or stairwells. Corridors and hallways of the health science center buildings shall not be used as exercise tracks.

CLOTHING AND PERSONAL EFFECTS

All health science center personnel are expected to dress appropriately for their jobs. A rubber soled shoe with a closed-toe leather upper is recommended for most tasks at the health science center. Open-toe footwear and canvas top shoes offer little or no protection from falling objects or chemical spills. For lifting and activities involving work on uneven or wet surfaces, employees shall have footwear that provides adequate traction and a mechanical resistance to falling objects.

Jewelry and loose clothing that may be caught by moving parts of machines or equipment used in your work should not be worn.

Long hair must be restrained when working with machinery in which hair may become entangled.

Use personal protective equipment (clothing, goggles, gloves, safety hats, etc.) when health science center management, after coordinating with the appropriate safety and health personnel, decides it is necessary for the prevention of injuries or illness.

All Facilities Management employees must wear the uniforms furnished. Face-shield, safety glasses, goggles or other protective equipment depending on the job will be used. All grounds personnel are required to wear a hat when outside, working in the sun.

EQUIPMENT OPERATIONS

Operators of hazardous equipment, products or techniques must be adequately trained in safe operating/handling procedures.

No machine or contrivance will be modified in any way that would negate the safety features that have been built into the equipment or processes.

Place and anchor machines in a way that precludes unnecessary risk to operators

and other personnel.

Keep protection devices (guards) on machines in place and use them properly.

Make sure operating controls on machines are easily accessible and identifiable in case of emergency. STOP controls must be identified with red color, where possible.

Immediately report any defects in equipment to management for action. Suspend use of defective equipment until repairs are made.

Post warning signs and lock out defective equipment, equipment being serviced and their power sources to prevent use and protect service technicians.

ELECTRICAL CONNECTIONS

Follow safe electrical work practices, as specified in the National Electrical Code.

Do not use extension cords, except temporarily until adequate electrical outlets can be properly provided. If extension cords must be used temporarily, they must be of the approved type (i.e. 3-conductor, grounded). Do not, under any circumstances, use 2-conductor, ungrounded lamp cords as extension cords.

HOUSEKEEPING

Good housekeeping is essential in preventing fires and accidents. Every employee and supervisor is responsible for keeping the work area free of obstacles to egress in case of fire or emergency. Periodic self inspections are recommended.

Spilled liquids and chemicals in a work area or hallway must be taken care of immediately. For small spills of water, coffee or other nonhazardous liquid or solid, perform the clean-up yourself. If you need assistance with a chemical spill, call the Safety Office at ext. 2697. For large spills of water, call custodial services at ext. 5071. Refer to Part 3, Chapter 2 for more information on chemical spill procedures.

Repair or replace broken items that present a safety hazard in the work area. Broken glass is particularly hazardous. Follow the waste segregation guidelines in Part 2, Chapter 11 of this safety manual. Do not place broken glass items in the regular trash as they present a hazard to custodial staff.

Additional recommendations on housekeeping can be found in chapters 2, 3 and 4 of Part 2 of this safety manual. Consult the index for other references to housekeeping.

Refer to Part 2, Chapter 6 for safe practices when storing materials such as paper, office supplies, chemicals, etc.

PART 2

CHAPTER 2

SAFE WORKING PRACTICES

FOR OFFICE AREAS

INTRODUCTION

The work practices in this chapter are in addition to those for all work areas that are described in Part 2, Chapter 1 of this safety manual.

SAFE WORKING PRACTICES

The most common injuries in offices are falls, striking against objects, tripping and strains (as a result of improper lifting techniques). The following safe work practices will reduce the possibility of office accidents:

Arrange office furniture to reduce personnel traffic. The principles of work flow are as important to safety as they are to efficiency.

The distance from the front of one desk to the back of another desk shall not be less than three feet.

Don't place office machines near the edges of tables and/or desks.

Secure office machines that "creep" during their operation by fastening them to the surface, or equip them with rubber feet.

Place filing cabinets against walls or columns, and bolt them together or fasten them to the floor or wall so they won't tip over.

Only non-slip wax will be used on floors that require polishing or buffing. Floor mats and runners should be used when possible to give a better slip-resistant walking surface.

Report defective or torn carpets immediately and cover them until repairs can be made.

Repair or replace worn, warped or curled floor mats and carpet protectors under chairs and desks. They are common causes of trips.

Aisles and passages through work areas (not hallways or corridors) shall be at least 32 inches wide and shall be kept unobstructed.

Keep wastebaskets where people will not trip over them.

Put low tables and office equipment against walls, partitions or in corners.

File drawers should not open into aisles, unless extra space is provided. Don't leave file drawers open and unattended. Open only one drawer at a time in the same cabinet to prevent them from tipping over.

Avoid facing employee desks towards windows, unshielded lamps or other sources of glare. This causes visual fatigue and low morale - both of which lead to accidents.

Make certain there's adequate ventilation in areas where duplicating machines are used, especially if they use spirits, ammonia, methanol or other toxic liquid or powder.

Do not use office chairs as ladders.

Chairs should be sturdily built. All swivel chairs on casters should have 5 castors and a base at least 20 inches in diameter (22 inches preferred) to help prevent tipping. All new purchases shall be of such construction.

Repair or replace defective chairs immediately.

Employees must not "scoot" across the floor while sitting in a chair, or lean a chair backwards on only two legs. The employee must sit properly in chairs, not on the edge.

Carefully inspect spring-loaded typing desk shelves to make certain they're working properly and locked in-place before placing typewriters or computers on the shelf.

Have all sharp edges and burrs on desks, chairs, cabinets and other furniture quickly removed or repaired.

Use of glass tops on desks and tables is discouraged. They often crack and cause safety hazards. Durable synthetic surfaces (acrylic/Plexiglas, Formica-type veneer or hard rubber) make glass tops unnecessary.

Office fans should have substantial bases and mesh-wire blade guards, front and back, with not greater than 1/2 inch squares. Place the fans well out of the normal traffic patterns and passageways.

Keep guillotine paper cutter blades latched down securely when not in use.

Remove electrical power to copiers before putting a hand in to remove jammed papers, etc. This will help prevent finger and hand injuries.

Learn and practice the correct method for lifting objects. Learn to lift with your legs and back in the proper manner. Refer to Part 2, Chapter 6 of this safety manual for a description of good lifting technique.

PART 2

CHAPTER 3

SAFE WORKING PRACTICES

FOR LABORATORY WORK AREAS

INTRODUCTION

This chapter serves as an introduction to safe working practices in the research and clinical laboratory. These requirements are in addition to those for all work areas as described in Part 1, Chapter 1 of this safety manual. These practices are supplemented by more detailed procedures that are found in the Chemical Hygiene Plan (Part 3, Chapter 2), the chapter on biological safety (Part 3, Chapter 3) and the **current policies which cover blood-borne pathogens as referenced in** Part 3, Chapter 1 of this document.

SAFE WORKING PRACTICES

The most common injuries in labs are animals bites, needle sticks, strains as a result of improper lifting techniques and cuts from broken glassware. The following safe working practices will reduce the possibility of laboratory accidents.

Appropriate attire shall be worn in all laboratories. Closed-toed shoes with leather uppers will be worn. Shorts will not be worn, not even if worn under lab coats. Appropriate, personal protection apparel including lab coats, safety glasses/goggles, filter masks and/or gloves will be made available and shall be worn. Laboratory supervisors and course directors are responsible for implementation of proper laboratory attire and personal protection apparel. Health science center personnel who are inappropriately dressed will be denied access to all laboratories and animal care facilities.

Hands shall be washed after an operation is completed, after removal of gloves and before leaving the laboratory area.

Gloves used in the laboratory shall be removed before leaving the laboratory.

Protective equipment provided shall be used when performing any task that may result in injury, illness or exposure to biohazards. Any defects in this protective equipment must be reported immediately to management. Use of this defective equipment must be suspended until repairs or replacements are made.

Work areas shall be kept clean and free from clutter.

Laboratory passageways and aisles must remain unobstructed and must be wide enough for free movement while handling standard materials and supplies.

Work areas must be adequately ventilated. The air ducts of the laboratory shall not be blocked or diverted. Likewise, the air flow of flow hoods must be adequate for the work performed in them and they must be vented properly.

Laboratory doors shall be kept closed. Laboratories are designed to contain a fire thereby giving the occupants of the building time to escape. Open doors defeat this design and allow the rapid spread of flames and smoke in the building. Open doors also disturb the ventilation balance throughout the building allowing possible buildup of airborne toxins in other areas.

All human body fluids, tissue and contaminated articles will be handled as potential sources of HIV, HBV and HCV infection. Specific procedures are referenced in Part 3, Chapter 1 of this document.

Mechanical pipetting devices shall be used. Never pipette by mouth.

All laboratory personnel that are required to come in contact with animals shall be trained in the proper handling techniques and shall be immunized for diseases as required by the health science center occupational health program for animal handlers.

Hazardous materials, including flammable liquids, chemicals, biohazardous materials and radioactive materials, must be stored, handled and disposed of properly. Specific procedures are listed in the health science center Radiation Safety Manual, the Chemical Hygiene Program and to bloodborne pathogens referenced in Part 3, Chapter 1 of this document.

Accidental spills or exposure of radioactive, hazardous or biohazardous materials must be reported immediately to management. Spill residues must be disposed of properly.

Non-hazardous chemicals spills (including water), and broken glassware must be **cleaned** up immediately and disposed of properly.

“Sharps” including syringe needles, scalpel blades, glass transfer pipettes and broken glass shall be handled carefully and disposed of in puncture-proof containers NOT in the regular trash.

Syringes shall not be placed in the common wastebasket with their needle tips still intact. Current Centers for Disease Control (CDC) guidelines recommend that syringes not be recapped, rather a disposal unit should be used that will accept the entire syringe unit. The one exception to this guideline is that syringes contaminated with radioactive materials from in vitro research should be carefully recapped and disposed of as radioactive waste.

Necessary emergency equipment will be readily available within the laboratory or just outside the room. The emergency equipment will be readily accessible and easily identifiable.

All gas cylinders must be individually secured to a wall or table using approved brackets or floor mounts. Cylinders not in use or cylinders being transported shall have their regulators removed and safety cap in place.

The safety recommendations section of the Chemical Hygiene Program, found in Part 3, Chapter 2 of this manual, includes additional safety procedures for handling corrosive substances, flammable substances, electrical equipment and compressed gases. Also included are safety guidelines for low temperature, pressurized and vacuum operations

PART 2

CHAPTER 4

SAFE WORKING PRACTICES

FOR CLINICS AND CLINICAL LABORATORIES

INTRODUCTION

These work practices are in addition to those that apply to all areas as described in Part 2, Chapter 1 of this safety manual. This chapter is an introduction to safe handling of potentially infectious materials for clinical areas. **More detailed procedures can be found in the references found on page 3-1-1 of this document.** Clinical laboratories must also follow the safe handling procedures for chemicals as outlined in the Chemical Hygiene Plan which is found in Part 3, Chapter 2 of this safety manual.

SAFE WORKING PRACTICES

A number of personnel in clinic, research and other areas risk accidental exposure to blood-borne pathogens, particularly HBV and HIV, through contact with human body fluids, unfixed human tissues, HBV or HIV infected research animals or other research materials containing these viruses.

To help prevent such exposures the health science center has implemented a Blood-borne Pathogen Exposure Control Plan (see the Infection Control Manual) which includes:

1. Identification of exposure prone positions. Defined as positions with one or more exposures per month to potential sources of infection.
2. Infection control training for individuals identified as being in exposure prone positions.
3. Adherence to established exposure control procedures in the workplace.

4. Voluntary vaccination against HBV as outlined in the health science center Policy for Occupational Protection from HBV Infection.
5. Testing and/or prophylactic treatment following documented exposures to potential infection sources.

Detailed safe working practices are listed in **more detail in the references found on page 3-1-1 of this document**. The following are general guidelines for handling potential sources of blood-borne diseases:

Standard precautions shall be taken. Appropriate precautions shall be taken when dealing with all patients and any human body fluid or unfixed tissue. ALL SAMPLES AND ALL PATIENTS SHALL BE ASSUMED TO BE POTENTIALLY INFECTIOUS. Hands shall be washed after handling potentially infectious materials, before leaving areas where such materials are used and before and after all medical procedures even when gloves are worn.

Appropriate personal protection equipment and apparel should be used: gloves for contact with tissues, fluids or mucus membranes; gowns, lab coats, and/or face shields when splashing is possible; and masks when aerosolization is possible.

All containers, refrigerators, freezers, waste receptacles and work areas with potential sources of infection shall be clearly labeled with the international biohazard symbol in the designated color.

Special attention shall be given to the use and disposal of “sharps”: needles, scalpels, glass pipettes, capillary tubes and broken glass. Use extreme caution during invasive medical procedures:

1. Never recap needles.
2. Dispose of sharps in marked, puncture proof receptacles.
3. Convenient disposal containers shall be available in all work areas where sharps are used.

Infectious wastes shall be collected in receptacles lined with “red” bags. Both receptacle and bags shall be marked with the international biohazard symbol. Wastes shall be double bagged where a potential for leaking exists. Bags shall be collected and transported for disposal by the designated employees.

All work areas and surfaces which may become contaminated shall be disinfected routinely at the end of a procedure, work shift or daily as appropriate. This shall be performed by health care workers and laboratory personnel.

Spills of potentially infectious materials shall be immediately contained and disinfected. A fresh, 1 to 10 dilution of household bleach is recommended for disinfection or other

any other product approved by the Infection Control Committee. See policy on
Approved Disinfectants:

http://intranet.hsc.unt.edu/policies/qualityassurance/Disinfection_SterilizationClassificationsApprovedDisinfectant.pdf.

PART 2

CHAPTER 5

CRIME PREVENTION

INTRODUCTION

This chapter lists recommended practices and actions members of the health science center community can take to reduce crime and help prevent becoming a victim of a crime. Additional information on crime prevention is available by calling Campus Police at ext. 2210 or 817-735-2210.

TYPICAL CRIMES ON CAMPUS

Most crimes against employees and students involve theft, burglary of motor vehicles and auto theft. Assault has been very rare in past years. There are a number of threatening and harassing phone calls made to employees and students every year. The following recommendations can be followed to reduce the chance that you are a victim of criminal activity.

HOW TO AVOID THEFT

SECURE YOUR PROPERTY

Crime statistics show that about 75 percent of theft involves items that are not secured.

OFFICE AREAS

Lock your office when it is not occupied.

If you don't carry your purse or wallet with you at all times, lock it in a drawer or file cabinet.

Don't leave change in your top drawer, put it in an envelope and place it in a locked drawer.

If you share a larger area with others, ask a trusted co-worker to keep an eye on your area while you are away.

MOTOR VEHICLES

Always lock car doors and keep valuables out of sight, preferably locked in the trunk. Do not leave spare keys where a thief can use them to steal your car. A locked car is no assurance that the car will not be stolen.

Anything you can do to increase the time it takes to steal your vehicle decreases the chances that it will be stolen. You can take the following additional steps to deter auto thieves:

- Use a steering wheel lock such as “The Club”;

- Use a locking metal collar that covers the ignition switch; add an alarm system with siren and lights;

- Use a locking gas cap;

- Or use a hidden switch that must be used to start the car.

MARK PERSONAL BELONGINGS

Engrave your Texas driver’s license number on personal items of value such as stereos, radios and computer gear.

If you drive one of the cars that thieves steal for parts, have your vehicle identification number engraved on all window glass, tailgates and other vehicle parts.

It might be a good idea to have your Texas driver’s license number engraved on the inside of all wheel covers.

Engraving tools to mark your property are available through Campus Police. Call Campus Police at ext. 2210 or 817-735-2210 for assistance marking your property.

HOW TO RESPOND TO HARASSING PHONE CALLS

If you receive an obscene phone call, hang up immediately. Call Campus Police immediately after you hang up. Let them know if it was a campus call or an outside call. If you recall any distinctive background noises or the caller’s voice was distinctive, mention this to the Campus Police. If you get repeated calls, once you know the call is obscene, blow a shrill whistle into the receiver.

In general, you should be suspicious of survey calls, and you should never give out personal or financial information over the phone.

TIPS ON AVOIDING ASSAULT

BE AWARE OF YOUR SURROUNDINGS

Don’t walk alone at night; there is safety in numbers. Having others around works

as a deterrent and provides someone to intervene, give support, or call the police if something does happen.

Use walks and pathways that are well lit. Light helps you to identify and avoid potential problems.

It is important to notice the people in the vicinity, possible hiding places for assailants, locations of exits and telephones, and the locations of police officers or security guards. Remember, if you do not feel comfortable or safe, you probably should not be there. The subconscious mind often picks up cues that your conscious mind misses.

When in facilities that are normally kept locked at night it is important that you do not prop or tape open doors or allow people to follow you into the buildings. More than your own safety is at stake. Potentially, such activities endanger everyone that is in the building.

Parking lots also may present some dangers to personal safety. When going to your car, walk with a firm determined step. Keep your keys in your hand. This not only allows you to open your car quickly, but gives you a handy weapon if you decide to resist or try to escape. Always check the front and back seats of the car before entering. Immediately lock the doors and start the car as soon as possible.

Emergency phones are located in the parking lots. These phones ring directly into the police department without dialing. When you pick up the phone, it calls the Campus Police and the phone number shows up on the department's screen so that the clerk will know where you are even if you are unable to say anything.

If you see a suspicious or criminal incident try to note the details of the scene: the person's sex, height, weight, race, hair color, eye color, type and color of clothes, and unusual characteristics; the car's license number, size, make, model and color, and a description of the driver or passengers. Police officers know that it is difficult to get this information, but each additional fact is helpful.

REPORT CRIMINAL AND SUSPICIOUS ACTIVITIES

Report all criminal or suspicious activities. Call immediately so that the police have a reasonable chance to do something about the situation. Police officers would rather check out a suspicious person than to have something happen. Don't hesitate or feel embarrassed to call. Dial ext. 2600 or 817-735-2600. The Campus Police dispatcher will send an officer.

CAMPUS KEY CONTROL POLICY

This policy has been moved to the General Institutional Policies Manual and is numbered Policy Number 17.0

PART 2

CHAPTER 6

MATERIALS HANDLING

INTRODUCTION

Approximately 25% of all occupational injuries occur during the handling of materials. Sprains, fractures and mashed extremities are common injuries caused by unsafe work practices, such as improper lifting, carrying too heavy a load, incorrect gripping and improper use of special materials handling tools. Failure to observe hand or foot clearance, to wear personal protective equipment or to utilize mechanical aids also contributes to injuries.

Material handling accidents are not limited to movers, shippers, receivers, and maintenance personnel, who frequently move stock or machinery. Picking up a box of stationery, carrying chemicals, moving a typewriter from one desk to another, or opening shipping containers are some simple tasks which can become materials handling problems.

PROPER LIFTING TECHNIQUE

Most strains and back injuries occur when lifting and/or moving objects by hand. To reduce such injuries, practice the following lifting techniques:

1. Place feet apart, with both feet in front of the object to be lifted. If balance is a problem, move one foot slightly ahead of the other.
2. Assume a powerlift position with the hips slightly higher than the knees, the chin forward and the natural inward curve of the lower back maintained by moving the pelvis outward.
3. Grip the object with the whole hand, not just the fingers (or fingertips). Be sure the grip is firm.
4. Tuck elbows in, close to the body.

5. Keep body weight directly over both feet.
6. Lift with your legs and back to a upright position. Do not twist your body as you lift.

ADDITIONAL PRACTICES WHEN LIFTING AND MOVING MATERIALS

1. Inspect materials for slivers, jagged edges. Remove nails, screws, wires and other sharp projecting points from packing cases as soon as they are opened. Protect your hands with pads or gloves whenever you handle sharp or rough objects.
2. Keep fingers away from pinch-points, especially when setting the materials down.
3. Wipe off greasy, wet or dirty objects before attempting to handle them.
4. Keep hands and gloves free of oil and grease.
5. Don't wear jewelry, rings or loose clothing while handling materials.
6. When lifting, don't twist, jerk or pull up rapidly! This is how most injuries occur.
7. Always "lock" the back before lifting a fairly heavy load.
8. Lift only by straightening your legs, not your back.
9. If you experience a low back pain, it is best to completely avoid lifting for the time being. If this is not possible, you must be sure to use the correct lifting techniques described above.
10. You must not bend from the waist to pick up an object, especially if the object is even moderately heavy!
11. Likewise, do not set the object down by using incorrect techniques. Simply reverse the procedure described above.
 - a. Bend the legs, keeping the natural curve of the back.
 - b. Set one corner of the load on the floor, then tip the load toward that corner, remove your hands from underneath, and

- c. Allow the load to gently settle to the floor.
12. When the object must be placed on a shelf or table, don't bend over to position it just where you want it. Instead, simply . . .
- a. Set one end onto the surface first, crouching down slightly by bending the knees a little bit, if necessary.

Then, slide the object to the desired position. (Note: If you don't want to scratch the surface (or if the surface won't permit the load to slide) lay down a heavy cloth or plastic sheet first, and then slide this with the object.

Safety Manual
2005)

2-6-2

(July

- 13. If you must carry more than one object, it is always better to split the load so that you can carry half of it in each hand.
- 14. Use carts, dollies or hand trucks to move objects any significant distance. NEVER carry heavy or bulky objects up or down stairs.
- 15. When using a hand truck, don't pile anything higher than the handles. Likewise, when you get ready to move a loaded hand truck, pull the load back toward you. Tilt it only enough so the load feels balanced, but not so much that you are actually supporting any of the weight of the load. At the proper angle all of the weight will be on the wheels.
- 16. Special precautions must be taken in handling/transporting hazardous materials (see Chemical Hygiene Plan, Part 3, Chapter 2 or Blood-borne Pathogens Exposure Control Plan, Part 3, Chapter 1).

PERSONAL PROTECTIVE EQUIPMENT

Wear the correct protective equipment for the materials that you are handling, e.g., gloves, aprons, safety glasses, respirators, or safety shoes. The greatest number of injuries are to hands and feet, so the proper use of gloves and approved safety shoes is vital.

LIFTING AIDS

Lifting aids should be used for heavy or awkward loads. However, the use of

lifting aids present an additional set of safety concerns.

FORKLIFT TRUCKS

Only trained and authorized personnel are to be permitted to operate a powered industrial truck.

Forklift trucks should not be used for any purpose other than that for which they were designed. Particularly, never use any industrial truck as an elevator for employees or carry them around on the forks.

All powered industrial trucks, such as forklifts and motorized hand trucks, purchased and used at health science center must meet the design and construction requirements established by the American National Standards Institute (ANSI) in American National Standard B56.

High-lift vehicles must be fitted with an overhead guard. In addition, if the type of load presents a hazard, a vertical load backrest extension must be provided.

Do not attach spinner knobs to the steering hand wheels of trucks not originally so equipped.

For use in dimly lit areas, provide trucks with auxiliary lights.

If material of irregular shape must be carried, it should be blocked, tied, or otherwise properly secured.

Never load a truck or permit it to be loaded so that the operator's view is obstructed.

Know the maximum load the truck can carry, and stay within that limit. The load limit should be posted on the vehicle in a conspicuous place. Overloading puts added strain on the truck and thus endangers the operator and employees in the vicinity. An overloaded truck will not operate safely.

Forklift truck operators should make certain before raising a load that it will not strike structural members, sprinklers, wiring, cables, lights, or pipes carrying gas, flammable liquids, or water. When traveling, look out for gas cylinders in aisles or passageways.

Travel with forks or the pallet about 4-6 inches off the floor.

On a downgrade the truck should precede the load. On an upgrade, the load should be first. Travel slowly when crossing a bridge plate or expansion joint.

Observe regular traffic rules where possible; keep to the right, and slow down or stop at intersections or blind corners. Stay within safe speed limits and use the horn only when necessary. Keep the truck under control at all times so that an emergency stop can be made in a clear distance ahead. Remember, pedestrians have the right of way. Their safety is partially the responsibility of the operator. Always look in the direction of travel and never back up without looking.

Do not ride on powered lift vehicles or hand trucks and dollies that are not equipped with a seat. NO PASSENGERS ARE PERMITTED.

The driver must keep legs and feet inside the truck and, when operating in close quarters, keep hands where they cannot be pinched between the steering control and projecting stationary objects.

Never park the truck where it obstructs an exit, or material or equipment that someone else might need. If you must leave the truck unattended, shut off the power, neutralize the controls, and set the brakes. Do not leave a truck unattended with the engine running or with the keys in the ignition.

Do not operate a gasoline or propane powered truck in a confined space or unventilated area for excessive time periods (greater than 15 minutes).

Never operate faulty trucks. Daily checks must be made to ascertain that brakes, horn, clutch, steering mechanism, lights, etc. are in good working order. Report any unusual condition to your supervisor.

Fuel tanks should not be filled while the engine is running, and care should be taken to prevent fuel spillage.

Where batteries are used to power industrial trucks, battery charging locations must be designated for that purpose. Provisions must be made for flushing spilled electrolyte, for ventilation, and for fire extinguishing. The proper equipment for siphoning or otherwise handling electrolyte must be used. Battery racks must be made of nonconductive and noncorrosive materials.

Use overhead hoists or equivalent materials-handling equipment for handling batteries.

There must be no smoking in the battery-charging area.

Open flames must not be used near electrolytic batteries and battery cap vents should be checked to be certain that they are functioning.

HOISTING APPARATUS

All portable hoisting apparatus must be firmly secured to its supports. These

supports must have a safety factor adequate for the load to be lifted. Know the safe lifting capacity of the unit being used. The safe load capacity must be shown on both sides of the machine. Though most machines have a safety margin built in, never exceed the posted limit.

Eye bolts used for lifting should be of the full-threaded type, as should the object into which they are screwed. Be sure that the bolt is screwed into the hole a distance at least one and a half times the diameter of the hole.

Make sure that you use the correct size and type of sling to handle the load. Inspect slings before each use, and replace those that are frayed or broken. Do not let the sling bear directly on the sharp edge of a load. Put a piece of wood or packing material between the sling and the sharp edge.

Use hooks with safety latches to prevent the loss of a load.

A load should be picked up only when it is directly beneath the hoist, so as not to subject the hoist to stress that it was not designed to bear.

When WORKING WITH OTHER PEOPLE, CHECK WITH EACH BY MEANS OF SIGNALS, AND DO NOT MOVE UNTIL EACH SIGNAL IS CLEARLY UNDERSTOOD AND ACKNOWLEDGED.

Raise the load high enough to clear all obstructions before moving the unit.

If the load is not properly balanced when it is lifted, it should be lowered and readjusted.

Use special care when moving loads over machinery and equipment.

Avoid lifting over such objects whenever possible.

Never walk under or move a load over any person. If necessary, stop and request a person to get out the way.

When handling long items or other unwieldy loads, attach a tag line to the object to assure good control.

Look out for twists in a lifting cable, chain or rope which may cause loads to spin or twist when raised. Watch for obstructions on which the load, sling, or hook may become engaged.

Do not allow cable to cross over itself on drums. There must be at least two wraps on the drum when the hook is in the extreme bottom position.

