FACILITY SAFETY PLAN

Department of Chemical and Biological Engineering
Colorado State University
Glover Building

SAFETY OFFICE: ADMINISTRATIVE OFFICE
ROOM 100 GLOVER
PHONE 491-5252

Emergency Numbers: **911** **University Police/Fire/Ambulance**
1-6745 **Environmental Health Services**

On Job Injuries: **Injured Person on University Payroll:**

Health Care Contacts:

Emergency Care-
Poudre Valley Hospital Emergency Dept
1024 South Lemay Ave
Fort Collins, CO
24 hours, 7 days per week

Walk-In Urgent Care, Appts & Testing-
Concentra
2620 East Prospect Road, Suite 160
Fort Collins, CO
(970)-221-5811
Mon-Fri, 8:00am - 6:00pm

WORKWELL
1608 Topaz Drive
Loveland, CO 80538
(970)-593-0125
Mon-Fri, 8:00am - 5:00pm

General Care Medical Clinic
620 South Lemay Ave.
Fort Collins, CO 80524
(970)-482-6620
Mon-Fri, 8:00am - 7:00pm
Sat, 9:00am - 5:00pm
Sun, 10:00am - 2:00pm

Walk-In Urgent Care, OHS, Appts & Testing-
Poudre Valley Hospital Occupational Health Services
1330 Oakridge Drive
Fort Collins, CO
(970)-495-8450
Mon-Fri, 7:00am - 6:00pm

Poudre Valley Hospital Occupational Health Services
1025 Pennock Place
Fort Collins, CO
(970)-495-8450
Mon-Fri, 8:00am - 5:00pm
(closed from 12 Noon to 1:00 PM daily)

Injured Person NOT on University Payroll
On Campus: Hartshorn Health Service, Hartshorn Health Center

Facility Safety Plan

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Appendices

EMERGENCY TELEPHONE NUMBERS

POLICE AND FIRE **911**
BUILDING PROCTOR .....Tim Gonzales 1-2390
DEPARTMENT CHAIR .....David Dandy 1-7437
ENVIRONMENTAL HEALTH SERVICES 1-6745

EVACUATION PLAN

1. Faculty who are teaching classes at the time of the emergency are responsible for the orderly evacuation of the class.
2. **DO NOT** take time to turn off computers, printers, or office lights. Close, but **DO NOT** lock, office door.
3. Exit the building through the closest exit. **DO NOT** use the elevator.
4. All personnel should be familiar with the exit paths for their areas. **REFER TO YOUR FLOOR PLAN** and be familiar with the shortest path possible.
5. Proceed in an orderly manner as quickly as possible to the nearest exit and then to the designated reporting area.
6. Stay in the designated reporting area until you are instructed to leave. This way an accurate head count can be taken. Faculty and Lab assistants are responsible for the students.
7. Upon arrival of University Police, the proctor will assist them in whatever manner they request or direct. Poudre Fire Authority staff and/or the University Police will clear the building, checking elevators, areas for the use of the physically disabled, and laboratory areas in the building.

Emergency alarms being turned off DOES NOT mean the building is clear and safe to re-enter. They are silenced so that emergency response personnel are able to communicate with each other. DO NOT RE-ENTER THE BUILDING for any reason until instructed to do so by fire department, EHS, or police officials.

FIRE

a) Pull the red fire alarm. Refer to the floor plan and be familiar with the nearest alarm location. An alarm will ring at CSU police. University Police will call the fire Department.
b) If there is immediate danger, remain calm and follow evacuation procedures and **then** call University Police Department at **911** from a nearby building.
c) If there **IS NOT** an immediate danger, call University Police Department at **911**.
d) If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
e) Follow evacuation plan. Listen for directions and congregate at the designated area. Faculty and lab assistants will account for students.
f) Call the building proctor. (See emergency telephone numbers)
g) **DO NOT RE-ENTER BUILDING**.

IF YOU ARE TRAPPED IN THE BUILDING…

1. If the door to the room you are in is hot to the touch and/or smoke is seeping in around it, **DO NOT OPEN IT.**
2. Remain calm. Walls, ceilings, floors, and doors are designed to withstand fire for a safe period of time.
3. Pack the crack under the door with clothing or other material to keep the smoke out.
4. Let someone know you are trapped. Call **911** and stay on the line until the dispatcher tells you to hang up. If there is no phone available, yell out the window, wave out the window to gain attention.
5. If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
6. Stay low to the floor near the window as the smoke will fill higher areas first.

FIRE EXTINGUISHERS ARE TO BE USED ONLY TO PUT OUT A PATH OF FIRE TO GET OUT OF BUILDING. DO NOT USE A FIRE EXTINGUISHER TO PUT OUT THE FIRE.

HAZARDOUS MATERIALS SPILL

BENCH TOP SPILLS

A bench top spill is defined as; a spill that will not contaminate the water supply, sewer, air handling system, or any other area, is small enough to be easily handled by staff, and there are **NOT** any injuries.

1. Remain calm.
2. Contain the spill with absorbent pillows.
3. Consult the Materials Safety Data Sheet (MSDS).
4. If you are familiar with handling the spilled reagent, obtain the proper spill kit and follow the directions that are with the spill kit.
5. Notify the Principle Investigator for the laboratory.
6. Dispose of all adsorbent according to; Colorado State University Hazardous Chemical Waste Systems Manual.

If you are not familiar with the spilled reagents or you do not feel comfortable cleaning up the spill, follow instructions for large spills.

LARGE SPILLS

A large spill is defined as; a spill that may contaminate the water supply, sewer, air handling system, or any other area, is too large to be easily handled by staff, and/or there are injuries.

1. Remain calm.
2. Only if there **is NO immediate danger**; call **911**, have the following information available for the dispatcher; where the spill has occurred, what was spilled, how much was spilled, when the spill occurred, and if there are any injuries. Stay on the line until the dispatcher tells you to hang up. If there **is immediate danger**, follow the evacuation procedures and call University Police from a nearby building and have the above information available.
3. If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
4. Call the Principle Investigator for the laboratory.

ALL LABORATORIES SHOULD BE EQUIPPED WITH SPILL KITS FOR THE APPROPRIATE MATERIALS BEING USED IN THE LABORATORY. FOR EXAMPLE, ACIDS, BASES, MERCURY, ETC…

SPECIAL AREAS

To assist University Police and Poudre Fire Authority with possible emergencies that require special attention, laboratories, computer areas that have critical data, or any other area which may require special attention in an emergency should be listed here.

1. FLOOR NUMBER
2. ROOM NUMBER
3. WHAT IS SPECIAL ABOUT THE AREA

EARTHQUAKE

1. Take cover under heavy furniture – a table, desk, or bench – or within a doorway.
2. Keep away from glass.
3. Wait for quake or tremor to subside and all falling objects to come to rest.
4. For small quakes and tremors with **NO** apparent damage, return to normal activities, building proctors will survey entire building for possible damage such as; leaking pipes, fallen books, etc. All proctors will meet in designated areas to report damages to University Police.
5. Remain calm.
6. If damage appears heavy, evacuate **ONLY** when notified by University Police that it is safe to leave.
7. Proceed immediately to designated area.
8. Stay away from electrical power sources, fallen lines, buildings, or other tall objects.
9. Do **NOT** smoke. Gas lines may have ruptured.

FLOODING

INTERIOR FLOODING

1. Evacuate the affected area.
2. Report to designated area.
3. Call Facilities for assistance in having water shut off.
4. Call University Police at **911** from a near by building and have the following information available; where the flooding occurred, if there are any injuries and stay on the line until you are told to hang up.
5. If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
6. Stay away from all power (electrical) sources.
7. Stay away from utility vaults.

EXTERIOR FLOODING

1. Remain calm.
2. Call University Police at **911** and let them know what building you are in, how high the water is, and how many people are with you.
3. If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
4. If there is water all around the building, proceed to the roof of the building or the highest point accessible.
5. If there is water on only one side of the building, proceed in an orderly fashion out of the building exit that has **NO** water.
6. Immediately go to the highest area possible.

MEDICAL

1. Remain calm.
2. Call **911** and stay on the line until the dispatcher tells you to hang up.
3. If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
4. Do **NOT** move the victim or give first aid unless you are trained and certified to do so.
5. Remain with the victim and try to keep the victim warm and alert by talking with them until emergency response teams arrive.

TORNADOS AND WINDS

1. Proceed to the nearest interior room that has been designated as a tornado evacuation point and close the door (Refer to floor plan). If at all possible have a phone, radio, flashlights and first aid kits available.
2. Contact University Police at **911.**
3. If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
4. Monitor the storm by listening to the radio**. DO NOT LEAVE THE TORNADO EVACUATION POINT SAFE AREA UNTIL TOLD TO DO SO.** University Police and Poudre Fire Authority will be making rounds throughout campus determining damages and will contact you when it is safe to leave the building. This may take a while, so remain in the designated area until you are contacted to leave. There may be structure damage.

NOTE: Tornadoes have been known to leave the ground and come back down again in a matter of minutes or even as long as half an hour. Remain in the designated area until notified by University Police or Poudre Fire Authority that it is safe to leave.

BOMB THREAT

1. Locate the FBI Bomb Data Questionnaire and fill it out while talking to the caller. If questionnaire is not immediately available, record every word spoken by the caller and any background noises. Then immediately fill out Bomb Threat Questionnaire.
2. Alert a co-worker via note (if possible) while on the line with the bomb threat. Have co-worker call University Police at **911** and have the following information available; where the bomb threat is, who is taking bomb threat call, an estimate of how many people are in the building, and have them stay on the line until the dispatcher tells them to hang up.
3. If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
4. Notify the department head.
5. Notify the building proctor.
6. Evacuate the building immediately.

OTHER EMERGENCIES

ASSAULT, HARASSMENT, DESTRUCTION OF PROPERTY, MUTILATION, VANDALISM, PROBLEM PATRONS, AND THEFT:

1. Call University Police immediately at **911.**
2. Notify the building proctor.
3. Observe suspicious persons but *DO NOT TRY TO DETAIN THEM.*
4. Ask the victim to remain until University Police arrive.
5. Obtain names, addresses, and telephone numbers of witnesses.

POWER FAILURE

1. Facilities maintenance will be contacted by designated departmental personnel.
2. University Police will be contacted by designated departmental personnel after normal working hours and on the weekends.

SNOW EMERGENCY

1. Administration will inform you of any closures during normal business hours.
2. In a severe storm, Housing Management, along with other University operations, will coordinate food and shelter as necessary.

UNDERGRADUATE LABORATORY SAFETY RULES

1. Eye Protection: All students must wear goggles in laboratories where chemical work is done.

2. Warning Signs: "No Smoking", "Caution--Radiation Area", or other warning signs must be strictly obeyed.

3. Horseplay: Horseplay and practical joking of any kind is strictly forbidden.

4. Labeling Containers: All containers of chemicals must be clearly labeled showing the name of the chemical, date, owner's name, and hazards and safety precautions if hazardous. Cancer Hazard labels should be used where appropriate.

5. Securing Compressed Gas Cylinders: Compressed gas cylinders must be secured with a strap, base or chain at all times.

6. Working Alone: No one is to perform experimental work in a chemical laboratory unless a second person is present or located within calling distance.

7. Work Authorization: Unauthorized experiments are forbidden. Before an experiment is performed in an instructional laboratory, approval must be given by the instructor in charge. Experimental work in research laboratories must be a part of the program approved by the research preceptor.

8. Radiation Hazards: Experimental work with radioactive materials or equipment generating ionizing radiation is strictly forbidden without official approval from the University Radiation Officer. Approval for such work may be requested by the Preceptor who will contact the Supervisor of University Radiation Control Office (ext. 3736).

9. Reporting Accidents and Fires: All accidents resulting in injury, property damage, or fire must be reported promptly to the appropriate supervisor and to the Central Safety Committee Chair. (See the section on "General Work Practices", SP-1, for instruction on reporting.)

10. Narcotic Drugs and Carcinogens: Use of narcotic drugs in research work is strictly limited. For up-to-date information on rules and regulations governing narcotic drugs, contact a member of the University drug committee. The chemicals that are considered carcinogens should be used with great care to prevent contamination of either personnel or the work place. All chemicals of this type should be appropriately labeled. For the current list of carcinogenic chemicals, contact the Office of Environmental Health Services (ext. 6745).

11. Dress: Appropriate clothing is to be worn in the laboratories at all times. Clothing should not be loose (saris, dangling neckties, overlarge shirts/blouses, etc.), skimpy (shorts and/or halter tops) nor torn but should provide adequate protection in case of spills. Long hair should be tied back. Shoes must cover the upper part of the foot and must be made of a material that will repel or shed liquids in case of a spill.

SAFE PRACTICES

SP-1, General Work Practices

A. Laboratory Layout and Facilities

It is important that graduate students, postdoctoral fellows, and faculty assigned to a given laboratory make a thorough safety assessment of the facility before starting work.

The scope of such a safety check of the laboratory layout should include:

1. Locating the exits from the laboratory and from the building. Are the aisles, stairwells, and corridors clear? Do not block exits.

2. Locating the fire doors. State codes require that fire doors be kept closed.

3. Locating the nearest telephone and fire alarm box for use in case of an emergency.

4. Locating and checking the condition type and accessibility of fire extinguishers.

5. Locating and checking the operability of the safety showers /emergency sprays.

6. Checking to make sure the exhaust hood system is operating properly and is appropriate for the work that is planned.

7. Locating and checking the operating condition of utility lines, such as hot and cold water, distilled water, steam, gas, nitrogen, oxygen, electrical power, and sewer drains. Location of the main cut-off switches to the laboratory should be known. All drains, valves, and fittings should be checked and requests submitted for repairs when necessary. University and State codes require that only authorized mechanics are to repair or modify power and utility lines.

8. Make an inventory of chemicals and apparatus. Arrange for discarding waste chemicals and obsolete apparatus (see SP-4).

9. Inspect and clean all lockers, cabinets, and benches.

10. Check to see that the proper trash, chemical, and solvent waste disposal containers are available and properly labeled (see SP-3).

11. Make sure gas cylinder supports (bases, chains or straps) are available and used. If needed, make a request to the building proctor.

12. *Special chemicals or spill kits needed to deal with particular types of hazardous materials must be available in the labs in which the hazardous materials are being used.*

Teaching Assistants assigned to an instructional laboratory for the first time are expected to make a like assessment of the instructional laboratory in order to be prepared to handle emergencies. The Teaching Assistant should know:

1. Location of emergency exits from the laboratory and building.

2. Location of the fire alarm.

3. Location, type and condition of the fire extinguishers.

4. Location and operability of safety showers.

5. Location of power line and utility line cutoffs.

6. Operating condition of exhaust hoods.

B. Working Alone

Faculty, postdoctoral fellows, and graduate researchers may work alone in areas other than offices provided the following minimum safety criteria are met:

1. The researcher's presence is known to a second researcher located on the same floor within calling distance.

2. There is little potential for a serious injury producing accident which would render the researcher helpless to call for assistance by voice, telephone, etc.