Never exceed the height limits for which hoisting equipment is designed.

A semiannual, or at least annual, scheduled detailed inspection of all hoisting apparatus should be made. Devote special attention to load hoods, cables, chains, ropes, brakes, limit switches, sheaves and drums.

These inspections should be made by someone able to recognize existing and predictable deteriorating conditions, who is familiar with the applicable regulations, and who has the authority to take the necessary steps to correct hazardous conditions.

The department head may designate someone who meets these qualifications to do the inspecting; or, if no qualified personnel are available, an outside concern specializing in hoists can be retained. Any repairs or required replacement parts must be of the same material, size, grade, and construction as the original equipment supplied by the manufacturer.

All accidents resulting in damage to hoisting equipment or any irregularities observed in the operation of hoists should be promptly reported to your supervisor. Tag the hoist as unsafe before leaving the area.

PART 2

CHAPTER 7

FIRE SAFETY

GENERAL

Fire safety at the health science center is taken seriously. Much time and effort is devoted to making areas “fire safe” through fire prevention methods, training, and fire detection or protection systems. Nonetheless, fires do happen from time to time. The best protection comes from persons trained to understand fire safety basics. Be prepared before the fire occurs. Be familiar with reporting and evacuation procedures, and know your evacuation plan and the location of emergency equipment in your area.

The institution does not have its own fire department. We rely on the Fort Worth Fire Department. They are well trained. Their response time is generally under 5 minutes.

Fire prevention is of paramount. It is in everyone’s best interests to participate in good fire prevention practices at work and at home.

FIRE PREVENTION PRACTICES

1. Evaluate and analyze your own areas. Use common sense. What is the most likely thing to cause a fire and what can you do about it?
2. Practice good general housekeeping. Avoid clutter that permits fire to spread rapidly. Throw out combustibles no longer needed.
3. Practice good specialized housekeeping. This includes maintaining proper storage for flammable liquids, chemicals and gases.
4. Electrical wiring and equipment should be kept in good condition. Cracked, frayed, or damaged wiring, and antiquated equipment of a suspicious nature should be discarded. Avoid overloading outlets and eliminate the use of extension cords.

5. Check your egress ways, including corridors and stairwells, to make sure they are free of obstructions and combustibles so that escape can be rapid and safe.
6. Try to keep ignition sources, fuel, and oxidizers separate and isolated as possible. Whenever possible, eliminate fuel loads and ignition sources.
7. Develop safe working habits and correct poor ones.
8. Maintain a good fire safety attitude and try to instill this in others. Don't permit others to compromise your safety.
9. Photocopy important lab notes and other important documents on a weekly basis and store them in another room or building.
10. See your department safety coordinator for further information regarding emergency planning and fire prevention.
11. Ask for help from the Safety Office (ext. 2697) if needed.

EGRESS

OBSTRUCTED

All corridors, stairways, entry vestibules, and other means of egress must always be clear for instant use in case of fire, explosion, or other reasons for evacuation.

LOCKING

Locks and fastening devices which may prevent free escape from inside of any building may not be installed.

MARKING

All exits and routes to exits shall be conspicuously marked so that they will be obvious to all occupants. If an exit is not immediately visible or accessible from an open floor area, signs or other means must be used so that the exit is easily recognized and clearly indicated.

Doorways and passageways which are in fact not exits, but may be mistaken for such, must be appropriately marked, e.g. Not an exit, in order to avoid confusion.

Furnishings or decorations **shall not** be placed so as to block access to or visibility of exits. In particular, mirrors may not be placed on exit doors or

adjacent to an exit in such a way as to cause confusion as to the true location of the exit or the correct direction of travel. In addition, hangings and draperies may not be placed over exit doors or in any way conceal or obscure an exit.

Exits must be designed and maintained to provide at least 7 feet 6 inches of headroom from the floor, with greater clearance provided where needed.

Many doors, both exit and internal, open into busy rooms or corridors, and it is easy to push the door open into someone walking on the other side. This can be particularly hazardous if the person on the other side is carrying equipment, chemicals, etc. A little bit of care and the use of the vision panel in the door can help prevent this kind of accident.

ELEVATORS

WHY AREN'T ELEVATORS SAFE TO USE DURING A FIRE ALARM?

The reasons elevators are dangerous in a fire are:

1. Fire, heat, and smoke tend to move rapidly in shafts and other vertical openings. The elevator shaft acts like a natural chimney, exposing elevator passengers to heat and smoke.
2. Occupants in an elevator risk becoming trapped in the shaft if the building loses power. Most elevators do not have emergency electrical power.
3. Should the elevator stop on the fire floor, the electric eye of some elevators can become occluded by the smoke, causing the doors to remain open exposing the occupants to smoke, heat, and flames.
4. The elevator may also stop on the fire floor because someone pushed the button for the elevator trying to escape the fire.
5. The elevators can act as giant pistons pushing fire and smoke to other portions of the building.
6. In all of the above, the elevator occupant has absolutely no control over the situation. Unwary or careless passengers can quickly become victims.

In conclusion, take the stairs. It really is the safe thing to do unless otherwise directed by fire department or emergency personnel. If you encounter smoke, seek another exit.

ENCLOSED STAIRWELLS

WHY CAN'T WE KEEP STAIRWELL DOORS OPEN?

To better understand this we must define an “enclosed stairwell” and its purpose. Enclosed stairwells are stairs surrounded by walls. They generally have an access door on each floor. The fire rated doors are self-closing to keep the stairwell enclosed. Along with corridors, corridor smoke doors, fire exit doors, and stairwell doors, enclosed stairwells are part of an exit system. The importance of maintaining this system cannot be overstated. Collectively, the elements of this system fulfill its purpose, which is to assure a protected pathway of escape in the event of fire. That assurance is quickly lost when the integrity of the system is compromised by keeping the doors open.

People unaware of the purpose or operation of the system often times will block open fire doors in corridors or stairwells. Generally this is done with objects or wedges in an attempt to alleviate air conditioning or heating problems, or merely for the sake of convenience. This causes the doors to get wracked out of shape, breaks the door closers, and ruins the frames or hinges. More importantly, if the doors are blocked or wedged open, or can't close because they need repair, smoke and fire will be permitted to travel uninhibited throughout the building endangering occupants by making escape routes impassable.

Some people think that since their stairwell is made from noncombustible materials and there is nothing in them, it is okay to keep the doors open. After all, what is there to burn? It is not okay. Consider the fact that smoke is the killer in virtually all fires. It contains flammable gases, poisons, and is notorious for suffocating its victims. In addition, smoke can be fuel for a fire. Dense smoke will often travel up stairwells or other open vertical arteries (such as elevator shafts). When the smoke gets hot enough along with some oxygen, it can explode into a fireball without warning.

One of the major causes for multiple death fires is the extension of fire or smoke through open corridors, open stairways or corridor and stairwell doors. Open stairways are those that do not have enclosed walls or an enclosed stairwell with its doors blocked open.

In summary, the following rules should be taken seriously and abided by:

1. Keep all doors to stairwells closed at all times. If the door is not working properly report it by calling the physical plant. **DO NOT WEDGE OR BLOCK OPEN FIRE DOORS.**

2. Corridor smoke doors should not be wedged or blocked open. Only Corridor doors that have automatic magnetic smoke closures may remain open.
3. Keep all exit ways, stairwells, and corridors clear and free of clutter and objects at all times. This includes bicycles, any type of equipment, apparatus, furniture, and appliances. There should be no combustibles of any kind in the corridors or stairwells.

EVENTS AND HOLIDAY FUNCTIONS

GENERAL

Begin the event planning early. Make facility reservations by calling the Special Events Coordinator in the President's Office. If your event involves 75 or more people or you plan to serve alcohol, you will need to obtain written permission for alcohol from the president's office. Security is required for such events. Call Campus Police at ext. 2210 or 817-735-2210 to arrange for security for such events.

PRECAUTIONS TO BE OBSERVED

The following are some of the most common items to be considered in most events of this type.

1. Never block, hide, or disguise an exit.
2. Keep exits free and clear from combustibles and obstructions.
3. Decorations or furnishings must not constrict or obstruct corridors.
4. Never place combustibles in corridors, lobbies, or on corridor walls.
5. All exits should have signs.
6. Plastics, styrofoam, and polyurethane foams must not be used for decorations or furnishings.
7. Fabrics and other combustibles should not be hung from the ceiling.
8. Fabrics such as curtains, drapes, furniture coverings, floor coverings, and other fabric hangings must be fire

retardant. A certificate of flame proofing is required.

9. Exotic lighting or unusual visual effects utilizing lasers or other unusual optical devices must be approved by the Safety Office.
10. Avoid the use of decorations with sharp edges or corners.
11. The use of flash pots, smudge pots, pyrophoric materials, or fire works of any kind for recreations, art, or entertainment is strictly prohibited.
12. Any items using or creating mist or smoke for theatrical effects must be approved by the Safety Office.
13. The use of existing conduit, cables, or piping to hang items or equipment is prohibited unless permission is granted. Contact the Safety Office for further information.
14. Wood frame or other combustible construction on Campus is not permitted without Safety Office and Facilities Management approval.
15. No gasoline, propane, or other internal combustion engines are permitted in the buildings except for propane powered buffers used by trained staff.
16. Temporary wiring such as extension cords and multiple outlet strips must be approved by the Safety Office for use with lighting or sound equipment and lighted decorations. Extension cords are for temporary use only. During the holiday season they should not be used in a way that will create a fire, tripping, or electrical hazard. The cords must be UL listed, be a minimum of 16 gauge wire (this excludes #18 lamp wire also known as “zip” cord), and be properly plugged into a wall outlet.
17. Combustible materials should be kept at a safe distance or be shielded from sources of heat such as radiators and light bulbs.

BARBECUES

A permit is required anytime barbecue grills or hibachis are used on campus. To obtain a permit contact the Campus Police for scheduling and details.

Be aware that grills, hibachis, charcoal lighter fluid, and charcoal will be confiscated by Campus Police if found in unauthorized areas.

For the safety and comfort of others, the following rules are enforced on campus:

1. Never use a charcoal grill or hibachi inside a building. In addition to being a fire hazard, the combustion process of charcoal can create toxic levels of carbon monoxide.
2. There will be absolutely no fires of any kind inside buildings or appurtenances. For example, hibachis and other barbecue appliances are prohibited from use on roofs, window sills, fire escapes, and other portions of the building. In addition, candles, sterno type fires, alcohol lamps, flammable liquid or gas lamps, heaters, or portable cooking units using flammable or combustible fuel are prohibited.
3. There must be adequate extinguishers of the appropriate type available at the barbecue. A charged garden hose with an adjustable nozzle is acceptable.
4. There must be a fire watch present that knows how to use the fire extinguishers or garden hose.
5. No other fires may be started that have not been approved by the Safety Office. Only the types of fires indicated on the permit are to be utilized.
6. A safe distance from shrubs, trees, vehicles, buildings, etc. will be maintained at all times. The Safety Office has final determination of what safe distance is.
7. The fire must be built in the open and confined with a noncombustible barrier such as steel, bricks, stones, concrete blocks, etc.
8. Fuel must be charcoal or charcoal briquettes. No wood or other combustibles allowed.
9. No flammable fluids other than approved charcoal lighter fluid shall be used for starting fires. Use of jellied or solid types of charcoal starters are preferred. Do not attempt to add more starter fluid or jelly after the fire has been ignited.
10. Electric charcoal starters may be used provided an adequately sized extension cord is utilized and all other normal precautions are taken.

11. If charcoal fires are low to the ground, be alert for wind conditions that may blow leaves, papers, and other combustibles over the coals and spread the fire. Take precautions to prevent this and persons that may inadvertently pass through the area. Utilize barricades and fire watchers.
12. When finished, thoroughly drench the coals with water. Coals are not to be thrown into a trash container. Clean up after use

PART 2

CHAPTER 8

TOOLS AND MACHINERY

HAND TOOLS

A single tool cannot do every job efficiently and safely. If it could, your shop, lab or office would need only that one tool. Screwdrivers are not chisels, and files are not pry bars. There is a correct tool for each job; the wrong tool will not do the job as well, will not protect you as well, and may cause a serious accident.

In order to do a job safely, one needs not only the correct tools, but training in their proper and safe use. This training is readily available. Anyone unfamiliar with equipment should see his/her supervisor for instruction in its use. Whenever a new piece of equipment is acquired or a procedure changed, everyone involved should receive instruction for safe and proper usage.

Wear eye protection whenever you are cutting, sawing, drilling, or grinding materials that may create chips, dust, or flying particles.

HANDLING

To reduce puncture-type injuries, do not carry a variety of hand tools in your pocket, use a tool belt or toolbox. Canvas tool bags are often desirable for carrying awkward or long-handled tools, or for hoisting tools.

When carrying a sharp cutting tool, such as an axe or large knife, protect the blade with a shield or carry it in a toolbox, with the shield in place.

Put your tools where people won't trip on them. Store them in drawers or chests with the cutting edge down, pointing away from someone who might reach for them.

MAINTENANCE

Be sure that the tools you are using are maintained in good condition for safe work. Remove burrs and rough edges. Check the handle and working surface before you use any tool. Files and similar tools are dangerous if their handles are loose or if they are used without handles. Make sure your tools are sharp and free from grease so they won't slip.

Watch for mushroomed heads on tools, such as chisels, which are designed to be struck. Fragments may fly off and can injure your eyes.

SCREWDRIVERS

Most screwdrivers are not designed to be used on electrical equipment. When working with electrical apparatus, be sure to use a completely insulated screwdriver. Screw driving in which the metal shaft goes through to the end of the handle presents a shock hazard.

Never use screwdrivers to check electrical circuits.

Do not hold an object or device in the palm of one hand and press a screwdriver into it. Place the object on a bench, table, or vise and position your hand so that if the screwdriver slips, it will not strike your hand or arm.

Never use a screwdriver as a makeshift punch, wedge or prybar.

Never hammer on a screwdriver or grasp it with pliers for turning leverage.

Keep a screwdriver in good repair. Check for a broken handle, bent blade, full or twisted tip. A sharp, square-edged bit is less likely to slip than a dull, rounded one.

PLIERS

Do not use pliers as a substitute for hammers or wrenches.

Use insulated pliers when doing electrical work. Inspect insulation frequently to make sure that it is free of breaks or cracks.

HAMMERS

Use the correct hammer for the type of work to be done. Various types of hammers are designed for specific jobs and should not be used for other purposes.

When using a hammer, be sure that you have an unobstructed swing. Look out for overhead interference.

CHECK ALL HAMMERS FOR DEFECTS BEFORE USING.

WRENCHES

When using wrenches, select one with the size and jaws for the job. Do not use one with too long a handle, and never use a pipe as a wrench handle extension. Too much leverage can ruin a tool and cause injury.

Make sure the wrench you are using fits the nut properly. If it doesn't it will damage the nut or possibly fly off.

To avoid sudden slips, always pull on the wrench instead of pushing against the fixed jaw. Be sure to stand in a balanced position.

The best way to free a frozen nut or bolt is to use penetrating oil. Then use a striking-face box wrench or other suitable heavy-duty wrench.

CHISELS

Always wear safety goggles or a face shield when using chisels.

Always drive wood chisels outward and away from your body, using a wooden, rawhide, or rubber mallet rather than a carpenter hammer. Remember, wood chisels are brittle and can snap, so don't use chisels to pry. The edges should be kept sharp for most effective work and should be protected when not in use.

Cold chisels used for cutting metal should be made from high-carbon steel. A cold chisel head should be dressed to a curve of about 1/8 inch as soon as it begins to crack or check. Dressing allows the chisel to withstand a maximum amount of pounding. Bronze bands around the wooden heads of chisels help to prevent mushrooming.

SAWS

All saws should be kept sharp and clean. When cutting, use slow, deliberate strokes. Forcing the cut can make the blade buckle and snap and/or jump out onto your hand. Don't hold work in your hand when using a hacksaw; put it in a vise. A hacksaw blade should be installed with the teeth pointing forward. An overheated hacksaw blade can break. Use light machine oil on the blade to keep it cool.

KNIVES

The principle hazard in the use of knives is that the hand may slip from the handle onto the blade, or that the knife may strike the body or the free hand. A handle guard or finger ring minimizes these hazards. Always cut in a direction away from the body. If this is not possible, keep the hands and body clear of the knife stroke.

Knives should be carried in sheathes or holders. Never leave knives lying on benches, where they can cause injury. When not in use, the blades should be guarded or the knives placed in a protective rack.

JACKS

Before using a jack, make sure that it has a rating sufficient to lift and support the load. The rated load should be clearly visible and permanently marked on the casting.

Jacks must be placed on a firm foundation or blocked. Once the load has been raised it must be cribbed or otherwise secured at once.

If a jack is out of order for any reason it must be removed from service and tagged accordingly and not used until repaired. It is expected that jacks will be regularly inspected and lubricated at frequencies not less than once every 6 months.

POWER TOOLS

Power tools can present hazards if not used properly. An attempt is made here to list precautions which should be taken to insure that these hazards are kept to a minimum. In operating power tools, there can be no substitute for knowing their intended use and limitations. Properly acquired expertise and adequate safety measures combine to make for safe use.

PERSONAL PROTECTIVE EQUIPMENT

When using power tools, dress properly. Safety glasses, safety shoes, dust masks, face shields and hard hats are personal protective equipment. Know the hazards and dress accordingly.

Don't wear loose clothing, which can catch in moving parts.

Don't operate power tools while barefoot. Tie back long hair or use a hairnet to keep it clear of moving parts.

Ground all power tools, or use the double-insulated type. Where an adapter must be used to fit an old, non-grounding receptacle, attach the pigtail on the adapter to the face plate screw before plugging in the adapter. Contact the Safety Office when this condition is discovered. Someone there will make arrangements to have the receptacle replaced with a grounding type.

Check portable power tools for poor wiring or loose switches. Do not use a tool with poor wiring or lose switches. Do not use a tool with a frayed cord. Return it for servicing. Use properly rated flexible cords when operating portable power tools. Do not abuse cords. Never yank a cord to disconnect it from a receptacle.

If an extension cord is used for lighting or to operate lightweight portable tools, be sure it is of the proper type and size and not stretched out so as to be a tripping hazard. If working near water or moisture, use a ground fault interrupter (GFI) to guard against electric shocks.

All hand-held power-driven tools must be equipped with "dead-man" control, such as a spring-actuated switch, valve, or equivalent device, so that power will automatically be cut off upon release of the control by the operator.

GUARDS

Guards should be kept in place and in good working order.

All power-driven saws must be guarded. All portable power-driven saws must be equipped with guards above and below the shoe or base plate. Both the lower and upper

guard must cover the blade, and when the tool is withdrawn from the work the lower guard must instantly return to the covering position.

Belt sanders and other portable tools must be provided with guards at each nip point where the sanding belt runs onto a pulley. These guards must prevent hands and fingers from being caught in the nip points. The unused run of the sanding belt must also have a guard to prevent accidental contact.

OPERATIONS

To avoid accidental start-up, be sure the switch is off before plugging in a power tool. Don't carry a plugged-in tool with your finger on the trigger. Before starting a tool remove all keys and wrenches. Never leave a running tool unattended.

Use a vise or clamp to secure work. When practical, this frees both hands to operate tools.

When using portable tools, don't overreach. Keep balance and proper footing at all times.

Be aware of potential hazards in your working area. When operating power tools in a strange environment, check for flammable liquids, combustible materials, etc., before beginning operations.

Housekeeping is important. Loose boards, debris, or tools can cause tripping accidents.

PORTABLE ABRASIVE WHEELS

Portable abrasive wheels must be equipped with guards, which must cover the spindle end, nut, and flange projections, and be mounted so as to maintain proper alignment with the wheel.

Inspect all abrasive wheels prior to mounting to be certain that they have not been damaged in storage, transit, or by the previous user.

A physical test to determine if the wheel is cracked, known as the "ring test," may be easily performed. This consists of gently tapping a clean wheel with the wood or solid plastic handle of a light screwdriver at a point about 45 degrees on each side of the vertical center line and about 1 or 2 inches from the edge. Rotate the wheel 180 degrees and repeat the test. An undamaged wheel will give a clear metallic tone. A dead sound implies a cracked wheel. Discard all damaged or suspect wheels.

Check the operation speed of the wheel against the RPM on the spindle and be certain that the maximum operating speed marked on the wheel is not exceeded.

Use only the recommended flanges and blotters, in good conditions, prescribed by the abrasive wheel manufacturer. Remember, excessive speed can cause grinding wheels to "explode" (shatter violently) and inflict serious injuries.

EXPLOSIVE-ACTUATED TOOLS

In general, the use of explosive-actuated fastening tools at the health science center is discouraged because of the difficulty in isolating such an operation to assure the safety of operations, personnel, students, and visitors. The Safety Office and the Director of Facilities Management must both be apprised of the contemplated use of such tools prior to their use and agreement reached as to the time of use, precautions to be taken, and the competency of the operator.

Any explosive-actuated fastening tools used must also meet the design requirements stated in American National Standard Safety Requirements for Explosive Actuated Fastening Tools, (ANSI).

Under no conditions may these tools be used in an area where flammable gases or chemicals are stored or in an explosive atmosphere.

LAWN MOWERS

Mowers of the walk-behind, riding-rotary, and reel-power types must meet design specifications described in American Standard Safety Specifications for Power Lawn Mowers, (ANSI) which states that all belts, chains, and gears must be positioned or guarded to prevent accidental contact by the operator during starting, operation or mounting of the equipment.

Be sure the operating control is in neutral before starting the engine. All positions of operating controls must be clearly identified with the word, "CAUTION": or similar wording, clearly visible at the engine starting control point.

Rotary mower blades must be enclosed, except on the bottom. The enclosure must extend to or below the lowest cutting point of the blade, in the lowest blade position.

Cautionary wording must be placed on the mower at or near the discharge openings. Mowers must be equipped with "dead man" controls, and blades must stop rotating within 15 seconds after declutching or shutting off power.

MACHINERY

Machine design and machine guarding have made significant progress since the time when machinery was the principal cause of industrial injuries. Still machinery is a source of severe disabling work injuries and accounts for a significant 10 percent of all injuries.

SAFE DESIGN

Safe, efficient design is the key to the reduction of injuries from machinery. Designing new equipment to provide built-in protection from machine hazards is the end result of an evolutionary process which began with guarding hazards in old equipment. In the long

run, safe design is not only more effective than guarding, but less costly as well.

The Occupational Safety and Health Act (OSHA), which the health science center uses as a source for developing voluntary guidelines, places the responsibility for providing safe equipment on the employer. Though many reputable manufacturers of industrial machinery design their equipment to meet OSHA standards, this is not always the case, and suppliers are not required by law to sell properly designed and/or guarded machinery. However, the health science center requires such compliance by suppliers with whom purchase orders are placed.

Buying properly designed equipment rather than guarding machines which have not been properly designed avoids at least two disadvantages:

Guards which may have to be added after purchase may hinder the operation of the machine, as they are not part of the original design.

Guards added after the original purchase increase the total expenditure.

In the end, it is better to buy properly designed machinery than to try to guard it after purchase. It is important, therefore, for those responsible for buying or designing machinery to think safe design, and to consider the following:

The design of machinery must be such that it is impossible for the operator or anyone else to get at the point of operation or any other hazard points while the machine is operating.

Round all corners and edges of the machinery.

Place controls so that the operator will not have to reach too far or move his/her body off balance in order to operate the machine.

Build power transmission and drive mechanisms as integral parts of the machine.

Build electrical overload devices into the machine.

Design the machine for single-point lubrication, if possible.

Use mechanical, instead of manual, holding devices.

Provide a mechanical device for feeding and ejecting parts in order to eliminate the use of the hands for such operations.

Minimize motor drift time.

Provide fail-safe interlocks so that the machine cannot be started when it is being loaded, unloaded, or worked on.

Provide lockouts for electrical or pneumatic switches to prevent inadvertent machine start-up when repair or other work is under way.

Install all electrical equipment so that it complies with the National Electrical Code (NEC).

Ground or isolate all conducting surfaces.

Provide standard access platforms and ladders where necessary for inspection and maintenance of equipment.

Design component parts of equipment for easy and safe removal and replacement to facilitate maintenance.

Eliminate machine repeat action.

Reduce sources of excessive noise.

Provide clear vision and stability.

MACHINE GUARDS

Machine guarding has been the traditional means of eliminating injury. Although an effective means of reducing machine hazards, guarding should be considered inferior to using machines which have been designed to eliminate hazards. Guards, if improperly designed, used, and maintained, can themselves cause hazardous working conditions.

Mechanisms where guarding is needed to protect against injury are:

Rotating mechanisms

Cutting and shearing mechanisms

Screw or worm mechanisms

Forming or bending mechanisms

In-running nip points where machinery has a moving part rotating over, under, or near a stationary object.

Mechanisms from which kickbacks, flying particles, molten metal, or chemical splashes may be anticipated.

Required guards must:

Conform to the standards of ANSI as well as OSHA;

Be designed and constructed to afford maximum positive protection to all people working on or around the machine;

Prevent access to the danger zone while the machine is in operation;

Not interfere with the efficient operation of the machine or cause discomfort to the operator or interfere with vision;

Be designed for the specific machine, with provisions for oiling, inspecting, adjusting, and repairing the machine;

Be durable, resistant to fire, wear, and corrosion, and easily repairable without sacrificing the effectiveness of the guard;

Be strong enough to resist normal wear and shock and to withstand long usage with minimum maintenance;

Not present hazards such as splinters, pinch points, shear points, sharp corners, rough edges, or other sources of injury;

If possible, be interlocked so that the machine will not operate unless the guard is giving maximum protection;

Be periodically checked for the condition of the guard concerning damage, correct adjustment, interference with other parts, and loose assembly parts.

If the manufacturer does not provide a guard or the machinery is noncommercial, the Safety Office will suggest designs for guards. If a custom guard is required or desired, you can call this office for assistance.

OPERATIONS

Operate only those machines you are authorized to use. If you are not sure of an operation, ask your supervisor before you start.

Do not attempt to repair a machine with which you are unfamiliar.

When operating any machinery, use the proper personal protective equipment and be sure all safeguards on machines are in place and working. Check them before you start. If guards are missing or seem inadequate, recommend replacement or installation to your supervisor before operating the machinery.

Never wear gloves or wristwatches, rings, bracelets, or other jewelry while operating machinery. They increase the probability and also the severity of an injury.

Moving parts can also catch hair, ties, loose clothing or fingers, arms, and legs. Do not reach into machinery or try to stop it by holding a belt or using your body as a brace.

Keep out of the way of things that may be thrown by machinery. Stand to one side when you are feeding circular saw or jointer.

Be sure to remove a chuck wrench immediately after you use it. If you forget to do so, it may fly off and cause serious injury.

Do not attempt calipering or gauging while a machine is in operation.

Do not use rags and other loose material around moving machine parts.

Shut off the power before you oil, clean, or adjust a machine or remove work that is jammed. Tag the controls and lock them out so that no one else will start the machine while you are working on it.

Clean up chips with a brush, not with your hands or compressed air.

Oily rags or waste should be discarded in an approved metal container with a self-closing cover. Such containers should be emptied frequently.