3. The researcher shall stay in periodic contact with the second person on the floor.

When the experiment is such that there is any potential for a serious accident then a second researcher must be immediately available for assistance.

To perform experimental work in a laboratory, an undergraduate student must have authorization from his or her instructor. Under no circumstances is an undergraduate permitted to work alone without written permission of faculty advisor or department head.

C. Working at Night

Except for regularly scheduled courses, all students and postdoctoral fellows must obtain authorization from their faculty advisor for a permit to work in the building after 5:00 p.m. A signed key request for a building key implies permission to work in the building after 5:00 p.m. Building keys will not be issued to undergraduates without an agreement to follow strict policies signed by both student and faculty. (See following example)

Undergraduate Glover Building Entrance Door Key Policy

Entrance keys for the Glover building will only be issued to undergraduate students if they meet the following criteria:

(1) Undergraduate students have sufficient previous research experience to pose no danger to others in the lab.

(2) Undergraduate students *NEVER* work in the laboratory alone. Somebody else must *always* be present in the labs, within sight and hearing, should an accident occur.

(3) Should an undergraduate student gain entrance to the building after hours and find the laboratory he is working in unoccupied, the student will leave the building.

D. Utility or Power Failures

To perform laboratory work safely, it is essential that the worker include in his or her experimental design provision for a possible utility failure which could cause an accident situation or an unsafe condition to develop. For example, in distillation operations loss of cooling water flowing through the condenser would develop an unsafe condition and result in a possible fire unless provision is made to cut off the source of heat to the still pot. Loss of power to vacuum pumps can cause serious damage to vacuum systems and expensive instruments unless the equipment design and operating procedures are carefully planned to meet such an eventuality. A broken fan belt could shut down a hood.

In the event of loss of power or a critical utility, the worker should quickly terminate his or her experiment, close down the laboratory, and evacuate. He or she should then inform his or her supervisor and report the situation to the Department Office. At night or on weekends the CSU police department should be called at 1-6425 or 911.

E. Unattended Operations

Operations or experiments are not to be left unattended except for certain routine operations where automatic safeties have been installed to effect shutdown in the event of loss in power and other utilities. Such unattended operations must be approved by the research supervisor. On an operation where permission has been given for unattended operation at night, another researcher who will be present in the building must be informed of the operation with agreement to check it periodically. Always leave your telephone number where you may be reached in case of an emergency.

The department periodically experiences a financial loss when a cooling water hose breaks loose and floods the area. Hoses and clamps should be inspected daily. Hoses should not be 'wired' on to connectors; a proper clamp should be used. These clamps are available in the stockroom.

F. Eating

Preparation, storage, or consumption of food or drink in chemical laboratory work areas is forbidden and shall not be practiced because of the danger of contamination with toxic substances. Each laboratory has a designated safe eating area. Before handling food or drink or any other item which may be placed in the mouth, researchers shall thoroughly wash their hands with soap and water to prevent ingestion of harmful materials. If the hazardous chemical is not readily soluble in soap and water, another effective safe solvent should be used, followed by washing with soap and water. Refrigerators used for chemicals are not to be used for food or drink.

The same rules and considerations for food handling also apply to the handling and application of cosmetics.

G. Smoking, Alcohol and Drugs

An Executive Order was issued by the Governor of the state banning smoking and the sale of tobacco products in state-owned buildings effective January 1, 1991. There are no exceptions to this order in academic buildings including offices, rest rooms, hallways, etc. The use of alcoholic beverages and illegal drugs in a chemical laboratory is also forbidden.

H. Reporting Unsafe Practices and Conditions

Unsafe practices and conditions cause virtually all accidents. Immediate correction of a potential accident cause is a basic accident-prevention technique. A person observing an unsafe act, practice, or situation should call it to the attention of the researcher involved or his or her supervisor.

I. Reporting Accidents

All accidents resulting in an injury, in property damage, in a fire or release of toxic chemicals into the environment must be reported promptly to the instructor in charge or to the building proctor. In the event of an accident, the following steps should be taken:

1. In case of injury, render prompt first aid doing only the minimum necessary to prevent more serious injury to the victim. Wash off chemicals with water (shower/spray). Cool burns with water. Control bleeding. Administer CPR if necessary.

2. If the accident occurs in an instructional laboratory, have someone summon help from the area storeroom.

3. If injury appears serious, have someone call an ambulance, giving room number and name of building. CSU Police Department-dial 911.

4. In case of fire:

   a) Pull the red fire alarm. Refer to the floor plan and be familiar with the nearest alarm location. An alarm will ring at CSU police. University Police will call the fire Department.
   b) If there is immediate danger, remain calm and follow evacuation procedures and **then** call University Police Department at **911** from a nearby building.
   c) If there **IS NOT** an immediate danger, call University Police Department at **911**.
   d) If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
   e) Follow evacuation plan. Listen for directions and congregate at the designated area. Faculty and lab assistants will account for students.
   f) Call the building proctor. (See emergency telephone numbers)
   g) **DO NOT RE-ENTER BUILDING**.

IF YOU ARE TRAPPED IN THE BUILDING…

   a) If the door to the room you are in is hot to the touch and/or smoke is seeping in around it, **DO NOT OPEN IT.**
   b) Remain calm. Walls, ceilings, floors, and doors are designed to withstand fire for a safe period of time.
   c) Pack the crack under the door with clothing or other material to keep the smoke out.
   d) Let someone know you are trapped. Call **911** and stay on the line until the dispatcher tells you to hang up. If there is no phone available, yell out the window, wave out the window to gain attention.

e) If calling **911** from a cell phone, the call will go to the Larimer County Dispatch Center. Immediately identify your location as at CSU and you will be transferred to CSUPD Dispatch
f) Stay low to the floor near the window as the smoke will fill higher areas first.

5. For minor injuries involving **students**, send or take the injured student to the Student Health Center (Hartshorn Health Service) for treatment. The injured person should be accompanied to the Health Center. **Accidents involving staff** are treated at the Convenient Care/Emergency Department, south side of Poudre Valley Hospital, 1024 South Lemay Avenue, 495-8000. For accidents involving staff, please see the cover of this book for the latest approved locations for treatment of workplace injuries.

6. Report the accident promptly to your supervisor, also to the Chair of the Safety Committee. Worker's Compensation rules require that notification be made within 48 hours. And that a written accident report (**"COLORADO STATE UNIVERSITY WORKERS' COMPENSATION INJURY REPORT")** be turned in to the department by the injured employee within four days. Forms can be obtained in the Chemistry main office.

7. Finally, prepare a written report for the Chemical & Biological Engineering Department for an accident resulting in injury, property damage, or fire. Departmental accident report forms are available in the main office.

8. Smells (and any other situation that may annoy those in other locations) must be reported even if they are not hazardous. If you create or detect such a smell, call the non-emergency police number: 491-6425.

J. Emergency Evacuation Plan

The following plan outlines the responsibilities of laboratory personnel, floor monitors, and the Safety Committee in the event that an emergency evacuation should become necessary. Fire, explosion, toxic fumes filling the building, etc. may all make necessary such an evacuation. Of prime concern is the safety of all personnel and consideration for property damage should only be given after personal safety is assured.

1. All Laboratory Personnel: When the alarm sounds, proceed as follows:

   a. Turn off electrical equipment and flammable gas outlets and shut, but do not lock, doors to localize fire if you are not in immediate danger.

   b. Vacate building by predetermined exit. Use both exits on Floor 2 unless instructed not to do so.

   c. Proceed to a safe distance and do not reenter the building until directed by a member of the Safety Committee.

   d. If emergency is in your area, retreat to a safe distance and then:

      1) Sound alarm by pulling down lever in fire alarm box.

2) Immediately call **911** and give location and nature of emergency. Do not hang up immediately; pause to give person you're talking with a chance to ask a question. Go to the front door of the building to direct firemen.
3) Attempt to contain fire with hand extinguishers only if you are not in immediate danger. Use extinguisher to clear path to exit.

2. Associate Chair of the Department (and/or Building Proctor): When the alarm sounds, he/she will proceed as follows:

   a. Immediately check to see that the elevator is unoccupied.

   b. Locate specific area and determine nature of emergency.

   c. Make certain emergency has been reported.

   d. Meet and direct fire department to location of emergency.

K. Visitors

Visitors shall comply with all safety regulations in force in the place visited. Appropriate eye protection shall be worn by visitors to any laboratory. In each laboratory it is the responsibility of the occupant assigned to work there to remind visitors of this regulation.

L. Dress

Appropriate clothing is to be worn in the laboratories at all times. Clothing should not be loose (saris, dangling neckties, overlarge shirts/blouses etc.), skimpy (shorts and/or halter tops) nor torn but should provide adequate protection in case of spills. Long hair should be tied back. Shoes should cover the upper part of the foot and be made of a material that will shed or repel liquids.

M. Safety Glasses

All persons in a laboratory, whether conducting experiments or not and including visitors, are required to wear safety glasses or other appropriate eye protection (goggles or face shield). Safety glasses are not required, but their use is still suggested, in areas of the laboratory designated as office areas which are often also designated food areas. Safety glasses may be briefly removed for such tasks as looking in a microscope.

SP-2, Housekeeping (Removal of Hazard)

The continuous practice of good housekeeping is essential to the prevention of accidents, fires, and personal injuries. Students and researchers working in laboratories are expected to keep their benches neat and orderly. A cluttered laboratory is a dangerous place in which to work; by cleaning up after each step of an experiment, a general housecleaning is necessary only occasionally. Each laboratory worker is responsible for:

1. Keeping benches, tables, hoods, floors, aisles, and desks clear of all materials not being used.

2. Keeping clear an adequate passageway to exits.

3. Keeping clear space around safety showers, fire extinguishers, fire blankets, and electrical controls.

4. Keeping floors free of spilled ice, dropped stirring rods, stoppers, pencils, and other tripping hazards.

5. Cleaning up spills and disposing of broken glass.

6. Using proper waste disposal receptacles for solvents, glass, rags, paper, etc.

7. Keeping chemical containers clean and properly labeled.

8. Retaining only the quantities of chemicals needed for current work.

9. Disassembling and returning to storage surplus equipment.

10. Hanging clothing in its proper place; do not drape over equipment and work benches.

SP-3, Chemical Hygiene*

* Later

SP-4, Handling Chemicals

A. General

Chemicals can be hazardous unless properly handled. Serious skin and eye irritations and damage to clothing can result from needless spills and sprays. Toxic materials can cause severe illness, even death. All chemicals, especially new compounds for which the toxicity has not yet been determined, should be assumed to be highly toxic. Flammable gases, liquid, and solids can cause fires or develop into explosive mixtures.

Before working with any chemical, it is essential to **know** its properties. The properties of known reaction products, intermediates, or even possible reaction products should be ascertained **before** work begins. In exploratory research work only very small quantities of chemicals should be employed. Larger amounts may be used only after the initial work has been successfully completed and the reaction rates and the properties of the reaction products have been established. It is worthwhile in making predictions about reactions to calculate the free energy of reaction for the planned experiment.

Hazardous chemicals include, in addition to flammable materials, those substances which are pressurized, cryogenic, temperature sensitive, toxic, corrosive, and/or reactive. It must be recognized that a material, which by itself is comparatively harmless, can become very hazardous under conditions of use and under conditions to which it may be subjected accidentally--as in the event of fire. Good references for additional information on chemicals and their hazardous properties are listed in Appendix IV; see also the EHS website Hazardous Laboratory Chemicals Disposal. Material Safety Data Sheets (MSDS) for all chemicals recently purchased are in a file cabinet in G146. A copy of the MSDS for any recently purchased chemicals should be provided to the main office for the file.

B. Training

The faculty member in charge of each laboratory group is responsible for training the members of the group in the following areas: All training is to be documented as to type of training and who received it. The training must include the following:

1. Safety and hazards associated with procedures and chemicals used by each group. Including biohazards and their symptoms, proper use of personal protective equipment, safe methods for handling and storage of hazardous materials, specific hazards of chemicals to which the group/individual may be exposed. Individuals in each group are also to be trained in methods and observations that they can use to detect the presence of hazardous chemicals, e.g., smell, visual appearance or monitoring equipment that may be available.
2. Location and availability of reference materials (including MSDS) on chemicals used in the laboratory covering the following data:

Hazards	Safe Storage
Safe Handling Procedures	Safe Disposal

3. Location and proper use of fire and spill control equipment.

4. Provisions of the Chemical Hygiene Manual and how it is to be implemented in the department.

5. Proper labeling as required by 29 CFR (Code of Federal Regulations) 1910.1200. A copy of this document is kept at Environmental Health Services. (http://www.gpoaccess.gov/cfr/index.html)

6. Procedures for waste reduction, detoxifying, hazard reduction and proper disposal for all waste generated in the laboratory.

7. Circumstances under which prior approval must be obtained before a procedure is started i.e.: use of controlled substances, use of radioisotopes, chemicals that are biohazards.

8. Permissible exposure limits for regulated substances and recommended exposure limits for other hazardous chemicals where no OSHA standard exits.

C. Labeling

A most important safety practice in the handling of chemicals is to keep reagent containers properly LABELED. Containers of all substances in your laboratory shall be labeled showing:

1. The chemical name and structure.
2. The date of purchase, preparation, or transfer to its present container.
3. The owner's name.
4. A brief notation of hazard if any, as for example a word like one of the following: toxic, corrosive, flammable, explosive, poison.

Labels are available from Tim Gonzales (Glover/146) that use the universal hazard symbol, a diamond containing four colored diamonds - blue for health hazard, red for fire hazard, yellow for reactivity and white for a specific hazard. Numbers from 0 to 4 are used to designate the degree of hazard in each category. The categories on the labels are blank allowing the user to fill them in with the appropriate number.

Containers used to collect and temporarily store chemical waste should be clearly labeled '**HAZARDOUS WASTE**' and in addition information as to:

1. Type of waste, i.e., halogenated solvents, acid waste, etc.
2. Date when waste collection in the container was initiated.
3. Owner's name and room.
4. A running record should be kept of the types of waste and quantities so as to be able to give percent composition (1%) of the contents of the filled container.

Labels are available to print on-line at: http://www.ehs.colostate.edu/forms/default.asp - Haz

D. Hazardous Vapors

Experiments involving toxic, flammable and/or corrosive vapors should be carried out in fume hoods. In general, when working with small quantities of such materials the hood exhaust volume is sufficient to prevent an atmospheric pollution problem above and outside the building. When large-scale operations are carried out in fume hoods which evolve large amounts of either flammable, corrosive, or toxic vapors, these vapors should be treated to destroy the harmful effects and thereby prevent atmospheric pollution outside the building. For example:

1. Condense flammable vapors and then dispose of the condensate.
2. Absorb halogens and like materials in an appropriate reducing agent and flush the resulting solution to the sewer (check pH). See Appendix II for a list of chemicals that may not be flushed to the sewer.
3. Absorb HCN in an alkaline oxidizing agent such as Clorox and flush the solution to the sewer.