Do not work alone in a shop when you are going to operate potentially dangerous machinery.

Caution: Machines which appear to be still may in fact be in motion. Fluorescent light produces a very fast flicker which can synchronize with the motion of machinery and produce a stroboscopic effect, so that the machine seems to be standing still or moving slowly.

MACHINING METALS

When milling pyrophoric metals, such as magnesium, use a suitable coolant, as excessive friction can cause ignition.

Clean up turnings and other pyrophoric metal waste immediately and place in covered metal containers. Dispose of them in the same manner as hazardous chemical wastes by calling the Safety Office ext. 2697 for waste chemical pickup service.

Fire extinguishers appropriate for fighting metal fires should be on hand. Call the Safety Office for advice.

Machining of toxic metals (i.e., beryllium, cadmium, lead, and osmium) requires certain precautions, such as adequate exhaust ventilation, and should be cleared through the Safety Office, ext. 2697.

LADDERS

GENERAL

Ladders come in many shapes, sizes, and styles, and some may be specially designed for a particular function or operation. The following suggestions are offered to help eliminate accidents in using ladders.

Never attempt to climb any ladder with both hands full. Arrange for a hoist or other method to get your equipment to the top of the ladder.

When you are using a ladder, one hand must be free to hold onto the ladder unless you are using a safety harness.

Avoid leaning or stretching on either side of a ladder. This is a hazardous practice.

Do not attempt to adjust the position of a ladder except when standing at the base of it.

Always face the ladder when climbing up or down.

Do not stand on a box, chair, barrel, machine, bench, or table to reach or work at elevated levels. Always use a ladder. Other objects are not built to facilitate climbing or to support your weight.

Ladders purchased at the health science center are TYPE IA-EXTRA HEAVY DUTY, 300 lb. Rating.

In addition to periodic inspection, the user should inspect all ladders before climbing. Discovery of a broken step, loose rung, cracked side rail, loose or broken hardware before climbing may prevent a very rapid descent.

Metal ladders are conductors of electrical current. Do not use them near exposed electrical equipment. Only ladders made of nonconducting materials, such as wood or fiberglass, should be used. Be careful with wet wooden ladders. They may also conduct electricity.

All metal ladders and step stools should be marked, CAUTION; DO NOT USE AROUND ELECTRICAL EQUIPMENT.

POSITIONING AND PLACEMENT

Do not use a straight ladder unless it has safety feet, is tightly fastened to the floor, or someone is holding it. A ladder board may be employed and secured under ladder legs that are on slick, soft, or uneven surfaces. Substantially designed safety feet may also be installed.

When using a straight ladder the safest angle is that at which the horizontal distance between the foot of the ladder and the support against which it has been placed is not more than one-fourth the length of the ladder from the top point of support to its base.

Do not place ladders in front of doors which open toward them unless the doors are blocked open, locked or guarded. If you must work on a ladder in front of a door, place warning signs conspicuously to prevent people from walking into the ladder. Better still, use a barrier.

Ladders should not be placed on boxes, barrels, or other unstable bases to obtain additional height. Use a longer ladder.

Do not use a ladder to gain access to a roof or platform unless the ladder extends at least 3 feet above the edge of the roof or the point of support. Reposition the ladder to eliminate the need for overreaching.

USAGE

Don't leave ladders unattended when not in use, and never leave them leaning against doors.

A ladder should not be used as a brace, skid, gin pole, gangway, or staging plank unless specifically recommended for that use by the manufacturer.

Short ladders must not be spliced together to provide longer sections.

Never stand on the top two rungs or steps of a ladder. If you should start to fall or lose your balance, there is nothing for you to grab to prevent a fall. As a reminder, folding stepladders should be stenciled, **DO NOT STAND ON THE TOP STEP**.

Be certain that hands and shoes are not greasy, muddy, or otherwise slippery.

MAINTENANCE

According to OSHA regulations, ladders should be inspected at regular intervals, and those that have developed defects must be withdrawn from service for repair or destruction and clearly marked or tagged so that others will not use them, e.g., **DANGEROUS, DO NOT USE**.

Store ladders in a location that will minimize damage to them and in a way that will allow easy access for use and inspection.

Keep ladders clean and free of grease.

Don't repair broken ladders yourself; leave that to people who really know how to do so.

Don't paint a ladder. Use clear varnish or lacquer. Paint will often hide the crack that is

the first warning of a defect that could result in failure. Ladders should be stored in a dry location, away from temperature extremes, and hung or stored in a manner that will prevent warping.

Trolley ladders must be provided with locking devices. Metal bearings of locks, wheels, pulley, etc., must be lubricated and inspected frequently.

Frayed or worn ropes in extension ladders must be replaced. Safety feet and any auxiliary equipment must be kept in good condition.

FIXED LADDERS

Fixed ladders used to ascend to heights exceeding twenty feet (except on chimneys) must be provided with landings for each thirty feet of height. Where installation conditions are such that ladders must be offset (for even short distances), landing platforms must be provided at each offset. All landing platforms must be equipped with standard railings and the boards arranged to give safe access to the ladder. Minimum platform size should not be less than 24 inches in width and 30 inches in length.

The side rails of fixed, through or side step ladder extensions must extend at least 3 1/2 feet above parapets and landings. Where rungs are omitted, clearances between rails must not be less than 18 inches and not more than 24 inches.

The preferred pitch of fixed ladders is between 75 degrees and 90 degrees with the horizontal.

Cages or wells must be provided on fixed ladders of more than 20 feet. Cages must extend downward to a point between 7 and 8 feet above the base of the ladder. Cages must extend a minimum of 42 inches above the top of the landing unless other acceptable protection is provided.

PURCHASING PORTABLE LADDERS

In order to assure the safety of personnel working off of portable ladders all future purchases will specify that such ladders shall be TYPE IA-EXTRA HEAVY DUTY, 300 lb. Rating.

TYPE IA portable ladders are rated by the AMERICAN NATIONAL STANDARDS INSTITUTE for a 300 pound working load. The working load includes the weight of the user, the materials and tools which the ladder is to support for the intended use. In cases where it is known that the working load may exceed 300 pounds the Safety Office should be consulted for further evaluation.

The following table summarizes the maximum lengths permitted by ANSI for TYPE IA portable ladders.

MAXIMUM LENGTHS OF TYPE IA PORTABLE LADDERS

	WOOD	METAL	REINFORCED PLASTIC
Step Ladders (Industrial)	20 ft.	3-20 ft.	3-20 ft.
Single Ladders	30 ft.	30 ft.	30 ft.
Two Section Extension Ladders	60 ft.	60 ft.	60 ft.
Three Section Extension Ladders	Not permitted	72 ft.	72 ft.
Sectional Ladders (Non-adjustable)	31 ft.	NA	NA

Special use portable ladders, such as, trestle ladders, painter's step ladders, mason's step ladders, platform ladders, combination ladders, should only be purchased after the proposed uses are reviewed by the Safety Office.

PART 2

CHAPTER 9

ELECTRICAL SAFETY

EMERGENCY MEASURES FOR ELECTRIC SHOCK

Everyone engaged in any electrical or electronic work should be capable of carrying out the following measures:

Free the person involved from the live circuit. If a person is “frozen” to a live electrical contact, shut off the current if possible. If this cannot be done, use wood boards, poles, or sticks, a belt, piece of dry rope, an article of clothing, or any non-conducting material of sufficient length to pull the body away from the contact. Act quickly, and remember to protect yourself during this operation.

Administer cardiopulmonary resuscitation if necessary. (Staff Development, ext. 2568 offers basic life support training classes.)

Cut off the power. Because of the dangers involved in being caught in a live circuit, know how to cut off the power anywhere in your work area, and how to summon help in case of an emergency-dial **2600** on campus.

Immediately report any shock received, no matter how slight, to your supervisor, instructor, foreman, or other appropriate authority.

Promptly report any “popping” or sparking as well as any noticeable defects or hazardous conditions that could cause injury, property damage, or interference with service.

ELECTRIC SHOCK

Shock happens when the body becomes part of an energized electrical path and energy is transferred between parts of the body, or through the body to a ground or the earth. In order for shock to occur, a potential difference or stored electrical charge must be present to cause the current to flow. Current flowing through the highly sensitive central nervous system can, under certain conditions, cause serious injury or death. Some of the conditions which govern the severity of a shock are mentioned below.

TYPE OF CURRENT

The type of current involved alternating current (AC) or direct current (DC) is important. Low voltage up to 40 volts, of direct current (DC) circuits do not normally present a hazard to human life.

Under some circumstances, however, severe burns can result. (See Table 2-9-1, which summarizes some possible effects on the body when the current path is from hand to hand). Even at low voltage, alternating current (AC) circuits can be dangerous and present a lethal threat. At commercial frequencies (50-60 cycles or hertz) and intermediate voltages (50 to 600 volts), lethal current may be conducted through the body. (See Tables 2-9-1 and 2-9-2).

RESISTENCE

The resistance of the body and the degree to which the skin is insulated from the ground govern the amount of current flowing through the body. The skin offers the principle resistance which the human body presents to the flow of current. Table 2-9-2 shows how skin resistance decreases with increased voltage. Current flow through the body is also given with resultant body sensations noted. The current path is from hand to hand, with the palms of the hands moist. If the skin is wet or moist, the resistance is lowered as shown in Table 2-9-3 and, therefore, the greater flow of current and the severity of shock.

TIME

The length of time the body is in the circuit is also important, particularly with respect to the severity of burns. Burns break down the skin, thereby lowering the resistance. The more extensive the burn, the less resistance provided.

Table 2-9-1 Effects of Electrical Current on the Human Body Effect Current in Milliamperes

	DIRECT		ALTERNATING			
	60 Hertz		10,000 Hertz			
	Men	Women	Men	Women	Men	Women
Slight sensation on hand	1	0.6	0.4	0.3	7	5
Perception threshold	5.2	3.5	1.1	0.7	12	8
Shock-painful, muscular control not lost	62	41	9	6	55	37

Shock-painful, let-go threshold	76	51	20	10.5	75	50
Shock-painful and severe, muscular contractions, breathing difficult	90	60	23	15	94	63
Shock-possible ventricular fibrillation						
effect from 3-second shocks			500	500	100	100

TABLE 2-9-2
HUMAN RESISTANCE AS AFFECTED BY VOLTAGE

Applied 60 Cycles Voltage	Resistance <u>Ohms</u>	Current <u>Milliamperes</u>	<u>Sensation</u>
10	10,000	1	Tingling
20	10,000	2-2.4	Strong tingling
30	2,500	12-15	Painful-muscular contraction
40	2,000	19-22	Extremely painful muscular contraction

TABLE 2-9-3
HUMAN RESISTANCE TO ELECTRICAL CURRENT

<u>Body Area</u>	<u>Resistance in Ohms</u>
Dry skin	100,000 to 600,000
Wet skin	1,000
Internal body	
Hand to foot	400 to 600
Ear to ear	About 100

Time becomes critical when current flowing through the body causes loss of muscular control, contraction of the chest (which affects breathing), and ventricular fibrillation of the heart. When the last occurs, the heart's pumping rhythm becomes irregular and it ceases to function properly. Table 2-9-1 shows the effect of time and current on fibrillation thresholds at 60 hertz or cycles.

CURRENT

Both the magnitude and path of the current flowing through the body are of primary importance. When the path of the current is hand-to-hand or hand-to-foot, vital organs (brain, heart, lungs, spinal cord) are affected, possibly with serious consequences. The age, physical and emotional condition of the person involved can also effect the severity of an electrical shock.

PREVENTION OF ELECTRICAL HAZARDS

When working with or around electrical equipment you should assume responsibility for your own safety and that of those working with you. The following information, principles, and good working practices will help you to avoid electrical shock and injury.

PROPER WIRING

All new, permanent or temporary electrical installations, or the replacement, modification, repair or rehabilitation of any electrical installation must be made in compliance with the requirements of the National Electrical Code (NEC) and of the National Fire Protection Association (NFPA).

Every effort must be made to eliminate potential hazards in research or development work that involves the design and construction of new systems so that equipment or apparatus will function safely in normal operations.

Electrical power distribution systems must be equipped with overcurrent protection such as fuses or circuit breakers, which must never exceed the rated capacity of the circuit.

All other sources of electrical potential for either service or experimental work must also be adequately fused and grounded.

All newly installed receptacles must be of the grounding type.

Multi-outlet bench strips must be grounded and should be equipped with fuses and pilot lights. They must be properly affixed to a bench, or chassis frame.

A switch must be provided in a readily accessible and convenient location for disconnecting the main power to apparatus in the event of an emergency. This switch

must be legibly marked to indicate voltage, current, wattage, and the equipment it controls, unless it is located and arranged so that its purpose is evident. Everyone working in the area or on the particular project should know where the switch is located.

GROUNDING AND BONDING

Grounding eliminates a difference in electrical potential between a conductive object and the ground by connecting them. Grounding will protect you from electrical shock by providing a path which offers less resistance to the current than you do. Bonding eliminates a difference of potential between conductive objects.

All exposed, non-current-carrying metal parts of fixed and portable equipment which are liable to become energized must be grounded.

Ground paths from circuits, equipment, and conductor enclosures must be permanent and continuous, having ample current-carrying capacity, and their impedance be low enough to facilitate the operation of overcurrent devices in the circuit (Article 250-51, NEC).

Bonding keeps separate pieces of conducting material at the same grounded electrical potential. All conducting material, such as metal floor plates, equipment chassis, bench tops, tables, piping, and conduits, should be bonded to each other.

Use suitable lugs, pressure connectors, clamps, or other approved connecting means. Connections that depend upon solder must not be used in grounding or bonding.

Where an adapter must be used to fit an old, ungrounded outlet, attach the pigtail on the adapter to the face plate screw before plugging in the adapter. Contact the Safety Office when this condition is discovered. Then the department should make arrangements with the Electric Shop to have the receptacle replaced with a grounded type. Ungrounded electrical fixtures or equipment should be located so that a person cannot touch them and a water pipe or other grounded object at the same time.

INSULATION

If you work continually with or around electricity, you should wear rubber-soled footwear to guard against slipping and to provide insulation.

Use rubber floor mats and adequately insulated tools when working with “hot” lines or equipment.

When working on high-voltage equipment, have properly rated gloves and matting available for protection.

Check the voltage stamped on the gloves and never use them for higher voltages. Also make sure that gloves are in good condition. They can be checked by holding the end closed and forcing air into the fingers; this enables you to see the cracks or spots that

are worn thin. Discard the gloves if these are visible. Never use unstamped gloves.

Portable tools or appliances protected by an Underwriters' Laboratories approved system of double insulation or its equivalent need not be grounded. Where such a system is employed, the equipment must be distinctly marked.

Many devices are equipped with commutators; these commutators and contacts can cause a lethal shock if soaked by rain or immersed in water.

ISOLATION

All electrical equipment or apparatus that may require frequent attention must be capable of being completely isolated electrically.

Live parts on electrical equipment operating at 50 or more volts or 10 joules must be guarded by approved means against accidental contact.

Enclose all power supplies so that accidental bodily contact with power circuits is impossible. All access doors must be provided with interlocks which will disconnect all power to conductors and short out capacitors when any access door is opened.

In every experimental setup, provide an enclosure to protect personnel against accidental contact with electrical circuits. Enclosures must be provided, even in temporary arrangements.

LOCKOUT

Before you start work on any system or circuit, it is your responsibility to make a personal inspection to assure yourself that it is de-energized. Opening a switch is not enough! To insure that all appropriate systems are isolated it is necessary that all possible sources of power be investigated and de-energized.

To isolate a system and guarantee that it remains de-energized, OSHA requires that all appropriate disconnecting switches be locked open and tagged with the name of the individual responsible. These locks and tags must be removed only by the person who placed them on the switches.

Before anyone begins work on a de-energized circuit or system it should be checked out by the use of a reliable voltage tester or other appropriate device to verify that it is "dead."

After making repairs or alterations, never close a circuit until all personnel are clear of mechanical equipment and circuit breakers. Do not close any switch until you are certain that it is safe to energize the circuit and all of the equipment on it.

Before putting equipment to use, test for adequate insulation resistance and ground connections. Always close and open circuits with apparatus suitable for the circuits involved.

Never work alone around energized electrical equipment.

Keep personnel away from dangerous situations or places unless their work requires them to be there.

SAFE WORK PRACTICES

Keep hands off connected electrical apparatus with which you are not directly involved or familiar.

Do not permit unauthorized people to work in hazardous areas. Do not hesitate to question unfamiliar faces. Health science center employees entering areas in which they do not usually work should check with whoever is in charge, state their reasons for being there, and receive clearance to perform their duties or to visit.

Question the methods or procedures of fellow workers if they violate any safety practices or otherwise work in an unsafe manner.

Provide signs and barriers to warn people of high voltage hazards, particularly on breadboard setups. Use danger signs and flashing lights wherever conditions require them. They should not be used promiscuously, or left where danger no longer exists, as this detracts from their effectiveness. Maintain safe working distances around energized equipment at all times. A minimum of 30 inch widths should be maintained on all working sides of equipment operating at 600 volts or less.

A neat, clean work space is essential where work on electrical equipment is to take place. Spaces behind and under consoles or power supplies should never be used for storage, and always be kept clear of rubbish or unnecessary equipment.

Equipment which is found to be defective should be labeled as such before storing. List defects on a tag. The tag must remain on this equipment until it is repaired, junked or dismantled.

Safe wiring practices call for the use of appropriate insulation, adequate spacing, and proper placement of conductors. When selecting an area for circuits and grounding, avoid dangerous locations.

The electrical assembly must be installed in a neat and professional manner. Work deliberately and carefully. Verify your connections as you proceed and be sure that they are secure.

Avoid exposed wiring and placing any part of your body in a circuit, either to ground or across terminals.

Always connect from the load to the source. Disconnect first at the source and work toward the load.

Check the supply circuit voltage to see that it is what you expect, either AC or DC- before closing circuits.

Avoid using electrical equipment or tools where there is moisture present. If it is unavoidable to do so, use ground fault circuit interrupters.

Rigidly observe the habit of using one hand when throwing open switches, removing leads, pulling plug leads from apparatus such as terminal or distribution boards, operating line power rheostats, measuring volatiles, or when testing circuits where any voltage may be present.

Do not wear rings, metal wrist bands, watches, key chains or other metal objects around exposed conducting material.

Do not use metal rulers, metal flashlights, or metallic pencils when working with or around electricity.

Use a wooden or fiberglass ladder instead of a metal one, if work requires the use of a ladder around electrical equipment. ALL metal ladders should be marked, CAUTION: DO NOT USE AROUND ELECTRICAL EQUIPMENT.

OTHER HAZARDS

Electric arcs can generate enough energy to cause shock, sufficient heat to cause severe burns, and ample ultraviolet light at certain wavelengths to cause serious and painful injury to the eyes even after a very brief exposure. To avoid such injuries, never close a switch or circuit breaker slowly or hesitatingly, (as arcing may occur) and keep your face turned away to avoid exposing your eyes and skin.

Vacuum and cathode ray tubes present a danger of possible implosion. Wear eye and face protection when handling them.

Soldering requires use of safety glasses or eye shields.

Lift power supplies, oscilloscopes, chassis, and other heavy materials in such a way as to prevent back strains and hernias.

Tripping hazards can be avoided by running power cables in cableways, beneath floors, or overhead.

PART 2

CHAPTER 10

VEHICLE SAFETY

WHO MAY DRIVE VEHICLES

Only specifically trained and/or authorized personnel will be permitted to operate health science center-owned vehicles.

Operators of health science center-owned vehicles must be pre-screened by the health science center Campus Police, to include a driver's license records check.

Employees, students and members of the public who operate private vehicles and park on campus shall abide by all state laws and with campus regulations (see below).

OPERATION OF VEHICLES

All health science center-owned vehicles shall be operated in accordance with state laws, rules and regulations.

Any problems or defects in a health science center-owned vehicle will be immediately brought to the attention of the health science center automobile shop. If the problem or defect is severe, the vehicle will **NOT** be used until repairs have corrected the problem/defect.

Each health science center-owned vehicle will be equipped with a seatbelt, unless specifically exempted from this requirement by State law. **THE USE OF SEAT BELTS IS MANDATORY.**

INSPECTIONS

Health science center vehicles will be visually inspected at the beginning of each work day to ensure they are ready for safe operation. Refer to Part 1, Chapter 5, Safety Inspections for more information on this topic.

DRIVER EDUCATION

From time to time, the health science center shall host defensive driving classes for employees who drive the institution's vehicles. Operators of health science center-owned vehicles may be required to take a defensive driving course.

PARKING AND TRAFFIC REGULATIONS

The current regulations regarding parking and traffic regulation, fees and fines are posted on the health science center's web site and can be obtained from the campus police office.

PART 2

CHAPTER 11

WASTE SEGREGATION

BACKGROUND

It is important to recognize different types of wastes call for different methods of disposal. Research laboratories have the most complex wastes. Waste segregation is performed to (1) meet environmental regulations, (2) meet federal and state law, (3) to protect the organization and the community, and (4) to manage the cost of waste disposal.

If in doubt as to the proper method of disposal, please call the Safety Office, x2697.

ANIMAL WASTES

ANIMAL CARCASSES

Kept frozen until this waste can be transferred to Laboratory Animal Medicine for final disposal, or as described below. Under no circumstances shall animal carcasses be placed into trash dumpsters or into the regular trash.

CONTAINING RADIOACTIVE ISOTOPES

Carcasses containing radioactive materials are transferred to the Safety Office for final disposal by either decay in storage followed by disposal in a type I sanitary landfill as allowed by regulation or direct disposal in a type I sanitary landfill. Before you generate this type of wastes, please consult the Safety Office on allowed amounts and types of isotopes to be used.

CONTAINING INFECTIOUS ORGANISMS OR rDNA

Animal carcasses containing pathogenic organisms and/or rDNA will be incinerated.

CONTAINING CERTAIN HAZARDOUS CHEMICALS

Will be brokered or landfilled as allowed by applicable regulations. Consult the Safety Office about this type of disposal. Transfer this waste to the Safety Office.

ANIMAL PARTS (RECOGNIZABLE TISSUE)

Transfer to Laboratory Animal Medicine as fresh or frozen material, unless these materials also contain radioactive materials, rDNA or infectious organisms. See above for methods of disposal. Consult with the

Safety Office regarding disposal if you have this type of waste.

ANIMAL PARTS (UNRECOGNIZABLE AS TO SOURCE)

Unless this materials contains radioactive materials, rDNA or infectious organisms, laboratory staff shall autoclave small amounts of animal tissue in ORANGE bags with an indicator showing that the bag has been autoclaved. This method is suitable for situations involving a few grams of soft tissue. Autoclaved materials must not be recognizable as animal parts. These ORANGE bags may be placed in the large trash can located near the autoclave. Do not re-open autoclaved bags.

ANIMAL BLOOD & BLOODY ITEMS

Animal blood may be poured down a working laboratory sink unless contaminated with radioactive materials, rDNA or infectious organisms.

Bloody items including paper, plastic and unbroken glass (not sharps) may be placed in the regular laboratory trash unless contaminated with radioactive materials, rDNA or infectious organisms UNLESS the quantity of blood is such that the waste is drippable, squeezable or pourable or when dried will flake off when handled.

Drippable, squeezable and pourable bloody animal wastes, with or without infectious organisms or rDNA will be autoclaved by lab staff in ORANGE bags with an indicator showing the bag has been autoclaved. Place autoclaved material into large trash container next to autoclave. Do not reopen autoclaved bags.

Consult the Safety Office for proper disposal of bloody items contaminated with radioactive materials and/or hazardous chemicals.

EXCEPTION: Laboratory Animal Medicine (Animal Facility) personnel who dispose of **certain animal waste materials** directly into the dumpster in accordance with provisions of the contract with the waste hauler/landfill and Texas State Law are exempted from the requirement to segregate animal bedding, droppings, etc.

BATTERIES

Lead-acid, nickel cadmium and mercury batteries are recycled by the health science center. Call the Safety Office at ext. 2697 for a pick up. Regular dry cells may be placed into the regular trash. If you are not sure of proper disposal for your batteries, call the Safety Office, ext. 2697.

Physical Plant Auto Shop recycles the batteries associated with agency motor vehicles.

CHEMICAL WASTES

Regulated chemical wastes are transferred to the Safety Office for disposal. Regulated wastes may not be placed into the regular trash, sanitary sewer, storm drains, on the ground or evaporated in fume hoods. Call the Safety Office at ext. 2697 for a chemical waste pickup or to have your chemical disposal questions answered.

All wastes are clearly marked with the contents and placed in suitable containers. In general, metal containers are not appropriate for most wastes.

The Safety Office has excess chemicals for redistribution. To check our inventory, search the chemical inventory using Safety Office as the department at our web site or look for the chemical you wish to borrow by searching for the chemical in the current **annual hazardous chemical** inventory.

Pump oil from research laboratories is picked up by the Safety Office and recycled. Call the Safety Office for a waste pickup, ext. 2697.

Motor oils and oil filters generated at the health science center are recycled by the Safety Office.

Used photo fixer is classified a hazardous waste due to it's high silver content. Call the Safety Office, ext. 2697 for pickup and treatment to recover the silver.

Used photo developer is nonhazardous and should be put down the drain follow by copious amounts of water.

Unused (old, outdated, excess) photo chemicals may be hazardous and should be transferred to the Safety Office for disposal.

HUMAN REMAINS

Human remains must be handled in accordance with the Texas State Anatomical Board policies and procedures. The health science center representative on the State Anatomical Board may be reached by calling the department of Cell Biology & Genetics at ext. 2045. Current policies call for cremation off site. For departments other than Cell Biology & Genetics that need this type of disposal, please call the Safety Office at ext. 2697. Under no circumstances shall human remains be placed in the regular trash or in a trash dumpster.

Small bits of tissue, blood and other human body fluids may be placed into a ORANGE autoclave bags which are closed by professional staff and autoclaved by

professional staff. These materials must not be recognizable as human body parts prior to placement into bags. For larger or recognizable materials, see Human Remains, above.

MEDICAL WASTES

See Appendix I for definition of medical wastes. **Most bloody items generated in research laboratories will not meet the definition of medical wastes, which are contaminated with blood sufficient to be drippable, squeezable or pourable.**

Medical wastes are placed into RED bags, closed by professional staff when 3/4 full or at the end of the shift, whichever occurs first and picked up by designated housekeepers on the day and evening shifts. Call housekeeping at ext. 5071 to arrange for medical waste pickup. Medical wastes must be clearly identified by a bag of RED color. Medical wastes are not to be consolidated into containers that may lead to inappropriate disposal. All medical wastes are incinerated. No medical wastes shall be placed into a trash dumpster.

See Sharps below.

MICROBIOLOGICAL WASTES

Professional staff shall follow the appropriate disinfection/sterilization and waste handling recommendations for biological agents as given in *Biosafety in Microbiological and Biomedical Laboratories*, **latest edition**, a publication of the National Institutes of Health and Centers for Disease Control. This publication is available in electronic format on the web server maintained by the health science center's Safety Office.