E. Explosive Reactants

Perchloric acid is especially dangerous because it explodes on contact with organic materials. Do not use perchloric acid on wooden benches or tables. Keep perchloric acid bottles on glass or ceramic trays having enough volume to hold all the acid in case the bottle breaks. Discolored acid (contaminated) should be disposed of immediately. Gently pour the discolored acid into a beaker or porcelain jar which contains at least twenty volumes of cold water for each volume of acid. Mix gently, neutralize to a pH range of 6-9 and pour the diluted and neutralized material down a drain with large amounts of cold water. A special hood is required if an operation is carried out in which the acid is heated to fuming. Such fuming operations are forbidden in ordinary hoods.

F. Unused Chemicals

Unused chemicals should not be allowed to accumulate in a laboratory. All reagents should be inspected periodically and those not needed removed. Dates on labels of materials that may form hazardous substances on prolonged storage should be checked periodically and those that are excessively old should be disposed of in a prudent manner.

The following items should not be stored beyond **three months** after opening.

Acetal
Decahydronaphthalene (Decalin)
Dicyclopentadiene
Diethylene glycol dimethyl ether (Diglyme)
Divinyl acetylene
Glycol monoethers (uninhibited)
Methylacetylene
Sodium amide
Tetrahydronaphthalene (Tetralin)
Vinylidene chloride
Cyclohexene
Diacetylene
Diethyl ether
(uninhibited) Dioxane
(uninhibited) Glycol ether acetates
Isopropyl ether
Potassium with Organic Material (e.g., oil)
Tetrahydrofuran (uninhibited)
Vinyl ethers

The following items should not be stored beyond **six months** after opening.

Acrylonitrile
Chloroprene
Methyl methacrylate (uninhibited)
Tetrafluoroethylene
Vinyl chloride
Butadiene
Chlorotrifluoroethylene
Styrene
Vinylacetylene
Vinylpyridine

Peroxidizable solvents should always be regarded as containing peroxides. Accordingly, the practice of routinely testing for peroxides prior to running a distillation should be adopted. A little practice with standard peroxide detection procedures should enable a chemist to make a round estimate of the quantity of peroxide found. A qualitative test for peroxides follows.

IODINE TEST METHOD based on the oxidation of iodide to iodine by the peroxide:
This procedure is satisfactory for all of the common solvents but does not indicate the presence of dialkyl peroxides or some dimeric and trimeric ketone peroxides. Add 6 ml of the solvent to be tested to 3 ml of a 1% absolute ethanolic solution of sodium iodide (potassium

iodide is insoluble) in a standard 6" test tube. Add one drop of 1% HCl solution, purge with N_2 and stopper. Mix and compare the color intensity developed after about three minutes with that of a standard prepared to represent 1:5000 parts of active oxygen (0.02%). If the test indicates this peroxide content or greater, the solvent should be discarded or the peroxide removed. The standard is prepared by dissolving 1.7 g of $FeCl_3$. $6H_2O$ in 100 ml of 5% HCl to reproduce the color obtained when 1.2 ml of 0.1N I_2 solution is diluted to 15 ml. The standard solution is stable.

G. Flammable Reagents

The total amount of volatile, flammable solvents stored in a laboratory should not exceed 10 gallons (five gallons in teaching laboratories). Whenever corrosion or contamination is not a factor, store solvents in excess of one gallon quantities in metal containers and store low flash point liquid in standard safety cans. Limit quantities of solvents in glass bottles to the smallest practical size but not over one gallon; store glass bottles of solvents in closed metal cabinets. Because of the danger of fire, low flash point liquids and gases under pressure should not be stored close to sources of heat such as radiators, hot plates, ovens, etc. Also, keep cloth and paper towels away from heat sources. (Safety may be increased by storing glass bottles in topless metal cans.)

H. Spills

Non-hazardous materials may be cleaned up using normal procedures. The appropriate response for a hazardous spill depends on the location (lab, hallway, outside the building) and the chemical (solid, liquid, flammable, toxic). Absorbent pillows are available in every lab and should be in a location known to all lab personnel. The spill should be contained as quickly as possible using appropriate means to do so. Corrosive material should be neutralized with sodium carbonate or sodium bisulfate. Avoid breathing vapors and use a respirator if necessary. Material that is especially hazardous may necessitate evacuation of the area/building and require special cleanup apparel (bromine, hydrofluoric acid, etc.) DO NOT ENDANGER HEALTH OR LIVES by failing to evacuate promptly if such a hazard exits. After containing the spill consult a manual, MSDS or Environment Health Services for proper cleanup procedure.

I. Routine Precautions

Listed below are a few simple but important reminders of precautions that should be considered in the routine handling of reagents. It should be remembered that under the right set of conditions any chemical can be hazardous. In the last analysis you are in charge of your own safety, it is your responsibility to use good safety practices at all times.

1. Keep reagent containers clean on the outside to protect your hands; use rubber or plastic gloves when appropriate.

2. Be sure laboratory gloves are clean on the inside before using; cleanse or decontaminate gloves regularly.

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

4. If water is not the appropriate washing agent or antidote, procure proper emergency supplies before starting work.

5. Avoid inadvertent contamination by not returning unused portion of reagents to stock bottles. Stoppers should be held while pouring.

6. Never taste a chemical.

7. Smell cautiously--sniff (never inhale).

8. Use a safety pipette filler (pipetting by mouth is prohibited).

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

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

11. Keep flammable solvents such as benzene, ether, etc. away from hot plates and flames.

12. Use bonding and grounding wires when transferring flammable solvents.

13. Use adequate eye protection for the job you are doing. If you are working with liquids use goggles that fit tight against the forehead and sides of the face, if you are working with solids where the danger is from propelled particles then regular safety glasses are probably sufficient. You must be the judge of the danger in what you are doing. Under no conditions should contact lenses be worn in the laboratory. If chemicals do get into the eyes they should be washed for at least 15 minutes with the spray and help should be summoned. In all cases involving the eyes a physician should be seen.

14. Use caution in working with mercury to avoid vapor contamination of the laboratory air. The equilibrium concentration of Hg vapor over liquid mercury at room temperature is approximately 20 times the threshold toxic limit (TLV).

15. Clean up spills of mercury and other chemicals promptly. Mercury spill kits (Cinnasorb Activator and Base) are available from Tim Gonzales (Glover//146). After the cleanup is complete have Environmental Health Services check the area.

16. Know the locations of safety showers and eye washes, and know how to use them.

17. Be sure that incompatible chemicals are stored in separate locations. See Appendix I for a typical list of incompatible materials.

18. Never eat, drink or apply cosmetics in an area where chemicals are used or stored.

19. Always wash areas of exposed skin after handling chemicals and prior to leaving the laboratory area.

20. Use appropriate protective equipment as the situation may warrant, i.e., lab coats, respiratory equipment, gloves, face shields, chemically resistant aprons. Bear in mind that plastic aprons can accumulate static electricity and should not be worn around flammable solvents. Lab coats should be removed immediately upon significant contamination.

21. Do not use chemicals with which you have not had previous experience prior to receiving clearance from the P.I. Discuss each experimental procedure with your laboratory P.I. from a safety standpoint prior to carrying it out for the first time. Where possible calculate a free energy for the reaction prior to actually trying the reaction.

22. Read the MSDS for each new chemical prior to using it for the first time and follow the recommended safety procedures. Have available the spill response equipment needed to clean up in case of a spill.

23. Be aware of the types of compounds that are susceptible to peroxide formation. Discard any that are suspicious. Active peroxide formers should be dated when first opened and then not kept for more than three months.