Biologically active wastes from research labs shall be **autoclaved by professional staff** in an ORANGE bag that will indicate that it has been autoclaved. Place autoclaved material into large trash can located by autoclave. Do not reopen autoclaved bags.

GLASS & BROKEN GLASS

Unbroken glass containers are picked up by housekeeping staff. If the container held a chemical, professional staff must triple rinse the container before leaving it for housekeeping. Chemicals may not be left in such containers.

Broken glass shall be placed in a sturdy cardboard box or other puncture resistant container. This container shall be sealed with tape by staff and the words "BROKEN GLASS" written on the outside of the box. Leave the box for housekeeping staff to pick up.

PAPER & PAPER PRODUCTS

The health science center recycles most waste paper and paper products. Recyclable papers are placed in specially marked receptacles OR in regular receptacles in office areas that have not been contaminated with food or liquids for pickup by custodial services. Call Custodial Services, ext. 5071 for information about recycling paper.

Paper which CANNOT be recycled:

Wet paper

Tissue papers

Paper contaminated with food

Examples of dry paper that CAN be recycled:

Cardboard and pasteboard containers

Catalogs and brochures

Computer paper

Office paper, all colors, with staples and clips

Mail

Newspapers and magazines, including inserts

Phonebooks

RADIOACTIVE WASTES

All radioactive wastes, as defined in the University of North Texas Health Science Center Radiation Safety Manual, shall be transferred to the Safety Office for proper disposal. A detailed waste segregation diagram is in the Radiation Safety Manual. All containers for radioactive wastes shall be marked with the international radiation symbol on at least two opposite sides of the container. Liners shall not obscure the labels. Call the Safety Office at ext. 2697 for a radioactive waste pickup.

SHARPS

Sharps include needles, scalpel blades and microscope cover slips. These items may or may not be contaminated with other materials. These items must be placed in a puncture resistant plastic container with the biohazard symbol on the side which is designed for this purpose. Full sharps containers with secured lids will be picked up by designated housekeeping staff. Call Custodial Services at ext. 5071 for pickup.

These materials are brokered to a licensed waste processor and disposed off site.

No sharps shall be placed into the regular trash or directly in the dumpster.

SHARPS CONTAMINATED with RADIOACTIVE MATERIALS

Sharps contaminated with radioactive materials are considered dry radioactive wastes. Sharps should be placed in a puncture resistant plastic or pasteboard container and then placed inside the dry radioactive waste container.

PART 3

CHAPTER 1

BLOOD-BORNE PATHOGENS & EXPOSURE CONTROL PLANS

The Blood-borne Pathogen Exposure Control Plan in its entirety **was** moved to the Infection Control Manual, effective August 1998. **Over the years, that manual has been divided into various separate documents located here in July 2005:**

Bacterial Meningitis

<http://www.hsc.unt.edu/education/studenthealth/documents/Varipol35.pdf>

Cleaning of Contaminated Instruments

<http://intranet.hsc.unt.edu/policies/qualityassurance/CleaningofContaminatedInstruments.pdf>

Disinfection/Sterilization Classifications and Approved Disinfectants

http://intranet.hsc.unt.edu/policies/qualityassurance/Disinfection_SterilizationClassificationsApprovedDisinfectant.pdf

Environmental Monitoring of Infection Control

<http://intranet.hsc.unt.edu/policies/qualityassurance/EnvironmentalMonitoringofInfectionControl.pdf>

Handwashing

<http://intranet.hsc.unt.edu/policies/qualityassurance/handwash30.pdf>

Management of blood-borne pathogen exposures: HIV, HBV, HCV

<http://www.hsc.unt.edu/education/studenthealth/documents/ExpMgmtStudents.pdf>

Notifiable Condition to Department of Health

<http://intranet.hsc.unt.edu/policies/qualityassurance/NotifiableConditionsReportingDepartmentHealth.pdf>

Responsibility for Infection Control Activities

<http://intranet.hsc.unt.edu/policies/qualityassurance/ResponsibilityInfectionControlActivities.pdf>

Spill (blood/body fluid) Decontamination

<http://intranet.hsc.unt.edu/policies/qualityassurance/SpillbloodbodyfluidDecontamination.pdf>

Spore (Biological indicator) Testing of Sterile Processing

<http://intranet.hsc.unt.edu/policies/qualityassurance/SporeBiologicalindicatorTestingofSterileProcessing.pdf>

TB Control Plan

<http://www.hsc.unt.edu/education/studenthealth/documents/TBControl25.pdf>

Triage of Patients with Communicable Diseases

<http://intranet.hsc.unt.edu/policies/qualityassurance/TriageofPatientsCommunicableDiseases.pdf>

Varicella Zoster (chickenpox) Control Plan

<http://www.hsc.unt.edu/education/studenthealth/documents/Varipol35.pdf>

PART 3

CHAPTER 2

CHEMICAL HYGIENE PROGRAM

FORWARD

The health science center is dedicated to providing a safe working and living environment for students, staff and the public it serves. This document outlines the health science center chemical hygiene program*. The purpose of this program is to provide for the safe procurement, handling, use and disposal of all chemicals used at the health science center.

Because hundreds of different chemicals are used in a wide variety of activities at the health science center, especially within research laboratories, it is not possible to provide detailed handling procedures for every chemical in every application. This program, therefore, outlines general procedures for handling chemicals to provide a framework within which supervisors and workers can insure the safe handling of all chemicals at the health science center.

On the next page, emergency procedures are listed for chemical exposures and spills.

Next, Section 1 describes administrative aspects of the program including the general principals on which the program is founded, the responsibilities of health science center employees, laboratory design considerations and the legal requirements this program is meant to address.

Section 2 contains the program's policies and procedures. These are based on established practices recognized by the National Research Council** as necessary for preventing chemical exposures in laboratories. They also conform to federal and state regulations for chemical exposures in the work place. It is critical that these policies and procedures are followed in all aspects of chemical handling at the health science center.

Section 3 lists general guidelines and procedures for minimizing chemical exposure when handling most chemicals. Additional precautions that must be taken when working with unusually hazardous chemicals are also listed.

Section 4 contains safety recommendations which relates to physical hazards associated with many laboratory operations. Often physical hazards increase chemical exposures as well as causing physical injury.

Adherence to this chemical hygiene program will prevent harmful exposure to chemicals furthering our goal of providing a safe environment in which to work and learn.

*This program is a supplement to the University of North Texas Health Science Center Safety Manual and the University of North Texas Health Science Center Radiation Safety Manual and is not intended to supplant provisions of those documents.

***"Prudent Practices for Handling Chemicals in Laboratories", 1981, National Research Council, National Academy Press, Washington D. C.

EMERGENCY INFORMATION

CHEMICAL EXPOSURES

Render **FIRST AID** as follows:

SKIN CONTACT

Remove contaminated clothing.

Immediately flush the affected skin area with large amounts of clean water for a prolonged period (15 minutes).

If symptoms persist after washing, seek medical attention.

EYE CONTACT

Promptly flush eyes with water for at least 15 minutes.

Seek medical attention.

INHALATION

Remove individual to fresh air.

Seek medical attention.

INGESTION

Encourage the victim to drink large amounts of water. **DO NOT** force fluids on an unconscious individual.

DO NOT induce vomiting except on the advice of a physician.

Seek medical attention.

IN ALL CASES

If injury is severe or the person is unconscious, treat as a Medical Emergency. Call the EMERGENCY NUMBER **ext. 2600** or **817-735-2600** and give the following information:

- (a). Location of accident/incident - building and room number.
- (b). Type of material involved - liquid or solid (wet or dry).
- (c). Name of material involved if known.
- (d). Quantity involved.
- (e). Severity of injury.
- (f). Is an ambulance and/or physician required?

Proceed with the necessary spill containment and clean-up procedures after rendering first aid.

CHEMICAL SPILLS

MINOR SPILLS WITHIN THE WORK AREA

Confine liquids with paper towels.

Notify other workers of spill.

Clean up spills as soon as possible.

Sample clean-up procedures are described below.

Use the necessary personal protection apparel and equipment.

Avoid producing dust or aerosols.

Contact the Chemical Hygiene Officer at ext. 2697 or 817-735-2697 for assistance if necessary.

Properly dispose of contaminated materials. Contact the Chemical Hygiene Officer, ext. 2697 or 817-735-2697, for assistance.

Report **ALL** spills of unusually hazardous materials to your supervisor.

LARGE SPILLS - NO IMMEDIATE LIFE/HEALTH THREAT

Use paper towels or other absorbent to confine the chemical to the smallest possible area.

Phone the EMERGENCY NUMBER, **ext. 2600** or **817-735-2600**. Report **ALL** spills that occur outside the work area.

Give the following information:

- (a). Location of accident/incident - building and room number.
- (b). Type of material involved - liquid or powder/crystalline (wet, dry).
- (c). Name of material involved if known.
- (d). Quantity involved.

Alert other workers and keep others from entering the area.

Notify your immediate supervisor.

The Safety Office or Campus Police will decide if the building is to be evacuated.

Contain the spill if possible using paper towels or other absorbents.

Begin clean-up procedures.

Sample clean-up procedures are described below.

Use the necessary personal protection apparel and equipment.

Avoid producing dust or aerosols.

Contact the Chemical Hygiene Officer at ext. 2697 or 817-735-2697 for assistance if necessary.

Properly dispose of contaminated materials. Contact the Chemical Hygiene Officer for assistance.

POSSIBLE LIFE/HEALTH THREAT

Phone the EMERGENCY NUMBER **ext. 2600** or **817-735-2600**.

Give the following information:

- (a). Location of accident/incident - building and room number.
- (b). Type of material involved - liquid or powder/crystalline (wet, dry).
- (c). Name of material involved if known.
- (d). Quantity involved.
- (e). Your name and phone number where you are now.
- (f). Whether clean-up assistance is required.

The or Campus Police will decide if the building is to be evacuated.

Alert other workers in the immediate area.

Prevent other people from entering the area until the Campus Police arrive.

Contain the spill if possible using paper towels or other absorbents.

Begin clean-up procedures.

Sample clean-up procedures are described below.

Use the necessary personal protection apparel and equipment.

Avoid producing dust or aerosols.

Contact the Chemical Hygiene Officer at ext. 2697 or 817-735-2697 for assistance if necessary.

Properly dispose of contaminated materials. Contact the Chemical Hygiene Officer for assistance.

CLEAN-UP PROCEDURES

All areas that contain chemicals should be equipped with a “Chemical Spill Control Kit.” Follow directions as given on the kit. *Wear appropriate personal safety apparel and equipment including gloves, face shield, apron and respirator, if necessary.*

In the absence of a kit, use the following procedures.

ACIDS

Neutralize with dry sodium bicarbonate and absorb with paper towels or other absorbent.

Collect absorbent into a plastic bag or pail.

Rinse and mop the affected area using large amounts of water.

BASES

Neutralize with citric acid and absorb with paper towels or other absorbent. Collect absorbent into a plastic bag or pail.

Rinse and mop the affected area using large amounts of water.

SOLVENTS

Wear solvent resistant gloves and apron and respirator if necessary. Absorb spill with vermiculite, paper towels or other absorbent. Collect absorbent into a solvent resistant plastic bag or pail.

Properly dispose of contaminated materials. Contact the Chemical Hygiene Officer for assistance by dialing ext. 2697 or 817-735-2697.

ADMINISTRATION OF THE CHEMICAL HYGIENE PROGRAM

GENERAL PRINCIPLES

The following general principles for work with laboratory chemicals are the basis for the policies and procedures which constitute the health science center chemical hygiene program.

MINIMIZE ALL CHEMICAL EXPOSURES

Because few laboratory chemicals are totally without hazards, general precautions should be adopted for handling **ALL** laboratory chemicals. These include avoiding any skin contact with chemicals and avoiding breathing any chemical dusts or vapors.

AVOID UNDERESTIMATION OF RISK

Exposures should be minimized even for substances of no known significant hazard. Take special precautions when working with substances which present special hazards. Assume that all substances of unknown toxicity are toxic and that any mixture will be more toxic than its most toxic component.

PROVIDE ADEQUATE VENTILATION

Prevent exposure to airborne substances by using hoods and other ventilation devices.

OBSERVE PELs AND TLVs

The Permissible Exposure Limits of OSHA and the Threshold Limit Values of the American Conference of Governmental Industrial Hygienists shall not be exceeded.

INSTITUTE A CHEMICAL HYGIENE PROGRAM

A laboratory chemical hygiene program designed to minimize exposures is needed and shall be instituted. It should be a regular continuing effort, not merely a standby or short-term activity. The program elements should be followed in academic teaching laboratories as well as by full-time laboratory workers.

CHEMICAL HYGIENE RESPONSIBILITIES

Responsibility for chemical hygiene at the health science center rests at all levels. Persons with specific responsibilities include the following.

PRESIDENT OF THE HEALTH SCIENCE CENTER

The President has ultimate responsibility for chemical hygiene within the health science center and must, along with the administrative staff provide continuing support for institutional chemical hygiene.

DEPARTMENT HEADS

Department heads are responsible for chemical hygiene within their departments.

CHEMICAL HYGIENE OFFICER

A chemical hygiene officer (CHO) will be appointed by the administration. The CHO will:

- (a) Work with administrators, supervisors and other employees to develop and implement appropriate chemical hygiene policies and practices;
- (b) Monitor procurement, use, and disposal of chemicals used at the health science center;
- (c) See that appropriate records are maintained;
- (d) Help develop precautions and adequate facilities;
- (e) Know the current legal requirements concerning regulated substances;
- (f) Review and seek improvements to the chemical hygiene program;

- (g) Supervise, compile and report the annual hazardous chemical inventory;
- (h) Maintain a file of SDSs for chemicals used and distribute SDSs to the departments using those chemicals;
- (i) Provide regular, formal chemical hygiene and housekeeping inspections including inspections of emergency equipment; and
- (j) Assist in accident investigations.

LABORATORY AND UNIT SUPERVISORS

Laboratory and unit supervisors have overall responsibility for chemical hygiene in their laboratory or unit including responsibility for:

- (a) Ensuring that workers know and follow the chemical hygiene rules by providing appropriate training and leadership;
- (b) Knowing the current legal requirements concerning regulated substances;
- (c) Planning operations in accordance with the health science center chemical hygiene procedures;
- (d) Determining the required levels of protective apparel and equipment and insuring that protective equipment is available and in working order;
- (e) Ensuring that facilities and training are adequate for all chemicals used; and
- (f) Investigating chemical accidents within their areas.

DEPARTMENT SAFETY COORDINATORS

Department safety coordinators are responsible for:

- (a) Maintaining SDS files for their departments;
- (b) Coordinating and reporting the annual chemical inventory and hazard communication training for their departments; and
- (c) Reviewing accident investigations.

Additionally, extra duty safety officers may help to identify chemical hygiene problems within their departments and assist the CHO in addressing those problems.

LABORATORY WORKERS

Laboratory workers are responsible for:

- (a) Planning and conducting each operation in accordance with the health science center chemical hygiene procedures;
- (b) Developing good personal chemical hygiene habits; and
- (c) Reporting unsafe working conditions to their supervisors and/or the CHO.

LABORATORY FACILITIES

DESIGN

Each laboratory facility shall have:

- (a) An appropriate general ventilation system (see below) with air intakes and exhausts located so as to avoid intake of contaminated air;
- (b) Adequate provisions for chemical storage;
- (c) Laboratory hoods (see below) and sinks;
- (d) Other safety equipment including eyewash fountains and drench showers;
- (e) Arrangements for waste disposal; and
- (f) An alarm system to alert people in all parts of the facility including isolation areas such as cold rooms.

Part 3, Chapter 5 of this manual contains more detailed construction standards for laboratories.

MAINTENANCE

Chemical hygiene-related equipment shall undergo continuing appraisal and be modified if inadequate.

USEAGE

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

VENTILATION

A general ventilation system is designed to provide a source of air for breathing and for input to local ventilation devices but is NOT to be relied on for protection from toxic substances released into the laboratory. It shall meet the following requirements:

Laboratory air shall be continually replaced (4-12 room air changes/hour) to prevent the increase of air concentrations of toxic substances during the working day.

General air flow shall not be turbulent and shall be relatively uniform throughout the laboratory.

Air flow shall be directed into the laboratory from non-laboratory areas and out to the exterior of the building.

Laboratory exhaust air shall not be recirculated. Please refer to Figure 3-52 for sample laboratory design.

HOODS

In most instances, laboratory hoods shall be used as the primary control of airborne toxic substances. The following requirements must be met:

Adequate laboratory hood space shall be provided in each laboratory. (2.5 linear

feet of hood space per person is recommended for workers that spend most of their time working with chemicals).

Hoods shall have regular performance testing and shall be tested before work with unusually hazardous chemicals begins. Face velocities of 80 to 100 linear feet per minute are recommended.

Hoods used for work with substances of unknown or high toxicity shall have a continuous monitoring device to allow convenient confirmation of adequate hood performance before each use.

Hoods shall not be located near the primary exit of a lab.

Hoods shall be installed such that the entire face of the hood is unobstructed by fixtures/furniture or stored articles.

Hoods shall not be used for storing chemicals.

OTHER LOCAL VENTILATION DEVICES

Ventilated storage cabinets, canopy hoods, snorkels, etc. shall be provided as needed. Each such device will be installed with a separate exhaust duct.

SPECIAL VENTILATION AREAS

Exhaust air from glove boxes and isolation rooms shall be passed through scrubbers or other treatment before release into the regular exhaust system. Cold rooms and warm rooms shall have provisions for rapid escape and for escape in the event of electrical failure.

MODIFICATION

Any alterations of the ventilation system shall be followed by testing for adequate worker protection from airborne toxic substances.

EVALUATION

Quality and quantity of ventilation shall be evaluated on installation, regularly monitored, and reevaluated whenever a change in local ventilation devices is made.

REGULATIONS

The health science center shall comply with the intent of federal, state and local regulations relevant to chemical hygiene and waste disposal. Some of the legislation listed below covers both public and private employers.

Federal Occupational Safety and Health Act of 1967
Texas Occupational Safety and Health Act of 1970
Texas Radiation Control Act of 1961
U.S. Atomic Energy Act of 1954

Texas Worker's Compensation Act
National Fire and Protection Codes (NFPA), as revised
Texas Hazard Communication Act of 1985
Any future regulations relevant to chemical hygiene at the health science center.

Certain acts and rules listed above do not apply to public employers and are used at the health science center, where applicable as voluntary guidelines.

REVIEWS OF THE CHEMICAL HYGIENE PROGRAM

The chemical hygiene program shall receive an annual, formal review. The CHO shall solicit input and assistance as deemed necessary. The results of the review shall be publicized and necessary revisions shall be made to this document. In addition to the formal review the CHO shall continuously evaluate the effectiveness of the program. Supervisors must also continuously evaluate chemical hygiene within their work areas.

SECTION 2

COMPONENTS OF THE CHEMICAL HYGIENE PROGRAM

BASIC RULES AND PROCEDURES

Because a wide variety of chemicals are used at the health science center a set of basic rules and procedures shall be adopted with the aim of minimizing all chemical exposures. When followed, these procedures will prevent harmful exposure to most chemicals in use at the health science center. Unusually toxic or otherwise hazardous chemicals will require specific procedures to be developed and implemented. Section 3 details general procedures for work with chemicals and additional safeguard required for some types of toxins.

CHEMICAL PROCUREMENT, DISTRIBUTION, STORAGE AND INVENTORY

The following procedures shall be followed to reduce the potential for accidental exposure to hazardous chemicals during procurement, distribution and storage.

PROCUREMENT

All chemical purchases shall be through the health science center Purchasing Department.

Chemical suppliers are required to forward SDSs on all purchases.

Research materials obtained through other sources, for example other research groups, will be registered with the Safety Office. An SDS or equivalent shall be obtained from the source and provided to the Safety Office. When information is limited, the laboratory supervisor shall provide the Safety Office with an assessment of the potential hazards associated with the material.

Purchases of CERCLA acutely hazardous chemicals (see Appendix A) and other unusually hazardous chemicals shall be coordinated with the CHO to allow for the following:

- (a) special shipping and delivery requirements;
- (b) evaluation of potential hazards;
- (c) establishing procedures;
- (d) alteration of existing space or equipment as necessary for safe use; and
- (e) review of disposal procedure.

Before any substance is received, information on proper handling, and

disposal shall be known to those who will be involved.

No container shall be accepted by Central Receiving without an adequate identifying label.

No damaged or leaking container shall be accepted by Central Receiving.

Chemical purchases shall be made with consideration for waste disposal. See Appendix B for suggestions for reducing chemical wastes.

Central Receiving personnel shall know about hazards, handling equipment, protective apparel, and relevant regulations.

DISTRIBUTION

All chemical orders will be received and distributed by the health science center central receiving except when special handling is warranted. Special handling shall be arranged by the CHO on a case by case basis.

The CHO shall be notified of receipt of any shipment which is leaking or damaged.

Chemicals will be distributed in their original shipping containers.

Chemicals will be delivered only to laboratory and other designated use areas. They shall not be delivered to office, clinic or other non-use areas.

Chemicals will be distributed and placed in proper storage as soon as possible after receipt.

When chemicals are hand carried, the container shall be placed in a secondary container or bucket.

Freight-only elevators shall be used for hazardous chemicals or large amounts of less hazardous chemicals.

STORAGE

All chemical storage areas will be marked appropriately.

Chemicals must be stored appropriately for their associated hazards and the amounts stored.

Chemicals will be stored in their original containers whenever possible.

Flammable liquids and chemicals must be stored only in approved safety cabinets or explosion proof refrigerators.

Chemicals will be segregated according to reactivity.
Compressed gases not in use will be stored in the designated gas cylinder storage area.

All compressed gas cylinders in use must be secured to a wall or table by using approved brackets or floor mounts.

Amounts of chemicals stored should be as small as practical. A three to 12 month supply is recommended depending on amounts used.

Chemicals which are unusually hazardous shall be stored in unbreakable secondary containers with local exhaust ventilation when necessary.

Stored chemicals should be examined periodically (at least annually) for replacement, deterioration, and container integrity.

Storage of chemicals on bench tops and in hoods shall be avoided.

Exposure to heat or direct sunlight shall be avoided.

Periodic inventories shall be conducted and unneeded items transferred to other users or to the CHO for disposal.

Chemicals shall not be stored with food or drink.

INVENTORY

LEGALLY HAZARDOUS CHEMICALS

A hazardous chemical inventory will be conducted annually in compliance with the Texas Hazard Communication Act. Each department will inventory chemicals on the Texas Hazard Communication Act Hazardous Chemical List. The Safety Office will compile the inventory and report it to the Texas Department of Health and the Fort Worth Fire Department as required by the act.

UNUSUALLY HAZARDOUS CHEMICALS

Each laboratory shall maintain an accurate inventory of unusually hazardous chemicals.

COMPLETE CHEMICAL INVENTORY

Each laboratory should also perform a complete chemical inventory to aid in training of personnel and to identify hazards from seldom used compounds. Such an inventory will also identify unused or out of date chemicals for transfer to the CHO and ultimate disposal.

ENVIRONMENTAL MONITORING

Environmental monitoring shall be conducted as required by state and federal standards.

In most situations at the health science center, chemical exposures should not approach established limits (Permissible Exposure Limits PELs and Threshold Limit Values TLVs). However, these limits must be observed, and personnel and area monitoring may be necessary to assure compliance. The laboratory supervisor or department head, with assistance from the CHO shall evaluate the need for and conduct monitoring when there is a possibility of routine exposure to regulated or highly toxic substances.

HOUSEKEEPING, MAINTENANCE AND INSPECTIONS

Good housekeeping, proper maintenance of safety equipment and routine inspections are critical to preventing and reducing chemical exposures. The following rules shall be observed.

HOUSEKEEPING

Chemical storage and use areas shall be kept clean and clear of clutter.

Chemical and water spills on floors and work surfaces shall be cleaned up as soon as possible.

Floors should be cleaned regularly.

Access to exits, emergency equipment, and utility controls shall never be blocked.

Isles and hallways shall not be obstructed.

Stairways shall not be used as storage areas.

MAINTENANCE

All laboratory equipment will be properly maintained with all safety features operable. Routine operating checks and preventive maintenance shall be performed as prescribed by the manufacturer.

Fume hoods and other special ventilation devices shall be tested annually and at the onset of work with very hazardous materials.

Eye wash fountains shall be inspected routinely.

Safety showers other safety equipment shall be tested routinely.

Procedures to prevent restarting of out-of-service equipment should be established.

Respirators for routine use should be inspected periodically by the laboratory supervisor. Respirators shall not be used in lieu of engineering controls.

INSPECTIONS

Formal housekeeping and chemical hygiene inspections shall be conducted annually and as need for special areas.

Informal inspections shall be continual.

MEDICAL PROGRAM

COMPLIANCE WITH OSHA REGULATIONS

This feature of an OSHA-compatible chemical hygiene program has not been implemented by the health science center.

QUALIFICATION FOR MEDICAL CARE

Not implemented.

APPOINTMENTS

Not implemented.

INFORMATION PROVIDED TO THE PHYSICIAN

Not implemented.

PHYSICIAN'S WRITTEN OPINION

Not implemented.

ROUTINE SURVEILLANCE

Not implemented.

FIRST AID

For serious injuries call Campus Police **ext. 2600** for assistance in obtaining medical aid.

Minor first aid is available from the health science center central clinic. There will be no charge for visits not requiring suturing, vaccinations or other chargeable procedures. (Charges for medical attention required because of an accident are generally covered by worker's compensation. Be sure to complete an accident report form.)

See **Emergency Information** for first aid procedures.

PROTECTIVE APPAREL AND EQUIPMENT

Protective apparel and equipment compatible with the required degree of protection for substances being handled shall be provided

The laboratory or unit supervisor shall evaluate the need for additional protective equipment and provide the equipment and training in its proper use. SDSs should be used in evaluating personal protection apparel and equipment for use with specific chemicals.

in each chemical use or storage area. Most areas will require as a minimum lab coats or aprons, gloves and goggles or face shields.

An eyewash fountain and a drench-type safety shower are available in the hallway on each level. Laboratory workers shall familiarize themselves with their location and use.

A fire extinguisher and telephone for emergency use shall also be provided for each chemical use or storage area.

Personal protective equipment shall be properly maintained in good working order. Routine maintenance schedules shall be instituted as necessary.

Routine use of respirators is not recommended. Exposures shall be limited by engineering controls, i.e. hoods and other devices, whenever possible.

RECORDS

Chemical exposure accident records shall be retained in written form by the Safety Office as part of the institutional accident record.

Medical records shall be retained by the Department of Public Health and Preventive Medicine in accordance with the requirements of state and federal regulations. The medical program has not been implemented by the health science center.

Training shall be documented and records retained by the Safety Office or the laboratory supervisor as appropriate.

Laboratory supervisors shall document that their facilities and precautions are compatible with current knowledge and regulations for unusually hazardous chemicals. Copies of that documentation shall be retained by the Safety Office as part of the chemical hygiene program.

Inventory and usage records shall be kept for unusually hazardous substances.

WARNING SIGNS AND LABELS

SIGNS

Permanent signs of the following types shall be posted as appropriate.

Entrances to areas where chemicals are used or stored will be marked with the NFPA symbol and no food and beverage signs.

A list of phone numbers of emergency personnel/facilities and supervisors shall be posted in each area.

Location signs will be posted for safety showers, eye wash stations, other safety and first aid equipment.

Warnings will be posted at areas or equipment where special or unusual hazards exist.

The Texas Hazard Communication Act Notice to Employees shall be posted as required.

CONTAINER LABELS

All chemical containers including primary and secondary containers, storage cabinets and waste receptacles shall bear permanent labels showing the identity of the contents and associated hazards.

Original labels shall not be removed or defaced.

Containers reused for other than their original contents must have the original labels removed or altered and shall be clearly relabeled such as to avoid any confusion as to the contents.

SPILLS AND ACCIDENTS

EMERGENCY PLAN

Emergency procedures are listed in the first part of this document under **Emergency Information**.

SPILL CONTROL

Prevention

Every effort shall be made to prevent spills.

Procedures listed in Section II, A are designed to prevent spills during receiving, distribution and storage and must be followed.

Containment

Contain spills as described in the **Emergency Information**

section.

Clean up

Wear appropriate personal protection apparel and equipment.

Clean up small spills as described in the **Emergency Information** section.

Contain large spills as well as possible and call the Campus Police **ext. 2600** or the Safety Office, **ext. 2697** for assistance.

Collect clean up materials and transfer to the CHO for proper disposal.

Reporting

Chemical spills must be reported as follows:

Spills which present a health or physical hazard shall be reported immediately to the Campus Police, **ext. 2600** and the Safety Office, **ext. 2697**.

Spills outside of a work area (in the hallway, elevator or outside) shall be reported immediately to the Campus Police and the Safety Office.

Spills of any amount of unusually hazardous chemicals shall be reported to the laboratory supervisor.

Spills which might present a health threat outside of the health science center or might reach surface water shall be reported by the Campus Police or the Safety Office to the National Response Center (1-800-424-8802) and the Texas Water Commission Emergency Response Center (1-512-463-7727). Other individuals at the health science center may not speak to these agencies on behalf of the institution.

ACCIDENT INVESTIGATIONS

Accidents or near accidents involving chemicals shall be investigated by the laboratory or unit supervisor and reviewed by the department head and the Safety Office as with all institutional accidents.

Near accidents involving chemicals shall be reported to the Safety Office on the standard accident report form.

The supervisor and CHO shall inform all who might benefit of the results of the investigation.

INFORMATION AND TRAINING PROGRAM

Information and training as outlined below shall be made available to assure that all individuals at risk of chemical exposure are adequately informed about the work in the laboratory, its risks, and what to do if an accident occur.

RESPONSIBILITIES

Laboratory and unit supervisors have the primary responsibility to ensure that their staff receive chemical hygiene training appropriate for their work areas.

HAZARD COMMUNICATION

All workers in chemical use areas shall be trained in accordance with the Texas Hazard Communication Act. This training shall include the following.

The provisions of the act.

The location of and how to read SDSs.

The physical and health hazards associated with chemicals in the work area.

CHEMICAL HYGIENE PROGRAM

All workers in chemical use areas and receiving personnel shall receive training on The University of North Texas Health Science Center Chemical Hygiene Program in accordance with the OSHA Laboratory Standard. This training shall include the following.

The provisions of the standard.

The University of North Texas Health Science Center Chemical Hygiene Program.

General procedures for handling chemicals and chemical wastes as outlined in the Chemical Hygiene Program.

Emergency procedures.

LABORATORY PROCEDURES

All workers in chemical use areas shall receive training emphasizing the chemical hygiene elements of all procedures specific to their work area including:

Chemical storage locations and policies,

Personal protection apparel and equipment location and use,

Emergency equipment location and use,

Small spill clean up, and

Wastes disposal procedures.

UNUSUAL HAZARDS

Personnel who work with unusually hazardous materials or in controlled areas where unusually hazardous materials are used must know the hazards involved with those materials and appropriate chemical hygiene procedures.

EMERGENCY RESPONSE

Further training in spill clean up and first aid should be made available to and encouraged for everyone who might need it.

FREQUENCY OF TRAINING

The training and education programs should be a regular continuing activity not simply an annual presentation.

ADDITIONAL INFORMATION

Supervisors shall make literature, in addition to SDSs, available to workers concerning unusually hazardous materials used in the laboratory.

Literature and consulting advice concerning chemical hygiene is available from the Safety Office and the Library. Laboratory personnel are encouraged to use these information resources.

WASTE DISPOSAL PROGRAM

The following waste disposal program shall be implemented to assure that minimal harm to people, other organisms, and the environment will result from the disposal of waste laboratory chemicals.

GENERAL PROCEDURE

Hazardous wastes shall be collected in individual laboratories and transferred to the CHO for holding and ultimate disposal. Laboratories may dispose of non-hazardous wastes by sink disposal. Laboratories may also recycle or chemically decontaminate wastes when appropriate with the approval of the CHO.

WASTE HANDLING IN THE LABORATORY

Laboratory supervisors and personnel shall use the following guidelines for handling hazardous wastes.

DISPOSAL PLANS

The laboratory supervisor shall evaluate and arrange with the CHO for disposal for each waste type generated.

Disposal arrangements shall be made with the CHO prior to the purchase and use of unusually hazardous materials.

Procedures for each laboratory operation shall include written procedures for waste disposal.

Procedures should be designed to minimize waste generation. See Appendix B for suggestions on minimizing hazardous wastes.

GENERAL RULES FOR DISPOSAL

Chemical wastes include spent solvents, reaction residues, instrument and chromatography waste streams, unused or outdated chemicals and solutions, contaminated disposables and spill cleanup materials. Disposal by chemical decontamination or recycling should be used when possible.

Chemicals shall not be indiscriminately disposed of by pouring down the drain or adding them to regular trash.

Hoods shall not be used as a means of disposal for volatile chemicals.

SINK DISPOSAL GUIDELINES

The following types of chemicals may be safely disposed of in the sink.

- Common buffer and salt solutions.
- Dilute, aqueous solutions of non-toxic reagents.
- Dilute acids and bases.

Concentrated, non-toxic reagents and small volumes of concentrated acids and bases should be diluted before sink disposal. Larger volumes of concentrated acids and bases should be diluted and neutralized before sink disposal.

Follow any waste disposed in the sink with copious amounts of water.

Do not discharge to the sewer any of the following.

- Concentrated acids or bases
- Organic solvents
- Heavy metals
- Highly toxic, malodorous, or lachrymatory substances
- Solids or non-water miscible fluids

Do not discharge to the sewer other substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage to lines or obstruct flow.

COLLECTION OF WASTES AND TRANSFER TO CHO

Chemical wastes which cannot be properly disposed within the individual laboratory shall be collected and transferred to the CHO.

Collect wastes in containers of an appropriate size and type for the waste. Original containers are recommended.

Leave unused or outdated chemicals, solutions of hazardous chemicals and unlabeled chemicals and solutions (i.e. contents are unknown) in their original containers. Do not open partially used containers.
Label and store containers appropriately.

DO NOT mix waste types without prior approval from the CHO.

Record the contents of the wastes as precisely as known.

Do not allow wastes to accumulate. Transfer wastes to the CHO at regular intervals as determined by the amounts used and the nature of the associated hazards.

Call the CHO to arrange for transfer of wastes.

WASTE HANDLING BY CHO

The CHO or a designate shall receive chemical wastes from individual laboratories, transport them to the chemical waste holding facility and prepare them for disposal by a licensed waste disposal vendor. The following procedures shall be observed.

Receipt and transportation to the waste holding facility

Chemicals will be removed from laboratories as soon as possible after notification of a required transfer.

A record of waste received shall be kept by the CHO.

Wastes shall be transported to the waste holding facility in secondary containers.

A hand cart shall be used except for small containers.

Service elevators shall be used to transport all wastes.

Holding of waste

Wastes located in the holding facility shall be segregated by type.

Wastes shall be in the original containers or transferred into containers approved by the waste disposal vendor for transport and disposal.

To protect the health science center's conditionally exempt small quantity waste generator status, accumulations of more than 1000 kg shall not occur.

Disposal

Waste shall be transferred from the chemical waste holding facility for disposal as often as practical.

All disposals must be in accordance with state and federal regulations. A licensed waste disposal vendor shall be used whenever necessary.

Transport of wastes from the health science center must be in accordance with DOT regulations.

SECTION 3

BASIC PROCEDURES FOR WORKING WITH CHEMICALS

A wide variety of chemicals are used at the health science center. It is beyond the scope of this document to detail procedures for each one. The following is a set of basic rules and procedures which, when followed, will prevent harmful exposure to most chemicals used at the health science center. Laboratory workers must know and follow these rules. However, these rules are NOT to be taken as complete. Specific procedures must be developed for working with any chemical which presents an unusual hazard.

GENERAL RULES

The following general rules shall be used for essentially all work with chemicals.

ACCIDENTS AND SPILLS

Follow procedures described in **Emergency Information**.

Report spills as detailed in Section 2 of the chemical hygiene program.

Promptly clean up all spills using appropriate protective apparel and equipment and proper disposal.

AVOIDANCE OF "ROUTINE" EXPOSURES

Develop and encourage safe habits.

Avoid unnecessary exposure to chemicals by any route.

Do not smell or taste chemicals.

Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices.

Inspect gloves and test glove boxes before use.

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

CHOICE OF CHEMICALS

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

Consider chemical hazards when designing procedures. Use the least hazardous or toxic chemicals possible.

EATING, SMOKING, ETC.

Do not eat, drink, or apply cosmetics in areas where laboratory chemicals are present.

Wash hands before conducting these activities.

Smoking is prohibited in all areas of all health science center buildings.

Do not store, handle or consume food or beverages in chemical use areas or storage areas or refrigerators.

Do not use glassware or utensils for food or beverages which are also used for laboratory operations.

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 chemical and fragments should implosion occur.

Use equipment only for its designed purpose.

EXITING

Wash areas of exposed skin well before leaving the laboratory.

HORSEPLAY

Do not engage in practical jokes or other behavior which might startle or distract another worker.

MOUTH SUCTION

Do not use mouth suction for pipetting or for starting a siphon.

PERSONAL APPAREL

Confine long hair and loose clothing.

Wear shoes at all times in the laboratory but do not wear sandals, perforated shoes or sneakers. Dresses and shorts are not proper laboratory attire.

HOUSEKEEPING

Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored.

Clean up the work area on completion of an operation or at the end of each day.

PERSONAL PROTECTION

Wear appropriate eye protection where chemicals are stored or handled.

Wear appropriate gloves when the potential for contact with toxic materials exists.

Inspect reusable gloves before each use, wash them before removal, and replace them periodically.

Use appropriate respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls. Inspect respirators before each use.

Use other protective apparel and equipment as appropriate.

Avoid wearing contact lenses in the laboratory. If they are worn, inform your supervisor of special precautions that can be taken.

Remove laboratory coats immediately on significant contamination.

PLANNING

Before beginning any new operation:

- Seek information and advice about hazards,

- Plan appropriate protective procedures,

- Plan positioning of equipment, and

- Make a “dry” run to evaluate planned procedures.

UNATTENDED OPERATIONS

Leave area lights on

Place an appropriate sign on the door

Provide for containment of toxic substances in the event of failure of a utility service (such as cooling water).

USE OF HOOD

Use a hood for operations which might result in release of toxic chemical vapors or dust. As a rule of thumb, use a hood or other local ventilation device when working with any appreciably volatile substance with a TLV of less than 50 ppm.

Confirm adequate hood performance before use.

Keep hood closed at all times except when adjustments within the hood are being made.

Keep materials stored in hoods to a minimum. Do not allow them to block vents or air flow.

Work in the back part of the hood to avoid blocking air flow.

Leave hoods and other local ventilation devices “on” when not in active use if toxic substances are stored in them or if it is uncertain whether adequate general laboratory ventilation will be maintained when they are “off”.

VIGILANCE

Be alert to unsafe conditions and see that they are corrected when detected.

WASTE DISPOSAL

Assure that the plan for each laboratory operation includes plans and training for waste disposal.

Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the Chemical Hygiene Program.

In general do not discharge to the sewer concentrated acids or bases, highly toxic, malodorous, or lachrymatory substances or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow.

WORKING ALONE

Avoid working alone in a building.

Do not work alone in a laboratory if the procedures being conducted are hazardous.

If you must work alone after hours, notify your supervisor and contact the Campus Police so that someone may check on you periodically.

ENDING EMPLOYMENT

Before a worker’s employment in the laboratory ends, chemicals for which that person was responsible should be discarded or returned to storage.

ALLERGENS AND EMBRYOTOXINS

In addition to the general procedures listed above, additional precautions must be taken when working with allergens and embryo toxins.

PERSONAL PROTECTION

Use personal protection apparel and equipment to prevent exposure.

Allergens (examples: diazomethane, isocyanates, dichromate's):

Wear suitable gloves to prevent hand contact with allergens or substances of unknown allergenic activity.

Embryo toxins (examples: organomercurials, lead compounds, formamide): Woman of child bearing age: handle these substances only in a hood with confirmed satisfactory performance, using appropriate protective apparel, especially gloves, to prevent skin contact.

REVIEW

Review use of these materials with the research supervisor, and review continuing uses annually or whenever a procedural change is made.

STORAGE

Store these substances, properly labeled, in an adequately ventilated area in an unbreakable secondary container.

EXPOSURES AND SPILLS

Notify supervisors of all incidents of exposure or spills and consult a qualified physician when appropriate.

CHEMICALS OF MODERATE CHRONIC OR HIGH ACUTE TOXICITY

In addition to the general procedures listed above all reasonable precautions must be taken to minimize exposure to these toxic substances by any route. The following precautions are appropriate for substances with moderate chronic or high acute toxicity used in significant quantities. Examples: diisopropylfluorophosphate, hydrofluoric acid, hydrogen cyanide.

LOCATION

Use and store these substances only in restricted access areas with special warning signs.

Always use a hood (previously evaluated to confirm adequate performance with a face velocity of at least 60 linear feet per minute) or other containment device for procedures which may result in the generation of aerosols or vapors containing the substance. Trap released vapors to prevent their discharge with the hood exhaust.

PERSONAL PROTECTION

Always avoid skin contact using gloves, long sleeves and other protective apparel as appropriate.

Always wash hands and arms immediately after working with these

materials.

RECORDS

Maintain records of the amounts of these materials on hand, amounts used and the names of the workers involved.

PREVENTION OF ACCIDENTS AND SPILLS

Be prepared for accidents and spills.

Assure that at least two people are present at all times if a compound in use is highly toxic or of unknown toxicity.

Store breakable containers of these substances in chemically resistant trays.

Work and mount apparatus above chemically resistant trays or cover work and storage surfaces with absorbent, plastic backed paper.

If a major spill occurs outside the hood, evacuate the area. Assure that clean-up personnel wear suitable protective apparel and equipment.

WASTE DISPOSAL

Decontaminate by chemical conversion if possible.

Store contaminated waste in closed, suitably labeled, impervious containers (for liquids, use glass or plastic bottles half-filled with vermiculite).

Thoroughly decontaminate or properly dispose of contaminated clothing or shoes.

Transfer wastes to CHO for proper disposal.

CHEMICALS OF HIGH CHRONIC TOXICITY

Further supplemental rules must be followed, in addition to all those mentioned above, for work with substances of known high chronic toxicity in quantities above a few milligrams to a few grams, depending on the substance. *Examples: dimethylmercury and nickel carbonyl, benzo-a-pyrene, N-nitrosodiethylamine, other human carcinogens or substances with high carcinogenic potency in animals.*

ACCESS

Conduct all transfers and work with these substances in a “controlled area”: a restricted access hood, glove box, or portion of a laboratory, designated for use of highly toxic substances, for which all people with access are aware of the substances being used and necessary precautions.

APPROVALS

Prepare a plan for use and disposal of these materials and obtain the approval of the laboratory supervisor.

NON-CONTAMINATION/DECONTAMINATION

Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood.

Decontaminate vacuum pumps or other contaminated equipment, including: Glassware, in the hood before removing them from the controlled area.

Decontaminate the controlled area before normal work is resumed there.

EXITING

On leaving a controlled area, remove any protective apparel (placing it in an appropriate, labeled container) and thoroughly wash hands, forearms, face, and neck.

HOUSEKEEPING

Use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance was a dry powder.

MEDICAL SURVEILLANCE

If using toxicologically significant quantities of such a substance on a regular basis (e.g., 3 times per week), consult a qualified personal physician concerning desirability of regular medical surveillance.

RECORDS

Keep accurate records of the amounts of these substances stored and used, the dates of use, and names of users.

SIGNS AND LABELS

Assure that the controlled area is conspicuously marked with warning and restricted access signs and that all containers of these substances are appropriately labeled with identity and warning labels.

SPILLS

Assure that contingency plans, equipment, and materials to minimize exposures of people and property in case of an accident are available.

STORAGE

Store containers of these chemicals only in a ventilated, limited access area in appropriately labeled, unbreakable, chemically resistant, secondary containers.

GLOVE BOXES

For a negative pressure glove box, ventilation rate must be at least 2 volume changes/hour and pressure at least 0.5 inches of water. For a positive pressure glove

box, thoroughly check for leaks before each use. In either case, trap the exit gases or filter them through a HEPA filter and then release them into the hood.

WASTE DISPOSAL

Use chemical decontamination whenever possible.

Transfer containers of contaminated waste (including washings from contaminated flasks) from the controlled areas in a secondary container under the supervision of the CHO.

CHEMICALS OF HIGH CHRONIC TOXICITY IN ANIMALS

The following supplemental rules must be followed for work involving administration of substances of known high chronic toxicity to animals.

ACCESS

All animals must be housed in the animal care facility to allow for control of access.

ADMINISTRATION OF A TOXIC SUBSTANCE

When possible, administer the substance by injection or lavage instead of in the diet.

If administration is in the diet, cage the animals under negative pressure or under laminar air flow directed toward HEPA filters.

AEROSOL SUPPRESSION

To minimize formation and dispersal of contaminated aerosols, including those from food, urine, and feces:

- (a) Use HEPA filtered vacuum equipment for cleaning,
- (b) Moisten contaminated bedding before removal from the cage and
- (c) Mix diets in closed containers in a hood.

PERSONAL PROTECTION

When working in the animal room, wear plastic or rubber gloves, fully buttoned laboratory coat or jumpsuit and, if needed because of incomplete suppression of aerosols, other apparel and equipment (shoe and head coverings, respirator).

WASTE DISPOSAL

Prior arrangements must be made with the CHO for disposal of contaminated animal tissues and excreta. Disposal will conform to State and Federal regulations.

SAFETY DATA SHEETS

LOCATION

Safety Data Sheets (SDSs) for chemicals purchased since 1987 are available for review in the Safety Office and in each department.

SDSs for other common chemicals are also available in the Safety Office.

SDSs not on file can be obtained by contacting the chemical supplier.

MAINTENANCE OF SDS

SDSs received from suppliers are used to update the Safety Office files if necessary.

Copies are forwarded to the extra duty safety officer of the department which placed the order for updating the departmental files.

SECTION 4

SAFETY RECOMMENDATIONS

The procedures given in preceding sections of this chapter are directed primarily toward prevention of toxic exposure rather than physical injury. However, failure to take proper precautions to avoid injury will often have the secondary effect of causing toxic exposures. Therefore, the following procedures concern some of the major categories of safety hazards which also have implications for chemical hygiene.

CORROSIVE AGENTS

Corrosive chemicals include strong acids and bases, dehydrating agents, and oxidizing agents.

Always use corrosives with adequate ventilation. Inhalation of vapors or mists of these substances can erode the respiratory epithelium causing severe irritation.

Wear appropriate skin and eye protection. These chemicals erode the skin and are particularly damaging to the eyes.

If exposures occur, the affected areas should be washed at once with copious quantities of water. An ophthalmologist should evaluate the need for further treatment after eye exposures.

Mix corrosives with water by adding the agent to water to avoid violent reaction and spattering.

Mix corrosives with water very slowly to slow the evolution of heat.

Avoid contact of strong oxidizing agents with organic compounds because of explosion hazards.

Strong oxidizing agents should be stored and used in glass or other inert containers (preferably unbreakable). Corks and rubber stoppers should not be used.

ELECTRICALLY POWERED APPARATUS

GENERAL

Specific power requirements should be met for each piece of equipment.

Use of extension cords and plug strips should be minimized.

Plugs and cords should be inspected for wear and fraying.

Motor driven equipment used in areas with volatile flammable materials should be equipped with non-sparking, induction motors.

The speed of induction motors should never be controlled with variable autotransformers. This will cause the motor to overheat.

Take action to eliminate the danger of fires when equipment with spark producing motors such as hand drills and vacuum cleaners are brought into laboratory areas for special purposes.

Adjustments and repairs to electrically powered apparatus should be conducted with the power off and the apparatus unplugged whenever possible. Remember that capacitors may remain charged and present a shock hazard even after being removed from the power source.

VACUUM PUMPS

Vacuum distillations or concentrations involving significant quantities of volatile substances should be performed using water aspirators.

When mechanical vacuum pumps are used with volatile substances, the input to the pump should be fitted with a cold trap to minimize contamination of the pump oil. The use of liquid air or liquid nitrogen in such traps can lead to flammability hazards as described below.

Kjeldahl traps should be used when there is a possibility of contamination of the pump with mercury.

HEPA filters should be used to prevent pump contamination with toxic substances.

Pump exhaust should be vented to an air exhaust system especially when used to evacuate systems containing toxic volatile or corrosive substances. In such cases it may also be necessary to scrub or absorb vapors in the pump exhaust.

Change pump oil regularly to minimize discharge of accumulated toxic substances.

Do not remove belt guards from belt-driven vacuum pumps.

DRYING OVENS

Do not use electrically heated drying ovens to dry chemicals of even moderate volatility or toxicity, including most organic compounds, unless precautions have been taken to vent the oven to prevent contamination of laboratory air.

Do not dry glassware that has been rinsed with an organic solvent. When such rinsing is necessary rinse the glassware again in distilled water before drying in an oven.

Ovens should be constructed or modified so that heating elements and temperature controls are isolated from the interior of the oven. Ovens not meeting these requirements should be clearly labeled “Not for use with flammable materials”, and that warning should be observed.

Mercury thermometers should not be mounted through holes in the top of the oven so that the bulb hangs into the oven. Bimetallic strip thermometers are preferred for use in ovens. If mercury is spilled in an oven, turn it off, and remove all the mercury from the cold oven.

REFRIGERATORS

Potentially explosive or highly toxic substances should not be stored in laboratory refrigerators. If this is necessary, the contents of the refrigerator should be clearly labeled on the outside and sealed secondary containers should be used.

Volatile substances should only be stored in refrigerators rated for flammable storage.

Uncapped containers of chemicals and solutions should never be placed in a refrigerator. Caps should provide a vapor tight seal which will also not allow spilling if the container is tipped over. Corks, glass stoppers, foil and Parafilm are generally not satisfactory.

Chemical stocks stored in refrigerators should be in sealed secondary containers.

Avoid placing your head inside the refrigerator while searching through its contents.

STIRRING AND MIXING DEVICES

These devices include stirring motors, magnetic stirrers, shakers, small fluid pumps and rotary evaporators.

When used with flammables and in special environments such as a hood, these devices should be equipped with induction motors and spark free switches and

controls. (Most devices currently on the market have induction motors but many lack spark free controls especially magnetic stirrers and rotary evaporators.)

Devices that are to be left unattended should be fitted with fuses and thermal-protection devices.

The consequences of device failure, container failure, electrical overload or physical blockage of stirrers should be considered when devices are left unattended.

HEATING DEVICES

These devices include hot plates, heating mantles and tapes, heating baths and heat guns.

All heating devices used with or near flammable substances should have enclosed heating elements and spark free switches and controls.

Heat guns have exposed elements and should not be used near flammable substances.

Heating devices should be equipped with protection from overheating especially if they are to be left unattended.

Autotransformers used with heating mantles and tapes or immersion heaters should be wired with double pole switches and grounded input plug and output receptacle to avoid shock hazards.

Heating mantles and tapes or immersion heaters should be equipped with a male connector to fit a female receptacle from the autotransformer output line. They should never be connected using alligator clips nor should they be connected directly to line current. The voltage applied to these devices should never exceed the manufacturer's recommendations.

ELECTROPHORESIS POWER SUPPLIES

Electrophoresis power supplies are capable of delivering lethal shocks. The following precautions should be taken when using these devices.

Be sure power supplies are properly grounded. Do not defeat the grounding plugs.

Do not ground either of the electrical outlet leads of a power supply. Negative leads are just as dangerous as the positive leads.

Use only heavily insulated leads or wires and electrical connectors. Do not use

Alligator clips.

Be sure that connectors are fully inserted and tightly fitting.

Always use all safety interlock devices provided on electrophoresis equipment.

Be very cautious when working around high voltage equipment. It is a good practice to work with only one hand, and keep the other hand out of the way. Do not let any other part of the body come close to any conducting object.

Turn high voltage off and wait 60 seconds before touching any of the electrical leads. Do not just turn down the variable adjustment control.

Always be sure that the high voltage power is off and that the output adjust knob is on ZERO before connecting or disconnecting an electrophoresis cell to a power supply.

Always turn the high voltage off, wait 60 seconds and disconnect the leads before opening an electrophoresis cell.

Always disconnect electrophoresis cells from the power supply when not in use.

Do not turn the high voltage on when an electrophoresis cell is not connected to a power supply.

Never place any liquid container (including electrophoresis cells) on top of a power supply.

Never operate a power supply known to be faulty or damaged.

Never open the power supply cabinet. No user serviceable parts are contained inside power supplies.

FLAMMABLES AND EXPLOSIVES

Basic precautions for safe handling flammable and explosive materials include the following.

FLAMMABLE LIQUIDS

Exercise particular care with liquids that have flash points at or below room temperature. Commonly used liquids which are potentially very hazardous, even under relatively cool conditions, include acetaldehyde, acetone, benzene, carbon disulfide, cyclohexane, diethyl ether, ethyl alcohol, n-heptane, n-hexane, isopropyl alcohol, methyl alcohol, methyl ethyl ketone, pentane, styrene, toluene and p-xylene. Appendix C lists

flash points for common liquids used in laboratories.

Flammable substances should be handled only in areas free of ignition sources. Because spillage is always a possibility, strict control of ignition sources is mandatory where flammable liquids are used or stored. Sources that can cause ignition of flammable substances include electrical equipment, open flames, static electricity, burning tobacco, lighted matches, and hot surfaces. Close attention should be given to all potential sources of ignition in the vicinity. Remember that the vapors of all flammable liquids are heavier than air and capable of traveling considerable distances. Special note should be taken of ignition sources at a lower level than that at which the substance is being used.

Flammable substances should never be heated by using an open flame.

Preferred heat sources include steam baths, water baths, oil baths, heating mantles, and hot air baths.

When transferring flammable liquids static-generated sparks should be avoided by the use of ground straps. When metal containers are used, bond to the container. When nonmetallic containers (especially plastic) are used, the bonding can be made to the liquid rather than to the container. When grounding is not possible, all processes should be carried out as slowly as possible to give the accumulated charge time to disperse.