J. Secondary Containment of Caustic/Flammable Chemicals

When transporting caustic or flammable chemicals from laboratory to laboratory or from the stockroom to the laboratory these chemicals should have secondary containment sufficiently large to hold the contents of the chemical container if it were to break. See Appendix A, Paragraph D. of CFR (Code of Federal Regulations) Part 1910.1450. A copy of this document is kept at Environmental Health Services. (http://www.gpoaccess.gov/cfr/index.html)

SP-5, Chemical Waste Disposal

A. Responsibility

In the instructional laboratories, the disposal of unused chemicals is incorporated as an integral part of the course and specific instructions are given on methods of handling and disposing of waste products. In the research laboratory, where many unusual and specific chemicals are used, the responsibility for disposal of unused reagents and waste reaction products is vested directly with the researcher and his or her project supervisor because, in most cases, it is only the researcher who knows how to handle the materials safely. In either case, waste chemicals should never be deposited in wastebaskets or other trash containers, but rather should be disposed of by one of the following general procedures. See Appendix II for further details. All researchers must take the University Hazardous Waste Training and have a yearly refresher course.

B. Water Soluble Wastes

In general, small quantities (100 ml or less) of water-soluble chemicals which do not hydrolyze to form volatile, toxic, or odoriferous materials may be flushed down the drain. Larger quantities of waste acids, bases, and chemicals which hydrolyze to form corrosive and hazardous products should be treated to render them harmless before flushing to the sewer. In general, hazardous chemical wastes should be subjected to a process in the laboratory which converts them into harmless products not requiring special handling. See Appendix II for the list of chemicals which may not be disposed of through the drain system.

C. Flammable Liquid Waste

Flammable liquids not miscible with water must not be poured into the sink or other sewer drains. Low flash point, flammable wastes and solvents should be placed in safety cans and turned over to Environmental Health Services for disposal. Waste solvents containing materials in solution apt to form toxic or corrosive substances of hydrolysis, oxidation, etc. should first be

treated to render them harmless prior to disposal. When in doubt, contact Office of Environmental Health Services (ext. 6745).

D. Water Insoluble Solids and Nonflammable Liquids

Those hazardous materials which can be stored safely over a period of time without deterioration should be kept in their original containers and turned over to Environmental Health Services for disposal. Forms are available in the Main Office to initiate this procedure. Used column packing (Al_2O_3, SiO_2) should not be dumped loose into waste paper baskets. It should be packaged and then disposed of by placing it in the dumpster or if contaminated by highly toxic compounds, disposed of by normal hazardous waste procedures.

E. Emptied Chemical Containers

Before discarding, all empty chemical containers must be triple rinsed and dried. Rinse containers for organic reagents first with acetone and then with water. This practice prevents subsequent injury to those handling the discarded containers. Discard with the lids removed. Metal cans must be punctured or open at both ends.

F. Special Attention

Mercaptans and organic sulfides have posed a number of problems for the Chemistry Department when improperly disposed. The proper disposal of these chemicals includes a pre-treatment, in the hood, with hypochlorite to oxidize the sulfur followed by acid/base neutralization (neutral to litmus), if necessary. This solution may then be washed to sewer with excess water.

SP-6, Handling Compressed Gas Cylinders (Safe Technique)

Compressed gases impose potential hazards on the laboratory worker if not properly handled. Such gases can be used in the laboratory with safety if the following precautions are complied with completely during cylinder receiving operations, storage, transportation, usage, and empty cylinder disposal.

A. Know Cylinder Contents and Its Properties

The physical properties, flammability, corrosiveness, and physiological (e.g., toxicity, anesthetic, and irritating) properties of a cylinder gas should be known before it is used. If the contents of a cylinder cannot be determined completely from looking on the cylinder or an accompanying tag attached to the cylinder (not its cap), mark the cylinder "Unidentified" and return to the supplier. Do not rely on cylinder colors, which vary from company to company; some people are color blind. Never remove or deface a label.

B. Handling of Cylinders

Cylinders are built as lightweight as possible consistent with safety and durability for use as shipping containers. They therefore should be transported carefully--large cylinders (over 24 inches high) should be transported only with a wheeled cart. Large cylinders should be fastened securely with a strap or chain before removing the cap. Abuse and hard knocks can seriously weaken a container, and a falling cylinder can break legs and crush feet. Do not transport cylinders in a car. Never be in a confined space (such as an elevator) with a cylinder. Finally,

should the valve be broken, the cylinder becomes a powerful rocket. Keep these hazards in mind when working with gas cylinders.

C. Heating of Cylinders

Most cylinders are equipped with fusible metal safety plugs which release if it is heated above 70°C. Therefore, if it is necessary to warm a cylinder to facilitate discharge of the contents, immerse no more than the lower 20% in warm water; steam should never be used directly on a cylinder. The valve must be partly open whenever a cylinder is warmed.

D. Use of Valves and Regulators

A cylinder is always used with a regulator selected specifically for the given gas. The threads of the regulator will match the threads of the cylinder outlets. If the connection must be forced, you have either the wrong regulator or the wrong gas. To remove gas through a regulator, first ensure that all valves are closed, then, in succession, and slowly open all valves (starting with the cylinder valve). Be sure that the final valve opening directs the flow of gas away from you, others and any ignition source if applicable. Always wear safety glasses or goggles. Close all valves in the same order as used in opening them. Since cylinder valves, particularly those used with corrosive gases, are designed so that the valve stem and packing are protected from contact with the gas when the valve is either completely open or closed, it should always be in either of these two positions. The cylinder valve should be closed when gas is not in use.

E. Control of Gas and Reaction System

To prevent contaminants from entering the system, always place a trap between the cylinder and the system. To prevent an explosion resulting from suck-back of contamination into the cylinder, never completely empty the cylinder. If pressure may build up in the system, equip the line with a pressure indicator and a safety vent.

F. Handling of Empty Cylinders

The valve should be closed and the cap replaced on empty cylinders. They should be marked with "MT" and dated. Do not attempt to refill a cylinder.

G. Repair and Adjustment of Equipment

Do not attempt to repair a regulator yourself. Also, never attempt to tighten nuts or bolts on fittings of high-pressure equipment while it is in use. Release the pressure first, then make adjustments.

SP-7, Handling Equipment and Apparatus (Safe Technique, Judgment)

Any material (be it a chemical, an apparatus, an item of furniture, a fixture...) can present a hazard, start a fire, or cause injury if not properly handled. You can remove or minimize the hazard with proper handling. Some of the precautions in handling common laboratory equipment are listed below.

A. Equipment Location

Locate equipment set-ups as far back from the bench edge as possible, and be sure that the center of gravity of the apparatus is within the base area. Use ring stands properly.

B. High-Pressure Apparatus

Inspect all pressure equipment carefully before using and establish the limitations of the equipment with respect to temperature, pressure, and capacity. Be certain that the system is equipped with a safety relief valve and that it is operative. Introduce compressed gas from cylinders slowly and cautiously into the system, making certain that there is adequate shielding between you and the system including the pressure gauge. Remember to reduce the internal pressure to atmospheric pressure via the relief valve before you open the pressure vessel. High-pressure apparatus should be used in the bomb room on the roof.

C. Reduced-Pressure Systems

Many of the precautions for use of high-pressure equipment apply equally here (e.g., limitations and inspection of equipment, provision for capillary relief valve, turning vacuum lines on (or off) slowly, examination of pressure gauges). In addition, round-bottom flasks should be used for low-pressure reactions, and vacuum pumps should be protected from corrosive gases (such as halogens, SO_2, HCl, etc.) by placing appropriate traps in the system. All glass vessels used in vacuum or pressure systems should be wrapped in tape to reduce the danger of flying glass in case of an implosion/explosion.