Use an exhaust hood whenever appreciable quantities of flammable substances are transferred from one container to another, allowed to stand in open containers, heated in open containers, or handled in any other ways.

FLAMMABLE OR EXPLOSIVE GASES AND LIQUEFIED GASES

Keep ignition sources away from cylinders of flammable gases and liquefied gases. Leakage or escape of flammable or explosive gases can produce an explosive atmosphere in the laboratory. Acetylene, hydrogen, ammonia, hydrogen sulfide, liquid oxygen and carbon monoxide are especially hazardous.

Keep connectors and regulators tight, and keep hoses in good condition to prevent leaks.

Regulators, hoses and other appliances used with flammable gases should not be interchanged with similar equipment intended for use with nonflammable gases.

Use caution when evaporating liquid nitrogen or liquid air. Liquid nitrogen will trap oxygen from the air. This oxygen and that in liquid air will concentrate upon evaporation resulting in potentially explosive concentrations of liquid oxygen.

DUSTS

Exercise care in handling oxidizable particles (such as magnesium powder, zinc dust, flowers of sulfur or powdered charcoal) to avoid exposure to ignition sources. Use a hood whenever possible.

REACTIVE CHEMICALS

Use caution when mixing even common laboratory chemicals unless the expected result is known. Appendix F lists common chemicals known to cause explosions when mixed, incompatible chemicals, and chemicals which react with water and air.

ORGANIC PEROXIDES

Organic peroxides are a special class of compounds that have unusual stability problems that make them among the most hazardous substances normally handled in laboratories. These compounds are sensitive to heat, friction, impact, and light, as well as to strong oxidizing and reducing agents and are highly flammable.

SPECIFIC CHEMICALS WHICH FORM PEROXIDES

Some specific chemicals that can form dangerous concentrations of peroxides on long exposure to air are cyclohexene, cyclooctene, decalin (decahydronaphthalene), p-dioxane, diethyl ether, diisopropyl ether, tetrahydrofuran (THF), and tetralin (tetrahydronaphthalene).

TYPES OF COMPOUNDS KNOWN TO FORM PEROXIDES

Aldehydes.

Ethers, especially cyclic ethers and those containing primary and secondary alcohol groups, form dangerously explosive peroxides on exposure to air and light.

Compounds containing benzylic hydrogen atoms especially if the hydrogens are on tertiary carbon atoms [e.g., cumene (isopropyl benzene)].

Compounds containing the allylic ($\text{CH}_2=\text{CHCH}_2\text{R}$) structure, including most alkenes.

Vinyl and vinylidene compounds, (e.g., vinyl acetate and vinylidene chloride).

PRECAUTIONS FOR HANDLING PEROXIDES

The quantity of peroxide should be limited to the minimum amount required. Unused peroxides should not be returned to the container.

All spills should be cleaned up immediately. Solutions of peroxides can be absorbed on vermiculite.

The sensitivity of most peroxides to shock and heat can be reduced by dilution with inert solvents, such as aliphatic hydrocarbons. However, toluene is known to induce the decomposition of diacyl peroxides.

Solutions of peroxides in volatile solvents should not be used under conditions in which the solvent might be vaporized because this will increase the peroxide concentration in the solution.

Metal spatulas should not be used to handle peroxides because contamination by metals can lead to explosive decomposition. Ceramic or wooden spatulas may be used.

Smoking, open flames, and other sources of heat shall not be permitted near peroxides.

Friction, grinding, and all forms of impact should be avoided near peroxides (especially solid ones). Glass containers that have screw-cap lids or glass stoppers should not be used. Polyethylene bottles that have screw-cap lids may be used.

To minimize the rate of decomposition, peroxides should be stored at the lowest possible temperature consistent with their solubility or freezing point. Liquid or solutions of peroxides should not be stored at or lower than the temperature at which the peroxide freezes or precipitates because peroxides in these forms are extremely sensitive to shock and heat.

DISPOSAL OF PEROXIDES

Pure peroxides should never be disposed of directly.

Small quantities (25 grams or less) of peroxides are generally disposed of by dilution with water to a concentration of 2% or less and then transfer of the solution to a polyethylene bottle containing an aqueous solution of a reducing agent, such as ferrous sulfate or sodium bisulfite. The material can then be handled like any other waste chemical; however, it must not be mixed with other chemicals for disposal.

Spilled peroxides should be absorbed on vermiculite as quickly as possible. The vermiculite-peroxide mixture can be burned directly or may be stirred with a suitable solvent to form a slurry that can be treated as described above.

Organic peroxides should never be flushed down the drain.

Large quantities (more than 25 grams) of peroxides require special

handling. Each case should be considered separately, and handling, storage, and disposal procedures should be determined by the physical and chemical properties of the particular peroxide.

EXPLOSIVE CHEMICALS

In general, compounds containing the following functional groups tend to be sensitive to heat and shock: acetylide, azide, diazo, halamine, nitroso, ozonide and peroxide. [e.g., diazomethane may decompose explosively when exposed to a ground glass joint].

Compounds containing nitro groups may be highly reactive, especially if other substituents such as halogens are present.

Perchlorates, chlorates, nitrates, bromates, chlorites, and iodates, whether organic or inorganic, should be treated with respect, especially at higher temperatures.

Explosive materials should be used only as required and then in the smallest quantities adequate for the experiment being conducted.

Explosives should be segregated from other materials that could create a serious hazard to life or property should an accident occur.

The handling of highly energetic substances without injury demands attention to the minutest detail. The unusual nature of work involving such substances requires special safety measures and handling techniques that must be thoroughly understood and followed by all persons involved. Refer to Prudent Practices for Handling Hazardous Chemicals for more detailed procedures.

LOW TEMPERATURE PROCEDURES

Wear eye protection and suitable gloves or mitts when handling cryogenic liquids, dry ice or cold baths. Wear gloves when working in low temperature freezers.

Always work in a well ventilated area.

Avoid working with cryogenic liquids in enclosed systems to prevent explosions due to pressure increases.

Use caution when evaporating liquid nitrogen or liquid air. Liquid nitrogen will condense oxygen from the air. The oxygen in it and that in liquid air will concentrate upon evaporation resulting in potentially explosive concentrations of liquid oxygen.

Shield Dewar flasks by wrapping in friction tape or enclosing in a wooden or metal container.

PRESSURIZED AND VACUUM OPERATIONS

All pressure and vacuum systems should be equipped with pressure relief devices with appropriate operating pressure to prevent explosion or implosion of the system.

Pressure relief devices and vacuum pumps that may discharge hazardous or noxious materials should be vented safely.

Glassware and plastics should be avoided in pressurized and vacuum operations.

When they are used appropriate shielding is necessary to protect workers from flying glass.

Shield glass vacuum systems which employ water aspirators. The pressure differential is almost as great as in high vacuum systems.

Use liquid seal, Bunsen tube or equivalent positive pressure relief devices to protect glass systems. Corks, stoppers and plastic tubing should not be used.

New or repaired glass should be examined for flaws before use.

Use all brass fittings with copper or brass tubing and stainless steel fittings with steel or stainless steel tubing.

Vacuum distillations or concentrations involving significant quantities of volatile substances should be performed using water aspirators instead of mechanical. See Electrical Equipment, Vacuum Pumps above for more information.

COMPRESSED GASES

Compressed gases can present fire, explosion, toxicity, asphyxiation, and pressure hazards. Know the hazards associated with the particular gases used.

Handle all compressed gases and compressed gases systems with care.

Clearly label all gas cylinders and supply lines.

Secure gas cylinders at all times with chains, belts or floor stands.

Use standard CGA fittings to prevent undesirable mixing of gases.

Cylinder valves should be accessible at all times.

Cylinder valves should be opened slowly, only as far as necessary and should be closed when the gas is not in use.

Cylinder valves should never be opened on an unregulated cylinder.

Use soapy water to leak test systems. Never use open flames to leak test flammable gases.

Keep sparks and flames away from cylinders of flammable gases.

PART 3

CHAPTER 3

BIOLOGICAL SAFETY

GENERAL

Persons who work with microorganisms need to be aware of the precautions to be taken to ensure worker health and safety and to protect the health science center environment from unregulated release of organisms and recombinant DNA molecules. The health science center is the recipient of federal grants for research involving microorganisms and recombinant DNA molecules. As a recipient of such funding, the health science center is required to observe certain standards of practice involving microorganisms and recombinant DNA.

The complexity of the *National Institutes of Health Guidelines for Research Involving Recombinant DNA Molecules* does not allow for a full description of the guidelines in this safety manual. Persons should review their responsibilities as outlined by the National Institutes of Health. Please refer to the Guidelines as amended and seek the guidance of the Institutional Biosafety Committee when conducting recombinant DNA research. Current guidelines are published on the NIH web server.

Persons who work with tissues and body fluids of human and non-human primate origin should refer to the Blood-borne Pathogens Exposure Control section of the safety manual and the Infection Control Manual for specific requirements and procedures. **Standard** Precautions as recommended by the Centers for Disease Control are to be followed for all patients and for all samples involving tissues and body fluids.

STANDARDS AND GUIDELINES

Persons working with microorganisms must observe standard practices as outlined in the **latest** edition of *Biosafety in Microbiological and Biomedical Laboratories*, published by the Centers for Disease Control and by the National Institutes of Health. Copies of this document can be obtained by writing to: Superintendent of Documents, U.S. Government Printing Office, and Washington, D.C. A reference copy is kept in the Research Office and in the Safety Office for reference. This publication is also posted in electronic format and is easily searched and printed. Check the Safety Office web server for an electronic copy of **or link to** this book. Supervisors, laboratory directors and principal investigators are responsible for adherence to the standards as published in this document.

Persons working with recombinant DNA must observe the *National Institutes of Health Guidelines for Research Involving Recombinant DNA Molecules*. The Guidelines must be observed for all funded NIH-sponsored projects and for projects that are not funded by NIH. Copies of these Guidelines are kept in the Research Office and by the Chairman of the Institutional Biosafety Committee (IBC). These guidelines are published on the NIH web site.

Persons working with tissues and samples of human or non-human primate origin must adhere to the provisions of the Blood-borne Pathogens Exposure Control program as outlined in the Infection Control Manual. A copy of the Infection Control Manual can be obtained from the Infection Control Coordinator in the Department of Quality and Patient Safety.

LABORATORY BIOSAFETY LEVEL CRITERIA

The CDC/NIH publication *Biosafety in Microbiological and Biomedical Laboratories*, **latest edition**, defines the roles and responsibilities of principal investigators and laboratory directors for ensuring that the appropriate biosafety level is utilized for the microorganisms present. Biosafety levels refer to the physical arrangement of facilities and the work practices to be employed to minimize the release of microorganisms. Laboratory directors and principal investigators shall refer to *Biosafety in Microbiological and Biomedical Laboratories*, **latest edition**, and to the *National Institutes of Health Guidelines for Research Involving Recombinant DNA Molecules* when determining the appropriate biosafety level for the work conducted. A listing of organisms and recombinant DNA host-vector systems by biosafety level is beyond the scope of this manual.

BIOSAFETY RESPONSIBILITIES FOR RECOMBINANT DNA

RESPONSIBILITIES OF THE INSTITUTIONAL BIOSAFETY COMMITTEE

The Institutional Biosafety Committee (IBC) is specifically charged with overseeing work at the health science center involving recombinant DNA molecules. Although the committee may consider other matters pertinent to this area, the health science center Infection Control Committee has purview in the area of infectious diseases not involving recombinant molecules that may be transmitted to humans, including, but not limited to blood-borne pathogens.

The committee is composed of at least 5 members from the health science center, including at least one member from each department that conducts recombinant DNA research. The composition shall be such that collectively the committee has the experience and expertise in DNA technology and the capability to assess the safety of

recombinant DNA research experiments and any potential risk to public health or the environment. The committee shall have two members appointed from outside the health science center. The composition and activities of the committee are subject to the requirement of the *National Institutes of Health Guidelines for Research Involving Recombinant DNA Molecules*.

PART 3

CHAPTER 4

RADIATION SAFETY

RADIATION SAFETY COMMITTEE

Policies and procedures governing the procurement, use and disposal of radioactive materials and the use of X-ray and laser devices are developed by the health science center Radiation Safety Committee. This committee is a free standing faculty committee with the Radiation Safety Officer as an ex officio member.

RADIOACTIVE MATERIALS LICENSE

The health science center holds a specific radioactive materials license from the Texas Department of Health, Bureau of Radiation Control for in vitro testing and the use of gas chromatographs containing Ni-63 electron capture detectors. All personnel shall abide by the terms of this license and the policies and procedures as stated in the institution's Radiation Safety Manual.

X-RAY REGISTRATION

All X-ray producing equipment is registered with the Texas Department of Health, Bureau of Radiation Control. Procurement, transfer or sale of such equipment must be approved in advance by the Radiation Safety Officer. Departments desiring to establish new diagnostic X-ray facilities must consult the Radiation Safety Officer before such facilities are constructed or equipment purchased.

LASER REGISTRATION

The institution registers all medical and research lasers with the Texas Department of Health, Bureau of Radiation Control. Contact the Radiation Safety Officer, ext. 2697 before you procure, use, transfer or sell lasers. Laser pointers and laser copiers are exempt from registration requirements.

RADIATION SAFETY MANUAL

A separate manual covering all aspects of the radiation safety program is available to faculty who are authorized users of radioactive materials and to physicians who supervise diagnostic X-ray facilities. The details of this program are not reproduced in

this safety manual.

RADIATION SAFETY OFFICER (RSO)

The day to day administration of the radiation safety program is delegated to the RSO. To contact the RSO, call the Safety Office, ext. 2697.

AUTHORIZATION TO USE RADIATION

Faculty who wish to use radioactive materials, x-ray devices or laser must obtain authorization from the Radiation Safety Committee. Please call the Safety Office, ext. 2697 and speak to the Radiation Safety Officer.

PROCUREMENT OF RADIOACTIVE MATERIALS

Only authorized users listed on the radioactive materials license may purchase radioactive materials. All purchases must be reviewed and approved in advance by the Radiation Safety Officer. Purchase requisitions require specific wording to identify the purchase as one of radioactive material, as described in the Radiation Safety Manual.

If an authorized user wishes to purchase materials to be shipped directly from the vendor to another institution, the authorized user must arrange such purchases through the Radiation Safety Officer. The name and phone number of the receiving institution's radiation safety officer will be required.

TRANSFER OF RADIOACTIVE MATERIAL

Faculty who wish to transfer isotopes to or from the health science center must do so through the Radiation Safety Officer. Call the Safety Office, ext. 2697 to make such transfers.

DISPOSAL OF RADIOACTIVE MATERIALS

The Safety Office offers a waste pick-up service for radioactive wastes. Call the Safety Office at ext. 2697. Such waste is segregated from all other wastes and tagged with the international radiation symbol and the words radioactive material. Authorized users and laboratory personnel may not dispose of radioactive materials except as provided for in the Radiation Safety Manual.

RADIATION SAFETY TRAINING

Please refer to the Radiation Safety Manual for duties of authorized users and the radiation safety officer regarding training. The Safety Office has a self-paced, web-based radiation safety training program and open book quiz. Persons who work in laboratories where radioactive materials are used and stored should complete the quiz and place a copy

of the certificate into the radiation note book for inspections. The web-based training can be found at:

<http://safety.hsc.unt.edu/office/rad/rad.html>

PART 3

CHAPTER 5

CONSTRUCTION STANDARDS

SAFETY REVIEW OF CONSTRUCTION AND RENOVATION PROJECTS

RESPONSIBILITIES OF DEPARTMENT HEADS

Department heads shall provide a full description of how renovated and new space is to be used prior to final approval of the plans for construction. To avoid delays and cost overruns, the safety consultation should occur very early in the planning phase. A memo or checklist shall be used to describe the space use, according to the procedures of unit responsible for construction and renovation.

Department heads may use this section of the safety manual as a guide when describing how space will be used. Turn to the heading that describes the space needed and refer to the headings as a guide in describing space requirements.

RESPONSIBILITIES OF THE CONSTRUCTION/RENOVATION FUNCTION

The institution's construction and renovation function shall be responsible for calling upon the Safety Office for a safety consultation on all renovation and new construction projects.

This unit shall serve as the "general contractor". It shall bring together the department head, the construction function and the Safety Office to facilitate the exchange of information related to safety in a timely manner. Safety planning is an early step in a construction/renovation project. The project shall be reviewed again prior to bidding of the project or start of work, whichever is the earlier event.

RESPONSIBILITIES OF THE SAFETY OFFICE

The Safety Office shall be responsible for providing a safety consultation to department heads and the renovation function in a timely manner. The review will depend in large part on the availability of information regarding the anticipated use of the renovated space or new construction.

The consultation shall include a review of occupancy classification, means of egress, fire protection, ventilation and special hazards considerations. This review shall include the

potential impact, if any, on operations located nearby.

RESPONSIBILITIES OF QUALITY MANAGEMENT

The Office Quality Management shall be responsible for providing a consultation to department heads and the renovation function in a timely manner with regard to Joint Commission on Accreditation of Health Care Organizations requirements. This review will depend in large part on the availability of information regarding the anticipated use of the renovated space or new construction.

CONSTRUCTION STANDARDS

LIFE SAFETY CODE

Project design incorporates the Uniform Building Code and the Life Safety Code as appropriate and will comply with the Elimination of Architectural Barriers Act, Article 9102, Texas Civil Statutes as outlined in UNT System Policy 8.4.5.

As described below, all laboratories shall be constructed as if each laboratory was classified as a type A, high hazard area, with regard to the use of flammable and combustible liquids. Although construction is specified for a class A laboratory, work practices shall be instituted to maintain class C ratings. Class B ratings are strongly discouraged. No research area may have flammable materials in quantities that result in a type A rating. This extra measure of protection takes into account additional hazards such as compressed gasses and cryogenic materials that may also be present in research and clinical laboratories.

Ambulatory health care clinics shall be considered to be business occupancies unless the location also administers general anesthesia, in which case it shall be considered a health care occupancy.

Office areas are considered to be business occupancies of normal hazard.

NATIONAL BUILDING STANDARDS

All new construction and all renovation projects shall conform to standards of good building practice acceptable to the state of Texas.

NATIONAL ELECTRICAL CODE

All electrical service shall be installed and maintained in compliance with the National Electrical Code Handbook.

AMERICANS WITH DISABILITIES ACT COMPLIANCE

All new construction and renovation projects shall meet the accessibility requirements of the Americans with Disabilities Act.

CONSTRUCTION STANDARDS FOR RESEARCH LABORATORIES

WORKING DEFINITION OF A LABORATORY

For the purposes of this manual an area which has one or more of the following characteristics shall be considered a laboratory:

- An area where biomedical research is conducted;
- An area where work with radioactive materials is conducted;
- An area where work with microorganisms is conducted;
- An area where laboratory animals are used for experimental or diagnostic purposes;
- An area where compressed gasses are used in conjunction with or in support of one of the above activities;
- An area where cryogenic liquids and solids are used in conjunction with or support of activities listed above;
- An area where human subjects research is conducted and one or more of the above characterizes the area;
- An area where instruction takes place that utilizes microorganisms, legally hazardous chemicals, radioactive materials or laboratory animals.

LIFE SAFETY CODE AND CHEMICAL USE

All research laboratories shall be considered as having such hazardous materials present. Work practices shall be instituted to keep the classification of the laboratory at the C or B rating. Because compressed gasses and cryogenic materials may also be present and because some research buildings also contain conference and clinical areas, all construction of research laboratories shall be suitable for class A laboratories. This affords an extra degree of protection to building occupants.

All laboratories shall have at least 1 hour walls on four sides which are slab to slab. Penetrations in these fire and smoke barriers shall be sealed to prevent the spread of smoke.

VENTILATION

Research laboratories require on average 6 to 12 air changes per hour. Air exchange rates shall not be used as the primary respiratory protection method when volatile, hazardous or infectious agents are present. Supply air shall be delivered in such a way as to minimize turbulence. All return air from laboratories shall be completely exhausted to the building exterior at the roof. No return air from laboratories shall be recirculated to other areas of a building. All research laboratories shall be under negative pressure.

Building designs shall separate air intakes and air exhaust so as to minimize to the greatest extent possible, the re-introduction of exhaust air into the building. On a practical basis, air intakes should be below air exhaust. In single story buildings, air intakes should be located near the ground level and exhaust on the roof. For multistory

buildings, air intakes may be placed at each level with all exhaust directed to the roof level. Such multistory designs shall take into account wind patterns that are generated by the architecture so as to minimize re-introduction of exhaust air in the building.

CHEMICAL FUME HOODS

Laboratories using volatile chemicals and hazardous powders shall have a chemical fume hood to be used as the primary protection against chemical fumes and powders. These hoods shall have a face velocity of at least 60 linear feet per minute with a face opening of 12 inches. Very high face velocities (greater than 150 LFPM) cause strong eddy currents in hoods and decrease the protection afforded by the hood.

Proper placement of the hood is critical to life safety.

TISSUE CULTURE FACILITIES

Tissue culture facilities require special ventilation to assure maximum cleanliness in the facility and to afford protection to building occupants. When possible, rooms for such use should be inside a larger laboratory. The tissue culture room should be under positive pressure so that the outer laboratory air does not enter the culture facility. The outer laboratory as a whole shall be under negative pressure so that air moves from the hallway into the laboratory.

When it is not possible to have a room-within-a-room configuration, the tissue culture facility which opens onto a hallway shall be under negative pressure.

BIOLOGICAL SAFETY CONSIDERATIONS

All research laboratories shall be constructed such that all labs can be utilized as Biosafety Level 2 facilities, provided that proper work practices and other containment equipment (class II biological safety cabinets) are used when appropriate. Refer to Part 3, Chapter 3 Biological Safety for a detailed description of biosafety levels.

SPRINKLER SYSTEM

All research laboratories shall be sprinkled.

FLOOR COVERINGS

All research laboratories shall be constructed with resilient floor coverings which are relatively impervious to chemicals and afford easy clean up of spilled chemicals and water. No carpet shall be used in laboratories.

CEILINGS

Research laboratories shall not utilize drop ceilings. Such construction minimizes the vertical usefulness of the space. It also contributes to turbulent air flow on the bench top by bringing air supply into the room at a lower level. Such surfaces are not easily cleaned or disinfected. Disturbance of ceiling tiles during maintenance will dislodge dust and fine particles which are not conducive to laboratory work. Such ceiling coverings

may exacerbate fire situations.

CLINICAL OPERATIONS

LIFE SAFETY CODE

Ambulatory health care clinics shall be considered to be business occupancies unless the location also administers general anesthesia, in which case it shall be considered a health care occupancy.

JOINT COMMISSION ON AMBULATORY HEALTH ORGANIZATIONS STANDARDS

All applicable standards and guidelines stated in the JCAHO's Plant Safety and Technology Manual shall be followed.

HAND WASHING FACILITIES

New construction and renovation projects shall include or upgrade all patient treatment and procedure areas to include hand washing facilities. Ideally, hand washing facilities should be located near the exit of the treatment or procedure area. The design of hand washing facilities should facilitate hand washing by health care workers.

VENTILATION

In general, ambulatory clinic areas require ventilation similar to administrative offices. These areas should be under slight positive pressure. Air should move from treatment areas into the hallway.

Clean-up areas that use legally hazardous chemicals for high level disinfection and/or sterilization shall be under negative pressure. These negative pressure clean-up areas shall be exhausted just like research laboratories. If these areas are located within a procedure suite (the most desirable configuration), the clean-up area shall be under negative pressure while the outer suite shall be under a net positive pressure.

Special purpose treatment areas may require other ventilation techniques. Departments that administer treatments which create aerosols for patients with infectious diseases that are transmitted via airborne particles shall make the construction and safety functions aware of these activities so that steps can be taken to minimize contamination.

MEDICAL WASTE AND INFECTION CONTROL

Renovations and new construction shall take into consideration the need for laundry hampers for soiled linens, medical waste cans and sharps containers. Containers for medical wastes and sharps are considered to be safety features that shall be present in all treatment and procedure areas.

FLOOR COVERINGS

All clean-up and procedure areas shall be constructed with resilient floor coverings which are relatively impervious to chemicals and afford easy clean up of spilled chemicals, body fluids and water. No carpet shall be used in these areas.

If carpet is to be placed in treatment rooms where the potential for spills of infectious materials or chemicals is low, it shall be carpet squares that will allow removal of damaged or contaminated areas, as needed. The use of roll carpet shall be minimized in treatment areas to the greatest extent possible.

X-RAY, NUCLEAR MEDICINE AND LASER FACILITIES

Planning for X-ray, nuclear medicine and laser areas must be conducted in consultation with the institutional radiation safety officer who administers the safety program as set for in the X-ray registration, radioactive materials license and laser registration of the institution.

CONSTRUCTION STANDARDS FOR ADMINISTRATIVE OFFICES

LIFE SAFETY CODE

Office areas are considered to be business occupancies of normal hazard.

JOINT COMMISSION ON AMBULATORY HEALTH ORGANIZATIONS STANDARDS

All applicable standards and guidelines stated in the JCAHO's Plant Safety and Technology Manual shall be followed.

VENTILATION

Administrative offices shall have 3 to 6 air changes per hour. Offices shall be under slight positive pressure so that air flows from the office or office suite into the hallway. This arrangement in conjunction with the ventilation standards for laboratories and clean-up areas is designed to minimize the movement of airborne contaminants from labs and clean-up areas into offices.

PART 3

CHAPTER 6

TUBERCULOSIS PREVENTION

The Tuberculosis control plan can be found among the policies listed on the student health web site. The direct URL to the TB control plan in July 2005 was:

<http://www.hsc.unt.edu/education/studenthealth/documents/TBControl25.pdf>

PART 3

CHAPTER 7

RISK MANAGEMENT PROGRAM

PURPOSE

The purpose of the agency risk management program is to minimize losses to the agency and the state of Texas. The program evaluates health science center activities to determine liability issues that may impact the agency. The program advises management on identified risks, loss mitigation and avoidance. The scope of the risk management program involves all areas of the health science center with particular emphasis on: health & safety, workers' compensation, employment policies, property conservation and insurance.

ORGANIZATION

The Safety Officer has the appointed duty to perform the function as the risk management contact when conducting business with the State Office of Risk Management (**SORM**).

The organization has a number of committees that manage various aspects of the risk management program. The Compliance Council is an umbrella group that addresses institutional issues when there is a concern regarding compliance with federal and state laws.

PROGRAM DOCUMENTS & MANUALS

The health science center uses the Texas Worker's Compensation Commission's Risk Management for Texas State Agencies Volumes I-IV as working guidelines for risk management. These manuals are located **on the SORM web site**.

This chapter of the Safety Manual outlines the structure and scope of UNT Health Science Center risk management programs. These documents do not replace any other manual or policy of the health science center.

APPENDIX A

CERCLA EXTREMELY HAZARDOUS SUBSTANCE LIST (40 CFR 355)

This appendix contains the CERCLA list of extremely hazardous chemicals that have individual reporting requirements under SARA Title III. This information is provided to health science center employees and students to help them identify extremely hazardous materials. The reportable quantity column is on an agency-wide basis. This column should NOT be used to determine if these chemicals should be reported on individual work place chemical inventories. Report ALL of these chemicals, regardless of quantity. This list is a subset of chemicals that must be reported annually.

CAS#	CHEMICAL NAME	REPORTABLE QUANTITY, LBS
75865	Acetone Cyanohydrin	10
1752303	Acetone Thiosemicarbazide	1
107028	Acrolein	1
79061	Acrylamide	5000
107131	Acrylonitrile	100
814686	Acrylyl Chloride	1
111693	Adiponitrile	1
116063	Aldicarb	1
309002	Aldrin	1
107186	Allyl Alcohol	100
107119	Allylamine	1
20859738	Aluminum Phosphide	100
54626	Aminopterin	1
78535	Amiton	1
3734972	Amiton Oxalate	1
7664417	Ammonia	100
300629	Amphetamine	1
62533	Aniline	5000
88051	Aniline, 2,4,6-Trimethyl	1
7783702	Antimony Pentafluoride	1
1397940	Antimycin A	1
86884	ANTU	100
1303282	Arsenic Pentoxide	5000
1327533	Arsenous Oxide	5000
7784341	Arsenous Trichloride	5000
7784421	Arsine	1
2642719	Azinphos-Ethyl	1
86500	Azinphos-Methyl	1
98873	Benzal Chloride	5000
98168	Benzenamine, 3-(Trifluoromethyl)-	1
100141	Benzene, 1-(Chloromethyl)-4-Nitro-	1
98055	Benzeneearsonic Acid	1
3615212	Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	1
98077	Benzotrichloride	1
100447	Benzyl Chloride	100
140294	Benzyl Cyanide	1
15271417	Bicyclo(2,2,1)Heptane-2-Carbonitrile, 5-Chloro-6...	1
534076	Bis(Chloromethyl) Ketone	1
4044659	Bitoscanate	1
10294345	Boron Trichloride	1
7637072	Boron Trifluoride	1

CAS#	CHEMICAL NAME	REPORTABLE QUANTITY, LBS
353424	Boron Trifluoride Compound With Methyl Ether (1:1)	1
28772567	Bromadiolone	1
7726956	Bromine	1
1306190	Cadmium Oxide	1
2223930	Cadmium Stearate	1
7778441	Calcium Arsenate	1000
8001352	Campechlor	1
56257	Cantharidin	1
51832	Carbachol Chloride	1
26419738	Carbamic Acid, Methyl-, 0-(((2,4-Dimethyl-L...	1
1563662	Carbofuran	10
75150	Carbon Disulfide	100
786196	Carbophenothion	1
57749	Chlordane	1
470906	Chlorfenvinfos	1
7782505	Chlorine	10
24934916	Chlormephos	1
999815	Chlormequat Chloride	1
79118	Chloroacetic Acid	1
107073	Chloroethanol	1
627112	Chloroethyl Chloroformate	1
67663	Chloroform	5000
542881	Chloromethyl Ether	1
107302	Chloromethyl Methyl Ether	1
3691358	Chlorophacinone	1
1982474	Chloroxuron	1
21923239	Chlorthiophos	1
10025737	Chromic Chloride	1
62207765	Cobalt ((2,2'-(1,2-Ethanediy)lbis	1
10210681	Cobalt Carbonyl	1
64868	Colchicine	1
56724	Coumaphos	10
5836293	Coumatetralyl	1
95487	Cresol, o- (Cresylic Acid)	1000
535897	Crimidine	1
4170303	Crotonaldehyde	100
123739	Crotonaldehyde, (E)-	100
506683	Cyanogen Bromide	1000
506785	Cyanogen Iodide	1
2636262	Cyanophos	1
675149	Cyanuric Fluoride	1
66819	Cycloheximide	1
108918	Cyclohexylamine	1
17702419	Decaborane(14)	1
8065483	Demeton	1
919868	Demeton-S-Methyl	1
10311849	Dialifor	1
19287457	Diborane	1
111444	Dichloroethyl Ether	1
149746	Dichloromethylphenylsilane	1
62737	Dichlorvos	10
141662	Dicrotophos	1
1464535	Diepoxybutane	1

814493	Diethyl Chlorophospate	1
1642542	Diethylcarbamazine Citrate	1
71636	Digitoxin	1
2238075	Diglycidyl Ether	1
20830755	Digoxin	1
115264	Dimefox	1
60515	Dimethoate	10
2524030	Dimethyl Phosphochloridothioate	1
77781	Dimethyl Sulfate	1
75183	Dimethyl Sulfide	1
75785	Dimethyldichlorosilane	1
57147	Dimethylhydrazine	1
99989	Dimethyl-p-Phenylenediamine	1
644644	Dimetilan	1
534521	Dinitrocresol	10
88857	Dinoseb	1000
1420071	Dinoterb	1
78342	Dioxathion	1
82666	Diphacinone	1
152169	Diphosphoramidate, Octamethyl-	100
298044	Disulfoton	1
514738	Dithiazanine Iodide	1
541537	Dithiobiuret	100
316427	Emetine, Dihydrochloride	1
115297	Endosulfan	1
2778043	Endothion	1
72208	Endrin	1
106898	Epichlorohydrin	1000
2104645	EPN	1
50146	Ergocalciferol	1
379793	Ergotamine Tartrate	1
1622328	Ethanesulfonyl Chloride, 2-Chloro-	1
10140871	Ethanol, 1,2-Dichloro-, Acetate	1
563122	Ethion	10
13194484	Ethoprophos	1
538078	Ethylbis(2-Chloroethyl)Amine	1
371620	Ethylene Fluorohydrin	1
75218	Ethylene Oxide	1
107153	Ethylenediamine	5000
151564	Ethyleneimine	1
542905	Ethylthiocyanate	1
22224926	Fenamiphos	1
122145	Fenitrothion	1
115902	Fensulfothion	1
4301502	Fluometil	1
7782414	Fluorine	10
640197	Fluoroacetamide	100
144490	Fluoroacetic Acid	1
359068	Fluoroacetyl Chloride	1
51218	Fluorouracil	1
944229	Fonofos	1
50000	Formaldehyde	1000
107164	Formaldehyde Cyanohydrin	1
23422539	Formetanate Hydrochloride	1
2540821	Formothion	1
17702577	Formparanate	1
21548323	Fosthietan	1

3878191	Fuberidazole	1
110009	Furan	100
13450903	Galium Trichloride	1
77474	Hexachlorocyclopentadiene	1
4835114	Hexamethylenediamine, N,N'-Dibutyl-	1
302012	Hydrazine	1
74908	Hydrocyanic Acid	10
7647010	Hydrogen Chloride (gas only)	1
7664393	Hydrogen Fluoride	100
7722841	Hydrogen Peroxide (Conc. > 52%)	1
7783075	Hydrogen Selenide	1
7783064	Hydrogen Sulfide	100
123319	Hydroquinone	1
13463406	Iron, Pentacarbonyl-	1
297789	Isobenzan	1
78820	Isobutyronitrile	1
102363	Isocyanic Acid, 3,4,-Dichlorophenyl Ester	1
465736	Isodrin	1
55914	Isofluorophate	100
4098719	Isophorone Diisocyanate	1
108236	Isopropyl Chloroformate	1
625558	Isopropyl Formate	1
119380	Isopropylmethylpyrazolyl Dimethylcarbamate	1
78977	Lactonitrile	1
21609905	Leptophos	1
541253	Lewisite	1
58899	Lindane	1
7580678	Lithium Hydride	1
109773	Malononitrile	1000
12108133	Manganese, Tricarbonyl Methylcyclopentadienyl	1
51752	Mechlorethamine	1
950107	Mephosfolan	1
1600277	Mercuric Acetate	1
7487947	Mercuric Chloride	1
21908532	Mercuric Oxide	1
10476956	Methacrolein Diacetate	1
760930	Methacrylic Anhydride	1
126987	Methacrylonitrile	1
920467	Methacryloyl Chloride	1
30674807	Methacryloyloxyethyl Isocyanate	1
10265926	Methamidophos	1
558258	Methanesulfonyl Fluoride	1
950378	Methidathion	1
2032657	Methiocarb	10
16752775	Methamyl	100
151382	Methoxyethylmercuric Acetate	1
80637	Methyl 2-Chloroacrylate	1
74839	Methyl Bromide	1000
79221	Methyl Chloroformate	1000
624920	Methyl Disulfide	0
60344	Methyl Hydrazine	10
624839	Methyl Isocyanate	1
556616	Methyl Isothiocyanate	1
74931	Methyl Mercaptan	100
3735237	Methyl Phenkapton	1
676971	Methyl Phosphonic Dichloride	1

556649	Methyl Thiocyanate	1
78944	Methyl Vinyl Ketone	1
502396	Methylmercuric Dicyanamide	1
75796	Methyltrichlorosilane	1
1129415	Metolcarb	1
7786347	Mevinphos	10
315184	Mexacarbate	1000
50077	Mitomycin C	1
6923224	Monocrotophos	1
2763964	Muscimol	1000
505602	Mustard Gas	1
13463393	Nickel Carbonyl	1
54115	Nicotine	100
65305	Nicotine Sulfate	1
7697372	Nitric Acid	1000
10102439	Nitric Oxide	10
98953	Nitrobenzene	1000
1122607	Nitrocyclohexane	1
10102440	Nitrogen Dioxide	10
62759	Nitrosodimethylamine	1
991424	Norbormide	1
0	Organorhodium Complex (PMN-82-147)	1
630604	Ouabain	1
23135220	Oxamyl	1
78717	Oxetane, 3,3-Bis(Chloromethyl)-	1
2497076	Oxydisulfoton	1
10028156	Ozone	1
1910425	Paraquat	1
2074502	Paraquat Methosulfate	1
56382	Parathion	1
298000	Parathion-Methyl	100
12002038	Paris Green	100
19624227	Pentaborane	1
2570265	Pentadecylamine	1
79210	Peracetic Acid	1
594423	Perchloromethylmercaptan	100
108952	Phenol	1000
97187	Phenol, 2,2'-Thiobis(4,6-Dichloro-)	1
4418660	Phenol, 2,2'-Thiobis(4-Chloro-6-Methyl-Phenol)	1
64006	Phenol, 3- Methylene-), Methylcarbamate	1
58366	Phenoxarsine, 10,10' -Oxydi-	1
696286	PhenylDichloroarsine	1
59881	Phenylhydrazine Hydrochloride	1
62384	Phenylmercury Acetate	100
2097190	Phenylsilatrane	1
103855	Phenylthiourea	100
298022	Phorate	10
4104147	Phosacetim	1
947024	Phosfolan	1
75445	Phosgene	10
732116	Phosmet	1
13171216	Phosphamidon	1
7803512	Phosphine	100
2703131	Phosphonothioic Acid, Methyl-, O-Ethyl O-	1
50782699	Phosphonothioic Acid, Methyl-, S-(2-(Bis...	1
2665307	Phosphonothioic Acid, Methyl-,O-(4-Nitrophenyl)	1
3254635	Phosphoric Acid, Dimethyl 4-(Methylthio) Phenyl Ester	1

2587908	Phosphorothioic Acid, O,O-Dimethyl-S-...	1
7723140	Phosphorus	1
10025873	Phosphorus Oxychloride	1000
10026138	Phosphorus Pentachloride	1
1314563	Phosphorus Pentoxide	1
7719122	Phosphorus Trichloride	1000
57476	Physostigmine	1
57647	Physostigmine, Salicylate (1:1)	1
124878	Picrotoxin	1
110894	Piperidine	1
5281130	Piprotal	1
23505411	Pirimifos-Ethyl	1
10124502	Potassium Arsenite	1000
151508	Potassium Cyanide	10
506616	Potassium Silver Cyanide	1
2631370	Promecarb	1
106967	Propargyl Bromide	1
57578	Propiolactone, Beta-	1
107120	Propionitrile	10
542767	Propionitrile, 3-Chloro	1000
70699	Propiophenone, 4-Amino-	1
109615	Propyl Chloroformate	1
75569	Propylene Oxide	100
75558	Propyleneimine	1
2275185	Prothoate	1
129000	Pyrene	5000
140761	Pyridine, 2-Methyl-5-Vinyl-	1
504245	Pyridine, 4-Amino	1000
1124330	Pyridine, 4-Nitro-, 1-Oxide	1
53558251	Pyriminil	1
14167181	Salcomine	1
107448	Sarin	1
7783008	Selenious Acid	10
7791233	Selenium Oxychloride	1
563417	Semicarbazide Hydrochloride	1
3037727	Silane, (4-Aminobutyl)Diethoxymethyl-	1
7631892	Sodium Arsenate	1000
7784465	Sodium Arsenite	1000
26628228	Sodium Azide (Na(N ₃))	1000
124652	Sodium Cacodylate	1
143339	Sodium Cyanide (Na(CN))	10
62748	Sodium Fluoroacetate	10
131522	Sodium Pentachlorophenate	1
13410010	Sodium Selenate	1
10102188	Sodium Selenite	100
10102202	Sodium Tellurite	1
900958	Stannane, Acetoxytriphenyl-	1
57249	Strychnine	10
60413	Strychnine, Sulfate	1
3689245	Sulfotep	100
3569571	Sulfoxide, 3-Chloropropyl Octyl	1
7446095	Sulfur Dioxide	1
7783600	Sulfur Tetrafluoride	1
7446119	Sulfur Trioxide	1
7664939	Sulfuric Acid	1000
77816	Tabun	1
13494809	Tellurium	1

7783804	Tellurium Hexafluoride	1
107493	TEPP	10
13071799	Terbufos	1
78002	Tetraethyllead	10
597648	Tetraethyltin	1
75741	Tetramethyllead	1
509148	Tetranitromethane	10
10031591	Thallium Sulfate	100
6533739	Thallous Carbonate	100
7791120	Thallous Chloride	100
2757188	Thallous Malonate	1
7446186	Thallous Sulfate	100
2231574	Thiocarbazide	1
39196184	Thiofanox	100
297972	Thionazin	100
108985	Thiophenol	100
79196	Thiosemicarbazide	100
5344821	Thiourea, (2-Chlorophenyl)-	100
614788	Thiourea (2-Methylphenyl)-	1
7550450	Titanium Tetrachloride	1
584849	Toluene 2,4-Diisocyanate	100
91087	Toluene 2,6-Diisocyanate	100
110576	Trans-1,4-Dichlorobutene	1
1031476	Triamiphos	1
24017478	Triazofos	1
76028	Trichloroacetyl Chloride	1
115219	Trichloroethylsilane	1
327980	Trichloronate	1
1558254	Trichloro(Chloromethyl)Silane	1
27137855	Trichloro(Dichlorophenyl)Silane	1
98135	Trichlorophenylsilane	1
998301	Triethoxysilane	1
75774	Trimethylchlorosilane	1
824113	Trimethylolpropane Phosphite	1
1066451	Trimethyltin Chloride	1
639587	Triphenyltin Chloride	1
555771	Tris(2-Chloroethyl)Amine	1
2001958	Valinomycin	1
1314621	Vanadium Pentoxide	1000
108054	Vinyl Acetate Monomer	5000
81812	Warfarin	100
129066	Warfarin Sodium	1
28347139	Xylylene Dichloride	1
58270089	Zinc, Dichloro(4,4-Dimethyl-5((((Methylamino)...	1
1314847	Zinc Phosphide	100

APPENDIX B

CHEMICAL WASTE MINIMIZATION

Waste minimization is an effective way of reducing the cost and headaches of waste disposal. The following are suggestions for minimizing the amounts of chemical wastes generated by laboratories and other work areas.

1. Order chemicals in amounts and container sizes appropriate for your use. Don't order one kilogram if you only need one gram. It will cost much more to dispose of the extra than you saved by ordering the economy size. Check with your vendor. Some are making it easier for you by offering smaller quantities. Smaller containers will keep reagents fresher and make it easier for you to give away unused portions. You will also save space on your shelves.
2. Order only what you expect to use in a reasonable time, perhaps one year. Again your reagents will be fresher. There will be less waste for disposal if your procedures change, and you no longer use a specific chemical.
3. Try to borrow chemicals which you will need in small amounts, to work out new procedures, or for temporary use.
4. Coordinate ordering with other labs to get bulk and multiple price breaks.
5. Pass unused chemicals on to colleagues who can use them.
6. Purchase pre-mixed and pre-weighed reagents when practical.
7. Mix only as much reagent, buffer or solvent as you expect to use in a reasonable time.
8. Plan procedures to minimize the use of hazardous chemicals. Use smaller volumes when possible. Substitute less hazardous chemicals whenever possible.

APPENDIX C

NFPA CLASSIFICATION OF SOME COMMON LIQUIDS USED IN LABORATORIES

The list below contains commonly used liquids in research settings. This list is not exhaustive. The chemical classification system of the National Fire Protection Association (NFPA) is used to classify laboratory fire hazards based on the types and quantities present. Use this appendix in conjunction with a chemical inventory to classify the fire hazards and construction requirements of a particular laboratory.

<u>Liquid</u>	<u>Chemical Classification (NFPA)</u>	<u>Flash Point (degrees F)</u>	<u>Boiling Point</u>	<u>Fire Hazard</u>
Acetaldehyde	IA	-36	68.7 F (20.4 C)	F, FB, E
Diethyl ether		-40	94.3 F (34.6 C)	F, FB, E
Ethyl chloride		-58	54 F (12.2 C)	F, FB, E
Isopentane		-70	82.2 F (27.9 C)	F, FB, E
Pentane		-57	97 F (36.1 C)	F, FB, E
Acetone	IB	4	133 F (56.1 C)	F, FB, E
Acetonitrile		42	179 F (81.6 C)	F, P, FB, E
Acrylonitrile		30	171 F (77.4 C)	F, P, FB, E
Allyl alcohol		72	206 F (96.9 C)	F, P, FB, E
Benzene		12	176 F (80.1 C)	F, FB, E
Carbon disulfide		-22	115 F (46.3 C)	F, FB, E
Crotonaldehyde		59	216 F (102.2 C)	F, FB, E
Cyclohexane		-4	177.3 F (80.7 C)	F, FB, E
Ethyl acetate		24	171 F (77 C)	F, FB, E
Ethyl alcohol		55	172.9 F (78.3 C)	F, FB, E
Gasoline		-36	140 - 390 F	F, FB, E
Heptane		25	209.1 F (98.4 C)	F, FB, E
Hexane		-7	155.7 F (68.7 C)	F, FB, E
Isobutyl acetate		62	243.1 F (117.3 C)	F, FB, E
Isopropyl alcohol		65	180.1 F (82.3 C)	F, FB, E
Methyl alcohol		54	148.1 F (64.5 C)	F, FB, E
Methyl ethyl ketone		20	175.3 F (79.6 C)	F, FB, E
n-Propyl acetate		58	214.9 F (101.6 C)	F, FB, E
o-Xylene		63	291.9 F (144.4 C)	F, FB, E
Propionaldehyde		-22	118.4 F (48 C)	F, FB, E
Pyridine		68	239.5 F (115.3 C)	F, FB, E
tert-Butyl alcohol		52	181 F (82.6 C)	F, FB, E
Tetrahydrofuran		6	151 F (66 C)	F, FB, E
Toluene		40	231 F (110.6 C)	F, FB, E
Trimethylchlorosilane		0	135 F (57 C)	F, FB, E, P
Chlorobenzene	IC	84	270 F (132 C)	F, FB, E
Ethylene glycol diethyl ether		90	252 F (122 C)	C
Isoamyl acetate		77	287.6 F (142 C)	F, FB, E
Isobutyl alcohol		82	226.2 F (107.9 C)	F, FB, E
m-Xylene		84	269.4 (131.9 C)	F, FB, E
n-Butyl acetate		99	259 F (126 C)	F, FB, E

n-Butyl alcohol		84	243.9 F (117.7 C)	F, FB,E
n-Dibutyl ether	IC	92	288 F (142 C)	F, FB, E
n-Propyl alcohol		81	207 F (97.2 C)	F, FB, E
p-Xylene		81	280.9 F (138.3 C)	F, FB, E
Propylene glycol methyl ether		97	250 F (121 C)	F, FB, E
sec-Butyl alcohol		75	211 F (99.5 C)	F, FB,E
Turpentine		95	302 - 320 F	F, FB, E
Acetic acid	II	112	244 F (117.9 C)	C,E
Acetic anhydride		136	282F (139 C)	C,E
Amyl alcohol		118	280.2 F (137.9 C)	F,FB,E
Bromobenzene		124	313 F (156 C)	C
Cyclohexanone		129	312.4 F (155.8 C)	C
Formic acid		138	214 F (101 C)	C
Isoamyl alcohol		114	270F (132 C)	C
Mineral spirits		105	310 - 395 F	C
Naphtha		107	200-500 F	C
No. 2 Fuel Oil		136	540-640 F	C
Propionic acid	II	134	285.4 F (140.8 C)	C
Aniline	IIIA	168	363.6 F (184.2 C)	C,P,E
Benzaldehyde		148	354 F (179 C)	C
Benzyl chloride		165	354.9 F (179.4 C)	C
Cyclohexanol		160	322 F (161 C)	C, P
o-Cresol		178	376 F (191 C)	C,P
o-Toluidine		167	392 F (200 C)	C,P
p-Cresol		187	395.5 F (201.9 C)	C,P
Phenol		185	359.2 F (181.8 C)	C, P
Benzyl alcohol	IIIB	220	401 F (205 C)	C
Diethylene glycol monobutyl ether		230	448 F (231 C)	C
Diethylene glycol monoethyl ether		201	396 F (202 C)	C
Ethylene glycol		240	387 F (197.6 C)	C
Glycerine		350	554 F (290 C)	C
m-Cresol		202	397 F (203 C)	C,P
Mineral oils		380		C
Motor oils		300		C
Propylene glycol		210	369.1 F (187.3 C)	C

Fire Hazard Symbols:

F - flammable

FB - flash back can occur

E- explosion of closed containers

C- combustible

P- poisonous fumes from fire

Source:

Hazardous Chemicals Data Book

G. Weiss, Noyes Data Corporation, Park Ridge, NJ, 1986.

ISBN 0-8155-1072-1

APPENDIX D

CARCINOGENS, SUSPECTED CARCINOGENS AND REPRODUCTIVE HAZARDS

11th Report on Carcinogens (RoC) — National Toxicology Program, Department of Health and Human Services.

The 11th RoC was released on January 31, 2005. The 11th RoC contains 246 entries, 58 of which are listed as known to be human carcinogens and with the remaining 188 being listed as reasonably anticipated to be human carcinogens. Seventeen of the listings are new to the RoC. The new listings in the 11th RoC include lead and lead compounds, x-and gamma-radiation , compounds found in grilled meats, and a host of substances used in textile dyes, paints and inks. The RoC also includes the listing of viruses for the first time including some human papillomaviruses, and Hepatitis B and C viruses.

The full text of the 11th Report on Carcinogens was posted at the following internet address in July of 2005:

<http://ntp.niehs.nih.gov/index.cfm?objectid=32BA9724-F1F6-975E-7FCE50709CB4C932>

Profiles for Agents, Substances, Mixtures or Exposure Circumstances Known To Be Human Carcinogens or Suspected Carcinogens (see web site for details).