D. Mechanical Systems

Avoid personal injury by protecting or covering pump shafts, moving belts, etc. from towels or clothing, using explosion-proof motors on which liquid has been spilled, and use again only after they have thoroughly dried inside and out.

E. Electrical Assemblies

Avoid dangerous makeshift wiring assemblies by having permanent wiring (either conduit or BX cable) installed by an electrician. Replace immediately worn extension cords. Never handle any electrical connections with damp hands or when standing in or near water, and be wary of static accumulations, especially in high voltage situations. Never leave any conductor exposed if the electrical potential from it to ground exceeds 50 volts.

SP-8, Handling Laboratory Glassware (Safe Technique)

If not properly handled, glass apparatus can be a serious hazard to the chemist. These hazards can be minimized by exercising certain precautions.

A. Handling Glassware and Tubing

Always carry glass tubing or rod in a vertical position. Protect your hands with a cloth towel or with gloves when cutting or breaking tubing, and fire polish immediately sharp edges of all glassware. Test glassware for strains, and when necessary remove strains by annealing.

B. Inserting and Removing Tubing and Stop-cocks

Lubricate, using water or glycerol, the surface of glass tubing before inserting into rubber tubing or stoppers. When working such connections, protect your hands with gloves or a towel, and keep your hands close together. Use the same technique to remove glass tubing from rubber tubing or stoppers, and never use great force. If necessary, a lubricant can be worked between the rubber and the glass with the neck of a file. Frozen stoppers or stop-cocks should be removed with a stop-cock lifter.

C. Using Vacuum Glassware

Protect yourself from flying glassware in the event of an explosion or implosion whenever glass apparatus under pressure or vacuum is used by employing a safety shield. *Face shields should be required when using glass vacuum lines containing corrosive or toxic materials.*

Additional protection can be gained by wrapping vacuum desiccators and Dewar flasks with electrical tape. Remove the cover of a desiccator with caution, after the pressure has been equalized, by sliding the cover to one side; do not lift. If the lubricant on the ground-glass surface has hardened, soften it by gentle warming with hot water. *Vacuum lines containing hazardous materials must be located in fume hoods.*

D. Disposing of Broken Glassware

Glassware should always be washed before it is stored or discarded. Remove broken glass fragments from desktops and floors with a brush (never your towel), placing it in the proper disposal can. Never store broken or fractured glass in your locker. Glass and other sharps (needles) should never be disposed of in the garbage. Always pack glass and sharps waste in a cardboard box (see next section) and tape the box closed for disposal. Label as “Sharps” or “Broken Glass”.

LABORATORY SHARPS WASTE HANDLING POLICY

(Building Services Group of Facilities Management)

(12/07/01)

The Building Services Division comprises both Custodial Services and Integrated Solid Waste (ISW) operations. The division handles waste from the standpoint of individual generation to the approved waste or recycle containers. The only exception to that service is in handling waste streams that fall privy to regulations interpreted, defined, and enforced by the Environmental Health Services (EHS) Department. Many of those regulations are directed at laboratory operations.

Recent negotiations between lab managers and their department, Building Services, EHS, and the Larimer County Landfill have resulted in the changes defined by this policy. The purpose of these negotiations about sharps handling and disposal was to resolve four issues:

1. to ensure that CSU meets all applicable regulations,
2. to meet Larimer County requirements for material acceptance at the landfill,
3. to define Custodial and ISW responsibilities in sharps waste handling and reduce the number of employee injuries in handling sharps waste, and
4. to define lab users/managers responsibilities in handling lab sharps waste.

Building Service's custodial personnel will move new, dedicated, and marked central collection bins to permanent locations for sharps waste pick up points for the ISW personnel outside of the given buildings. Custodial will then notify ISW that a pickup is needed. ISW will empty the bin on that shift. Custodial will return the bin to its designated location.

Laboratory personnel will be responsible for safely depositing sharps waste using approved containers into the central bins. If bins are full and they cannot immediately deposit the waste into the bin, they should return the waste to their lab temporarily and notify the Facilities Dispatch operator at 491-0077 of the situation. Only two types of containers are approved by EHS for this waste. ***Labs must either use approved disposable (single use) sharps containers or a sturdy, double Box (cardboard) system that is taped shut at the time of disposal and will fit into the designated bins provided in their buildings.*** Bin size is 23" by 19" (mouth) by 33" high. Five gallon buckets will not be acceptable to EHS and must be disposed of after placing sharps in one of the approved containers. Place sharps in one of the approved containers until they are full and then tape them shut securely before taking to the designated bin. Building Services will not handle containers left anywhere except inside the designated bins.

Should you have any questions about this policy, please call Building Services at 491-0119, ISW at 491-0113, or EHS at 491-6745. Should a lab manager need additional collection bins or changes in specified bin locations, please contact Building Services, ISW, or the Facilitates Dispatch operator. ISW work hours are Monday through Friday from 8:00 a.m. to 8:00 p.m.

SP-9, Fire Prevention (Judgment, Safe Technique)

A. Fire Requirements

To start a fire three components must be present: One must supply a fuel, an oxidizing agent, and a source of heat for ignition. Many fires can be avoided if the worker simply keeps the fuel and oxidant away from the hot ignition source. The major sources of heat in the laboratory are:

1. Matches
2. Bunsen burner
3. Electric hot plates
4. Electric sparks
5. Steam baths

The major source of oxidant is, of course, air (oxygen); however, other oxidizing agents can supply the oxidant. Sources of fuel are:

1. Wood
2. Painted surfaces
3. Towels, oily rags
4. Paper and books
5. Hair and clothing
6. Gases (methane, hydrogen)
7. Flammable solvents
8. Many other chemicals or dusts thereof

B. Precautions

The storage and handling of volatile flammable liquids requires that certain precautions be taken to minimize the fire hazard. The inherent fire and explosion hazard depends not only on the flash point of the fuel but also on its ignition temperature, explosive range, and vapor density.

1. The flash point of a fuel is the lowest temperature at which it volatilizes fast enough to form an ignitable mixture with the air surrounding the flash apparatus.
2. The ignition temperature of a material (whether solid, liquid, or gaseous) is the temperature required to cause sufficiently rapid oxidation to be self-sustained when the hot ignition source is removed.

3. The explosive range of a fuel refers to the definite limitations of combustibility and rate of burning of the flammable vapor or dust mixture in air. The mixture is "too lean to burn" when the particles are so widely separated that those set afire by the hot ignition source will not set fire to others that are nearest. The mixture is "too rich to burn" when the particles are so close together that they exclude the oxygen necessary for combustion. The concentration between the "leanest" and the "richest" mixtures that will burn is called the "explosive range".

4. A flash fire results from very rapid oxidation and occurs only when:

   a. The fuel is mixed with sufficient oxygen for complete combustion. The particles of fuel vapor or dust are suspended in a diffused state in air, close enough to each other to propagate the flame through the vapor or dust and still sufficiently separated to make room for the required amount of oxygen for combustion.

   b. A source of heat equal to the ignition temperature is present. Any electronic equipment, even equipment not used for heating, can generate heat. Furthermore, electronics and electrical equipment not rated as explosion proof (e. g. a stir plate) may produce a spark that could serve as an ignition source. Such equipment should not be used with volatile organics in confined spaces where explosive vapors may accumulate. For example, flammable liquids and gasses should never be stored in a non-explosion proof refrigerator or freezer.

To avoid a flash fire, keep the fuel at a temperature below its flash point and keep it away from hot surfaces that are above the ignition temperature. Remember the vapors having a density greater than air will flow downward to the hot plate whereas those less dense than air will flow upward.