Acetaldehyde
2-Acetylaminofluorene
Acrylamide
Acrylonitrile

Adriamycin® (Doxorubicin Hydrochloride)
 Aflatoxins
 Alcoholic Beverage Consumption
 2-Aminoanthraquinone o-
 Aminoazotoluene 4-Aminobiphenyl
 1-Amino-2,4-dibromoanthraquinone
 1-Amino-2-methylantraquinone
 Amitrole
 o-Anisidine Hydrochloride
 Arsenic Compounds,
 Inorganic Asbestos
 Azacitidine
 Azathioprine
 Benzene
 Benzidine and Dyes Metabolized to Benzidine
Benzotrichloride
 Beryllium and Beryllium Compounds
 Bromodichloromethane 2,2-
 bis(Bromomethyl)-1,3-propanediol
 (Technical Grade) 1,3-Butadiene

 1,4-Butanediol
 Dimethylsulfonate
 (Myleran®) Butylated
 Hydroxyanisole (BHA)
 Cadmium and
 Cadmium
 Compounds
 Carbon
 Tetrachloride
 Ceramic
 Fibers
 (Respirable
 Size)
 Chlorambucil
 Chloramphenicol
 Chlorendic Acid
 Chlorinated Paraffins (C12, 60%
 Chlorine) 1-(2-Chloroethyl)-3-
 cyclohexyl-1-nitrosourea 1-(2-
 Chloroethyl)-3-(4-
 methylcyclohexyl)-1-nitrosourea
 bis(Chloroethyl) Nitrosourea
 Chloroform
 bis(Chloromethyl) Ether and Technical-Grade

Chloromethyl Methyl Ether
 3-Chloro-2-methylpropene
 4-Chloro-o-phenylenediamine Chloroprene
 p-Chloro-o-toluidine and p-Chloro-o-toluidine
 Hydrochloride Chlorozotocin
 Chromium Hexavalent Compounds
 C.I. Basic Red 9 Monohydrochloride
 Cisplatin
 Coal Tars and Coal Tar Pitches
 Cobalt Sulfate
 Coke Oven Emissions
 p-Cresidine
 Cupferron
 Cyclophosphamide
 Cyclosporin A
 Dacarbazine
 Danthron (1,8-Dihydroxyanthraquinone)
 2,4-Diaminoanisole Sulfate
 2,4-Diaminotoluene
 Diazoaminobenzene
 1,2-Dibromo-3-chloropropane
 1,2-Dibromoethane (Ethylene Dibromide)

 2,3-Dibromo-1-propanol tris(2,3-Dibromopropyl)
 Phosphate 1,4-Dichlorobenzene
 Diaminoanisole
 Sulfate 2,4-Diaminotoluene
 Diazoaminobenzene
 1,2-Dibromo-3-chloropropane
 1,2-Dibromoethane (Ethylene Dibromide)
 2,3-Dibromo-1-propanol tris(2,3-Dibromopropyl)
 Phosphate 1,4-Dichlorobenzene
 3,3'-Dichlorobenzidine and
 3,3'-Dichlorobenzidine Dihydrochloride
 Dichlorodiphenyltrichloroethane (DDT)
 1,2-Dichloroethane
 (Ethylene
 Dichloride)
 Dichloromethane
 (Methylene
 Chloride) 1,3-
 Dichloropropene
 (Technical Grade)
 Diepoxybutane
 Diesel Exhaust Particulates

Diethyl Sulfate
 Diethylstilbestrol Diglycidyl
 Resorcinol Ether
 3,3'-Dimethoxybenzidine and Dyes Metabolized to
 3,3'-Dimethoxybenzidine 3,3'-Dimethoxybenzidine
 Dyes Metabolized to 3,3'-Dimethoxybenzidine
 4-Dimethylaminoazobenzene
 3,3'-Dimethylbenzidine and Dyes Metabolized to
 3,3'-Dimethylbenzidine 3,3'-Dimethylbenzidine
 Dyes Metabolized to
 3,3'-Dimethylbenzidine
 Dimethylcarbamoyl
 Chloride
 1,1Dimethylhydrazine
 Dimethyl Sulfate Dimethylvinyl
 Chloride
 1,4-Dioxane

 2-Amino-3,4-dimethylimidazo[4,5-
 f]quinoline (MEIQ) 2-Amino-3,8-
 dimethylimidazo[4,5-f]quinoxaline
 (MEIQx) 2-Amino-3-methylimidazo[4,5-
 f]quinoline (IQ) 2-Amino-1-methyl-6-
 phenylimidazo[4,5-b]pyridine (PhIP)
 Hexachlorobenzene
 Hexachloroethane
 Hexamethylphosphoramide
 Human Papillomaviruses: Some
 Genital-Mucosal Types
 Hydrazine and Hydrazine Sulfate
 Hydrazobenzene
 Ionizing Radiation
 X-Radiation and Gamma
 Radiation Neutrons
 Radon
 Thorium Dioxide
 Iron Dextran Complex
 Isoprene
 Kepone® (Chlordecone)
 Lead and Lead Compounds
 Lindane and Other Hexachlorocyclohexane Isomers
 Melphalan
 Methoxsalen with Ultraviolet A Therapy (PUVA)
 2-Methylaziridine (Propylenimine)
 4,4'-Methylenebis(2-chloroaniline)

4,4'-Methylenebis(N,N-dimethyl)benzenamine
4,4'-Methylenedianiline and its Dihydrochloride Salt
Methyleugenol
Methyl Methanesulfonate
N-Methyl-N'-nitro-Nnitrosoguanidine
Metronidazole
Michler's Ketone (4,4'-(Dimethylamino)benzophenone)
Mineral Oils (Untreated and Mildly Treated)
Mirex
Mustard Gas
Naphthalene
2-Naphthylamine
Nickel Compounds and Metallic
Nickel Nickel Compounds
Metallic Nickel
Nitrilotriacetic Acid
o-Nitroanisole
Nitroarenes (selected)
1,6-Dinitropyrene
1,8-Dinitropyrene
6-Nitrochrysene
1-Nitropyrene
4-Nitropyrene
Nitrobenzene
Nitrofen (2,4-Dichlorophenyl-p-nitrophenylEther)
Nitrogen Mustard Hydrochloride
Nitromethane
2-Nitropropane N-
Nitrosodi-n-butylamine
N-Nitrosodiethanolamine
N-Nitrosodiethylamine

N-Nitrosodimethylamine
N-Nitrosodi-n-propylamine
N-Nitroso-N-ethylurea
4-(N-Nitrosomethylamino)-1-(3-pyridyl)-1-butanone N-
Nitroso-N-methylurea N-Nitrosomethylvinylamine
N-Nitrosomorpholine
N-Nitrosornicotine
N-Nitrosopiperidine
N-Nitrosopyrrolidine
N-Nitrososarcosine
Norethisterone Ochratoxin A
4,4'-Oxydianiline
Oxymetholone
Phenacetin and Analgesic Mixtures Containing Phenacetin
Phenacetin
Analgesic Mixtures Containing Phenacetin
Phenazopyridine Hydrochloride Phenolphthalein
Phenoxybenzamine Hydrochloride
Phenytoin
Polybrominated Biphenyls (PBBs)
Polychlorinated Biphenyls (PCBs)
Polycyclic Aromatic Hydrocarbons, 15 Listings
Benz[a]anthracene
Benzo[b]fluoranthene
Benzo[j]fluoranthene

Benzo[k]fluoranthene
 Benzo[a]pyrene
 Dibenz[a,h]acridine
 Dibenz[a,j]acridine
 Dibenz[a,h]anthracene
 7H-Dibenzo[c,g]carbazole
 Dibenzo[a,e]pyrene
 Dibenzo[a,h]pyrene
 Dibenzo[a,i]pyrene
 Dibenzo[a,l]pyrene
 Indeno[1,2,3-cd]pyrene 5-
 Methylchrysene Procarbazine
 Hydrochloride Progesterone
 1,3-Propane Sultone β -
 Propiolactone Propylene Oxide
 Propylthiouracil
 Reserpine Safrole Selenium
 Sulfide

Silica, Crystalline (Respirable Size) Soots
 Streptozotocin
 Strong Inorganic Acid Mists Containing Sulfuric Acid Styrene-7,8-
 oxide
 Sulfallate
 Tamoxifen
 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD); "Dioxin"
 Tetrachloroethylene (Perchloroethylene) Tetrafluoroethylene
 Tetranitromethane
 Thioacetamide 4,4'-
 Thiodianiline Thiotepa
 Thiourea

Tobacco Related Exposures Environmental
 Tobacco Smoke Smokeless Tobacco
 Tobacco Smoking Toluene
 Diisocyanate
 o-Toluidine and o-Toluidine Hydrochloride Toxaphene
 Trichloroethylene 2,4,6-
 Trichlorophenol 1,2,3-
 Trichloropropane
 Ultraviolet Radiation Related Exposures Solar
 Radiation
 Sunlamps or Sunbeds, Exposure to Broad-Spectrum
 Ultraviolet (UV) Radiation Ultraviolet A Radiation
 Ultraviolet B Radiation

Ultraviolet C Radiation Urethane
Vinyl Bromide
Vinyl Chloride 4-Vinyl-1-cyclohexene
Diepoxide Vinyl Fluoride
Wood Dust

APPENDIX E

This appendix was removed from the Safety Manual in August 1998.

APPENDIX F

CHEMICAL COMPATIBILITIES

(NOT AN EXHAUSTIVE LIST)

CHEMICAL

Alkali metals such as
tetrachloride
Ca, Na, K and Mg
the

INCOMPATIBLE WITH

Water, carbon dioxide, carbon

and other chlorinated hydrocarbons and
halogens.

Acetic acid

Chromic acid, nitric acid, hydroxy –
containing compounds, ethylene glycol,
perchloric acid, peroxides and
permanganates.

Acetone

Concentrated sulfuric and nitric acid
mixtures.

Acetylene
chlorine,

Copper (tubing), fluorine, bromine,
iodine, silver, mercury, or their
compounds.

Ammonia, anhydrous
hypochlorite or

Mercury, halogens, calcium
anhydrous hydrofluoric acid.

Ammonium nitrate
compressed

Caustics, flammable liquids or
gases, chlorates, nitrites, sulphur,
metal powders, and finely divided
organics
or other combustibles.

Aniline
strong

Nitric acid, hydrogen peroxide, other
oxidizing agents.

Bromine

Ammonia, acetylene, butadiene, butane,
hydrogen, sodium carbide, turpentine,
or

	finely divided metals.
Calcium oxide	Water.
Carbon, activated agents.	Calcium hypochlorite, all oxidizing
Chlorates	Ammonium salts, acids, metal powders, sulfur, carbon, finely divided organics or other combustibles.
Chlorine benzene	Ammonia, acetylene, butadiene, and other petroleum fractions, hydrogen, sodium carbides, turpentine and finely divided metals.
Chromic acid alcohol, flammable liquids.	Acetic acid, naphthalene, camphor, glycerol, glycerine, turpentine, and other
Cyanides	Acids
Flammable liquids hydrogen	Ammonium nitrate, chromic acid, peroxide, nitric acid, sodium peroxide, and halogens.
Hydrocarbons acid,	Fluorine, chlorine, bromine, chromic or sodium peroxide.
Hydrogen peroxide the	Copper, chromium, iron, most metals or respective salts, flammable liquids, combustible materials, other organic materials, aniline, and nitromethane.
Hydrogen sulfide	Nitric acid, oxidizing gases.
Iodine	Acetylene, fulminic acid, hydrogen.

Mercury	Acetylene, fulminic acid, anhydrous ammonia, and oxalic acid.
Nitric acid, concentrated	Acetic, chromic and hydrocyanic acids, aniline, carbon, hydrogen sulfide, flammable liquids or gases and substances which readily nitrate.
Oxygen liquids,	Oils, grease, hydrogen, flammable solids and gases.
Oxalic acid	Silver and mercury.
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, oils and other organic materials, organic amines and anti-oxidants.
Phosphorous pentoxide	Water.
Potassium chlorate	Sulfuric and other acids.
Potassium permanganate benzaldehyde,	Glycerine, ethylene glycol, any free acid.
Sodium peroxide	Methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerine, ethylene glycol, ethyl acetate, furfural and any other oxidizable substances.
Sulfuric acid	Water, potassium chlorate, potassium perchlorate, potassium permanganate, and compounds with similar light metals such as Na and Li.

This is not a complete listing. The Safety Data Sheets for the materials to be used should always be consulted for reactivity hazards. Some other printed references are listed below:

1. *Fire Protection Guide on Hazardous Materials*, National Fire Protection Association, Latest Edition.
2. *Toxic and Hazardous Industrial Chemicals Safety Manual*,

- International Technical Information Institute, Tokyo, Japan, 1979.
3. J.T. Baker, Table of Hazardous Chemical Reactions.

POTENTIALLY EXPLOSIVE COMBINATIONS OF SOME COMMON CHEMICALS

Acetone + chloroform in the presence of a base
Acetylene + copper, silver, mercury, or their salts
Ammonia (including aqueous solutions) + Cl₂, Br₂, or I₂
Carbon disulfide + sodium azide
Chlorine + an alcohol
Chloroform or carbon tetrachloride + powdered Al or Mg
Decolorizing carbon + an oxidizing agent
Diethyl ether + chlorine (including a chlorine atmosphere)
Dimethyl sulfoxide + an acyl halide, SOCl₂, or POCl₃
Dimethyl sulfoxide + CrO₃
Ethanol + calcium hypochlorite
Ethanol + silver nitrate
Nitric acid + acetic anhydride, acetic acid
Picric acid + a heavy-metal salt, such as of Pb, Hg, or Ag
Silver oxide + ammonia + ethanol
Sodium + a chlorinated hydrocarbon
Sodium hypochlorite + an amine

WATER-REACTIVE CHEMICALS

The following is a list of some common laboratory chemicals that react violently with water. They should be stored and handled so that they do not come into contact with liquid water or water vapor. They are prohibited from landfill disposal, even in a lab pack, because of their reactivity.

Alkali metals - sodium, lithium, etc.
Alkali metal hydride
Alkali metal amides
Metal alkyls, such as lithium alkyls and aluminum alkyls
Grignard reagents (RMgX)
Halides of nonmetals, such as BCl₃, BF₃, PCl₃, PCl₅, SiCl₄, S₂Cl₂
Inorganic acid halides, such as POCl₃, SOCl₂, SO₂Cl₂
Anhydrous metal halides, such as AlCl₃, TiCl₄, ZrCl₄, SnCl₄
Phosphorous pentoxide
Calcium carbide
Organic acid halides and anhydrides of low molecular weight.

APPENDIX G

HOUSEKEEPING IN WALK-IN COLD ROOMS AND FREEZERS

POLICY

It is the responsibility of the department that has control of a cold room/freezer to maintain the space in a sanitary and hygienic manner. These spaces, like laboratory benches and other scientific equipment are not cleaned by housekeeping staff. Clean-up of spills and general cleanliness of cold rooms and freezers is the responsibility of research staff that use these areas.

In general, freezers require less cleaning due to inhibition of the growth of molds and fungus by the extremely low temperatures of these spaces. These spaces are cleaned on an as needed basis. The quarterly clean-up described below applies only to cold rooms. This requirement does not replace a more stringent cleaning schedule, if one is required due to the type of activities in the area.

PROCEDURE

Spills of chemicals and biologicals are immediately cleaned up by research staff. If the spill is beyond the ability of the staff to handle, the Safety Office will assist with clean-up at no charge.

Since cold rooms, like refrigerators, are breeding grounds for molds and fungus, a general clean up of each cold room is to be conducted on a QUARTERLY BASIS by the research staff of the department that controls the space. At a minimum, all walls, benches, fixtures and floors shall be scrubbed with soap and water sufficient to remove visible signs of dirt, caked matter, mold and fungus, if present. This shall be followed by a rinse of a fresh 1:100 dilution of household bleach, followed by a rinse with clean water. Excess water shall then be mopped up before returning the cold room to regular use.

For those cold rooms that open onto hallways that may contain clinic patient traffic or if clinical operations are present on the floor, such clean-ups shall be conducted so as to minimize the impact on patient care.

A log of routine cleaning of the cold rooms shall be maintained for inspection by the Safety Office.

In the event that a department is unable to maintain their cold rooms and walk-in freezers in a satisfactory state of cleanliness, the Safety Office staff shall perform the routine cleaning. The responsible department will be charged \$30 per hour for labor, including time to organize the job and perform the clean-up. The minimum charge shall

be \$250.

LIST OF DEPARTMENTS WITH WALK-IN COLD ROOMS & FREEZERS

ROOM	TYPE OF SPACE	DEPARTMENT
EAD-424	Cold room (front)	Pharmacology
EAD-424	Freezer (back)	Safety Office
EAD-216	Cold room	Anatomy
RES-068	Freezer	Lab Animal Medicine
RES-312	Freezer	Safety Office
RES-352	Out of service as a cold room	Pharmacology
RES-412	Cold room	Biochemistry

APPENDIX H

SAFETY OF INDOOR PUBLIC SPACES

POLICY

It is the responsibility of the various divisions of the Facilities Management to maintain the indoor public spaces of the health science center in a safe manner. Public spaces for the purpose of this policy are generally defined as exit corridors, open alcoves along the exit corridors, stairwells and stairways, elevators and ramps. Administrative control of these spaces is assigned to the Director of Facilities Management.

PROCEDURE

Persons wishing to place objects into public spaces must first obtain permission for such placement from the Director of Facilities Management. Unapproved items will be removed from public spaces at the direction of the Facilities Management director.

GUIDELINES

The Director of the Facilities Management shall use the NFPA Life Safety Code 101 as the guide for decisions to place items into public spaces.

No items shall be placed into exit corridors that shall reduce the clear width of the corridor to less than 44 inches. In Medical Education Buildings 1 and 2, at least one exit corridor from the freight elevator to the opposite end of the building will be maintained with a clear width of not less than 50 inches to accommodate the movement of equipment and supplies.

Research equipment shall not be placed into public spaces. Examples of research equipment include but are not limited to: incubators, centrifuges, scintillation counters, freeze dryers, lyophilizers, etc. On a case-by-case basis, refrigerators and freezers may be placed into hallways with the approval of the Director of Facilities Management provided that these do not contain legally hazardous materials, flammable liquids, toxic materials, infectious agents or radioactive materials. All such refrigerators and freezers shall be kept locked when unattended. All such refrigerators shall be marked with the name of the supervising faculty member and an emergency contact number shall be on file with the Campus Police Department.

Under no circumstances shall the storage or use of compressed gasses or cryogenic materials be allowed in public spaces, except for special events involving helium

balloons and other similar activities.

APPENDIX I

UNDERSTANDING MEDICAL WASTES

The term "medical waste" used at the health science center is called "regulated waste" by OSHA's Blood-borne Pathogens Standard. Here is OSHA's definition of "regulated waste":

The Blood-borne Pathogens Standard uses the term, "regulated waste," to refer to the following categories of waste which require special handling at a minimum; (1) liquid or semi-liquid blood or OPIM; (2) items contaminated with blood or OPIM and which would release these substances in a liquid or semi-liquid state if compressed; (3) items that are caked with dried blood or OPIM and are capable of releasing these materials during handling; (4) contaminated sharps; and (5) pathological and microbiological wastes containing blood or OPIM.

It should be noted that only materials that are **dripable, pourable, squeezable** or materials that are **caked** in quantities that material would be released by handling are considered "regulated wastes" or "medical wastes".

In the above definition, the term otherwise potentially infectious material (OPIM) is used. Here is OSHA's definition of OPIM:

OPIM is defined as the following human body fluids: saliva in dental procedures, semen, vaginal secretions, cerebrospinal, synovial, pleural, pericardial, peritoneal, and amniotic fluids; body fluids visibly contaminated with blood; along with all body fluids in situations where it is difficult or impossible to differentiate between body fluids; unfixed human tissues or organs (other than intact skin); HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture media or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Frequently discarded items in patient care & research settings: Are they medical wastes?

Item	Medical Waste?	Container to Use
------	----------------	------------------

Bandaids with spot of dried human blood	No	Regular trash
Diaper, dirty	Yes	Red bag
Dressings from wounds with drainage	Yes	Red bag
Exam gloves (most)	No	Regular trash
Fecal occult blood test strips	No	Regular trash
IV bag	No	Regular trash
IV tubing, with visible blood	Yes	Red bag
Microscope slides & cover slips	Yes (sharp)	Sharps
Needles, syringe or suture	Yes (sharp)	Sharps container
Paper from patient exam table (most)	No	Regular trash
Paper towel with small amount of dried blood	No	Regular trash
Scalpel blade	Yes (sharp)	Sharps container
Surgical items that may be contaminated with blood or other potentially infectious material, other than sharps	Yes	Red bag
Swabs, cotton (most)	No	Regular trash
Test tube with liquid blood or other potentially infectious material, stoppered	Yes	Red bag
Tongue depressors	No	Regular trash
Urinary catheters	Yes	Red bag

APPENDIX J

POLICY AND PROCEDURE ON FIRST AID KITS

Background

Health science center employees on the main campus and in the agency's owned and leased remote clinical operations have access to trained medical professionals including physicians, physician assistants, registered nurses, licensed vocational nurses and medical assistants during the day shift. Injured agency employees may access these medical services on a walk-in basis as clinic patient schedules allow.

Persons on other shifts, predominately on the main campus, have access to emergency medical services across the street at Osteopathic Medical Center of Texas hospital.

Injured agency employees should follow the guidelines of their personal health insurance coverage when seeking professional medical treatment for an on-the-job injury that may be part of a workers' compensation claim. This advice is given in case a claim is denied, so that the employee may qualify for the maximum benefit their health coverage allows.

Because agency employees have ready access to medical services, first aid kits in all departments are not required by the published risk management guidelines from the State Office of Risk Management.

Many departments find it advantageous to maintain a first aid kit with supplies appropriate to the needs of the department. First aid kits can be effective tools to deal with minor injuries and they allow employees to receive minor care quickly and allow employees to remain on the job longer.

This policy and procedure applies to those departments that voluntarily maintain a first aid kit. This policy does not apply to agency owned or leased clinics.

Policy

Departments that maintain a first aid kit will develop a written list of supplies to be maintained in the kit. This list shall also indicate a reorder level when supplies run low. This list should be kept with the kit for easy access by the person(s) maintaining the first aid kit(s).

Departments that maintain a first aid kit shall check the kit on a monthly basis to determine if supplies need to be ordered to keep the inventory above the reorder

level.

One or more individuals in a department should be assigned the task of keeping the kit stocked and submitting documentation of monthly checks.

Procedure to report monthly checks

Departments that maintain a first aid kit shall report the monthly checks to the Safety Office by a method such as an electronic record so that paperwork and effort in the department and in the Safety Office can be minimized.

APPENDIX K

POLICY AND PROCEDURE

ON MAINTENANCE OF

EMERGENCY CONTACT INFORMATION

Policy

Department safety coordinators are assigned the responsibility to maintain an up-to-date list of emergency contact numbers for their department for the purpose of notification of department personnel in case of emergency.

Procedure

On a quarterly basis, department safety coordinators shall update the emergency contact information for their department using an electronic system that can be accessed with a web browser, a userID and a password. User id's and passwords can be obtained by calling the Safety Office, ext. 2697

The Safety Office will make available to department safety coordinators, a means of accessing a central database in which to maintain current emergency contact information utilizing the existing network of the health science center.

The log-on URL for the emergency contact database can be found on the database page on the Safety Office web server:

<http://safety.hsc.unt.edu/office/database/databases.html>

A user guide will be posted on the database page.

The Safety Office will create the types of contacts that need to be maintained for each department, consulting with the department as needed. Department safety coordinators will update and maintain the information for each contact type. Contact types will vary depending on the activities and organization of each department.

The Safety Office will send reminder notices to department safety coordinators when updates are due.

Access to Emergency Contact Information

Access to the emergency contact information is restricted as follows:

1. Department safety coordinators only have access to their department's information.
2. Individuals in the Safety Office who maintain the database have access to all of the contact information.
3. A subset of the emergency contact information will be distributed in paper form to members of the Emergency Operations Center and their alternates, as part of their confidential contact list when the emergency preparedness plan is activated.
4. Dispatchers in campus policy may be granted access to all of the emergency contact information when they act within the role and scope of their duties 24 hours a day, 7 days a week.

APPENDIX L

PROGRESSIVE DISCIPLINE POLICY for FOOD and DRINK in laboratories not posted for radioactive materials

Scope

This policy applies to all individuals who enter research laboratories owned or leased by UNT Health Science Center at Fort Worth.

Definitions

Principle investigator — means the faculty member who has physical control of a research laboratory.

Supervisor — means a non-faculty employee of the health science center who exercises direct authority over an individual who commits an infraction of this policy. Generally, the supervisor is the person who signs the performance evaluation of the offender.

Research laboratory — means a space designed to function as a research laboratory and those interior rooms that may be enclosed or entered only by means of entering the outer laboratory space.

Safety Officer — the department head of the institutional Safety Office.

Background

Food and drink may not be present, stored or consumed in research laboratories, with the exception of certain human subjects research projects, which may be approved on a case-by-case basis.

This rule is already part of the written institutional safety policies found in the Safety Manual and in the Radiation Safety Manual. This discipline policy is necessary to maintain compliance with regulations in the area of radiation safety, chemical safety and biological safety.

There are at least three mechanisms to spread radioactive contamination, hazardous chemicals and organisms to food and drink that may be present in a laboratory: (1) physical transfer of contamination in refrigerators and freezers when food and drink items are stored together; (2) physical transfer of materials from contaminated hands or gloves directly to food or their wrappings when these items are handled or consumed; (3) and by dispersions of aerosols and powders in the laboratory.

Internalization of radioactive materials, hazardous chemicals and organisms can lead to acute illness in some cases and can initiate or promote chronic processes that lead to

illness many years after the internal exposure. This policy is designed to promote good laboratory practice and to prevent harm to all who enter and work in research laboratories.

Policy

The institutional Safety Committee with the concurrence of senior administration has determined that the presence, storage and consumption of food or drink by humans in research laboratories shall be prohibited and infractions of this rule shall constitute a **serious violation** of safety protocols and institutional policy.

Certain human subjects research projects may obtain a waiver on a case-by-case basis when the experimental design calls for the consumption of liquids or food by the human subject. A safety plan for an exempted project shall be required to mitigate risk to the human subject.

Policy enforcement and discipline

Enforcement of this policy is a shared responsibility of principle investigators, supervisors, the Safety Officer as the agent for the institutional Safety Committee, department heads and senior administration of the health science center.

Discipline shall be progressive in nature. The purpose of discipline is to protect human health and to prevent recurrence of violation of this policy.

Individuals possessing, storing or consuming food and drink in research laboratories

The institutional Personnel Policy Manual, the Faculty By-laws and student handbooks shall be followed as applicable.

When a principle investigator takes a discipline step under this policy, there is a duty to inform the Safety Officer of such action.

When the Safety Officer detects a violation, the principle investigator who supervises the offender shall be informed of the infraction and the principle investigator shall be required to take the appropriate disciplinary step.

Principle investigator discipline

When the Safety Officer detects a third violation of this policy during a rolling 2 year period for a research group, the principle investigator shall be referred to the cognizant Dean for discipline as provided by the Faculty Bylaws.

When the principle investigator detects a violation of this policy by an individual in their research group or in their laboratory, and takes the

appropriate disciplinary action, such infractions of this policy shall not count toward the three violations in a two-year period for the principle investigator. Only when the Safety Officer detects the infractions, do they count toward the three infractions in a two-year period. This provision is meant to encourage principle investigators to take a firm stand and enforce this policy without fear that such a stance will penalize them.

Special situations

In the event the individual committing the infraction in a research laboratory is not a member of the research group having physical control of the research laboratory, the infraction shall count against the principle investigator in control of the space and also against the supervisor or other principle investigator supervising the individual committing the infraction.

When an infraction takes place in a shared laboratory or shared cold or warm room, not assigned to any particular principle investigator, and is detected by the Safety Officer, the person in a supervisory role for that space shall be the department head for the purpose of this policy, and the infraction shall be charged to the department head.

In the event the individual committing the infraction is neither a student, employee nor faculty member at the health science center, and the violation is detected by the Safety Officer, the principle investigator in charge of the laboratory shall be charged with the infraction. Principle investigators may wish to review their laboratory security procedures to ensure only authorized individuals may enter their laboratories.

The progressive discipline policy for food and drink in laboratories and areas posted for radioactive materials, as given in the Radiation Safety Manual, shall be followed and that policy takes precedence over this policy because it provides additional research group discipline such as loss of ability to order or receive radioactive materials for fixed periods of time.

In the event the principle investigator with three violations of this policy in a rolling two year period is the cognizant Dean, the matter shall be referred to the next highest level of authority to ensure appropriate discipline under the faculty bylaws is administered.

APPENDIX M

Controlled Precursor Chemicals and Laboratory Apparatus

The Texas Higher Education Coordinating Board has entered into a memorandum of understanding (MOU) with the Department of Public Service (DPS) regarding reasonable and prudent safeguards to prevent the diversion of certain chemicals and laboratory apparatus for the manufacture of illegal substances (drugs).

Precursor Chemicals	Laboratory Apparatus
Anthranilic acid	Adapter tubes
Barbituric acid	Condensers
D-lysergic acid	Distilling apparatus
Diethyl malonate	Distilling flasks
Ephedrine	Encapsulating machines
Ergotamine tartrate	Filter funnels, buchner funnels, and separatory funnels
Ethylamine	Flasks: Erlenmyer, two-necked flasks, single neck flasks, round-bottom flasks, Florence flasks, thermometer flasks, and filtering flasks, three-necked flasks
Ethyl malonate	Flask heaters
Hypophosphorus acid	Heating mantles
Malonic acid	Soxhlet extractors
Methylamine	Tableting machines
N-acetylanthranilic acid	Transformers
Norpseudoephedrine	Vacuum dryers
Phenylacetic acid	
Phenylpropanolamine	
Piperidine	
Pseudoephedrine	
Pyrrolidine	
Red phosphorus	

Ordering

The precursor chemicals in the above list must be ordered through the Pharmacy at UNT Health Science Center.

Laboratory Apparatus listed above may be ordered via ePro, but not with a procurement card. Persons ordering this type of apparatus are to mark their orders "Controlled Laboratory Apparatus"

Security

Laboratory personnel and their supervisors/major professors shall keep all controlled chemicals and laboratory apparatus in the laboratory, and these items may not be placed

in public spaces where they be lost, stolen or otherwise left uncontrolled. This includes placing unwanted items in hallways prior to returning them to Central Receiving.

Transfer and sale

These items may not be transferred to other institutions or individuals or sold. Property Control shall contact the Safety Office to review all laboratory equipment lots before they are placed for bid or sale.

Institutional contacts

Dan Hooper, RPH and James Sims, Ph.D. serve as the institutional contacts with the DPS regarding controlled chemicals and laboratory apparatus.