C. Fire Extinguishing

A fire is extinguished by applying the same principles followed in trying to avoid it.

1. Reduce the air supply by smothering--cover the vessel or apply CO_2.

2. Shut off or reduce the fuel supply.

3. Cool the fuel below its ignition temperature.

4. Lower the concentration of the fuel by dilution with an inert material.

Types of fires:

1. Class A: burning wood, paper, cloth, etc.; extinguished with water, foam, soda-acid, or CO_2.

2. Class B: burning oils, greases, paints, etc.; extinguished with foam, CO_2, or dry chemical.

3. Class C: live electrical equipment; extinguished with CO_2 or dry chemical.

4. Class D: active metals such as sodium, potassium, aluminum, magnesium, lithium, also diborane, etc.; extinguished by smothering with dry soda ash, dry sodium chloride, sand (never use water, foam, CO_2, or CCl_4).

D. Safe Practices

The following safe practices must be known and observed to prevent or handle a fire:

1. See that corridors and stairwells are kept clear; avoid placing chemicals, equipment or furniture therein.

2. See that fire doors are kept closed at all times.

3. Know the location of fire blankets, safety showers, buckets, and fire extinguishers.

4. Know how to operate fire extinguishers and the type of fires for which they are to be used.

5. If a fire occurs, first get a fire extinguisher, and after assessing the situation and your personal safety, extinguish the fire, render assistance, or get additional help.

6. Never return an empty or partially used extinguisher to its rack. Tag it empty and call the facilities dispatcher (1-0077) to have it replaced.

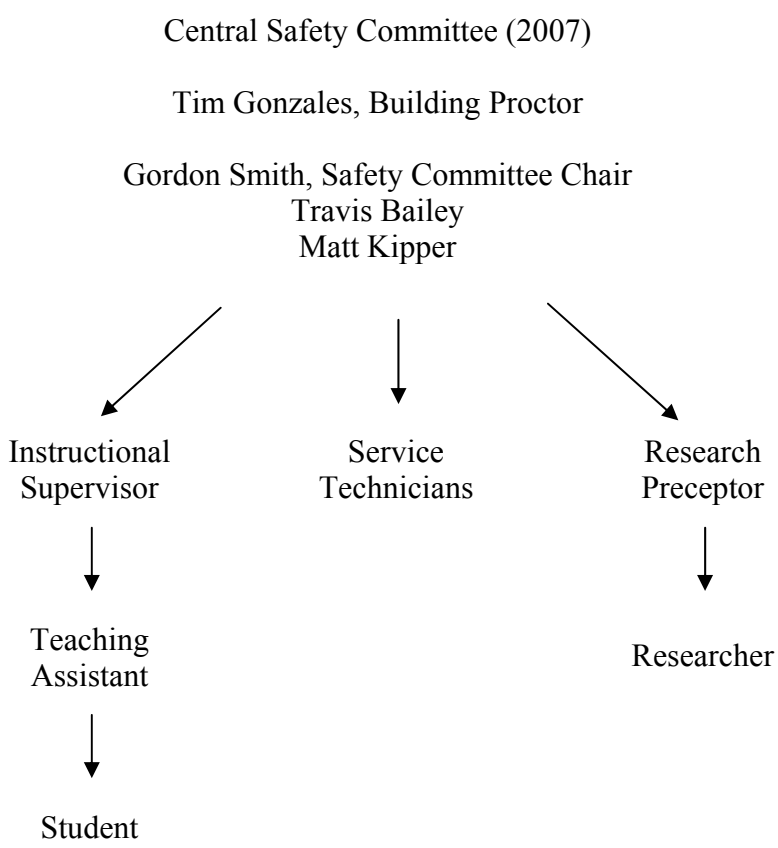
7. All fires for which an extinguisher is used or which causes damage or injury must be reported.

8. If your clothing should catch fire, try to stay calm, don't run, but quickly get under a shower and keep the water running. Or, wrap yourself in a fire blanket. Yell for help.

9. If a fire cannot be snuffed out immediately, have someone sound the building fire alarm and call **911**. Give name and room number. Go to the front door of the building to direct firemen.

10. After hours call the emergency number (911). Give name, building, and room number.

DEPARTMENT OF CHEMICAL & BIOLOGICAL ENGINEERING
SAFETY ORGANIZATION



A. Responsibility for Safety

Each member of the Chemical and Biological Engineering Department is a member of the safety team; this includes all employees as well as postdoctoral fellows, and graduate and undergraduate students associated with the Department. Each is responsible to the Department through the line organization. Primary responsibility is placed on the individual doing the work. For example, the student, the craftsman, or the researcher is responsible to his or her supervisor or preceptor for doing their work safely. In turn the teaching assistant, the instructor, or the service supervisor is responsible to his or her supervisor who in turn is responsible to the Chair and to the Dean of the College.

B. Central Safety Committee

Members of the committee representing major work areas in the Department are appointed by the Department Chair. The committee is responsible for:

1. Establishing Department safety policy.
2. Promoting uniform safety practices.
3. Fostering good communication in safety.
4. Reviewing the Department's safety program.

5. Reviewing the Department's accident experience.

6. Conducting departmental safety inspections at intervals.

7. Assessing the Department's safety protection equipment.

8. Formulating the annual safety budget.

C. Chemical Hygiene

1. Chemical Hygiene as specified in CSU's Biosafety Handbook, 29CFR (Code of Federal Regulations) (http://www.gpoaccess.gov/cfr/index.html) 1910.1450 (OSHA Laboratory Standard) and the CBE Department's Chemical Hygiene Plan (under development).

D. Principal Investigator and Group Safety Representative

The PI and/or supervisor of each operational group in the Department is responsible for the safety program within that group. To assist in discharging this responsibility, he or she should appoint a member of his or her group to serve as safety representative and an alternate. On the other hand, the supervisor or preceptor may elect to serve in this capacity himself or herself. The primary duties of the safety representative include:

1. Development of a safety program for his or her group.

2. Consultation on matters pertaining to safety.

3. Establishing procedures to handle emergencies.

4. Reviewing new or modified practices.

5. Reviewing design and construction of new and modified experimental units.

6. Periodically participating in Division safety inspections.

E. Teaching Assistant Duties and Responsibilities for Safety

The strength of the Department's safety program depends on the performance of its Teaching Assistants in the undergraduate instructional laboratories. By his or her actions and example the Teaching Assistant develops students with safe working habits. By doing so he or she strengthens his or her own safe working habits and acquires an alertness to the hazards of the chemistry laboratory. These habits carry over to his or her own graduate research work. A few guidelines regarding the Teaching Assistant's duties with respect to safety are:

1. Teach and enforce safety as an integral part of the course.

2. Make and see the students make a careful analysis for safety before starting an experiment. Such an assessment includes:

a. Collecting pertinent information

b. Forecasting potential hazards

c. Selection of safe techniques

d. Use of protective equipment

e. Plan of action in case an unanticipated accident occurs.

3. See that safety rules are obeyed; set a good example yourself.

4. Remain in the laboratory at all times when students are present; have someone else in charge if you must leave.

5. Know the location and use of the protective equipment provided.

6. In case of accident or illness:

   a. Render prompt first aid

   b. Have someone report to the course storeroom for help.

   c. If injury or illness appears serious, have someone call for an ambulance.

   d. Report all accidents that cause injury, no matter how minor, immediately to your supervisor and the Chair of the Central Safety Committee.

   e. Prepare a written report on all accidents that cause injury.

7. In case of a fire:

   a. If small and easily extinguished, select and use the laboratory extinguisher at once.

   b. If a fire cannot be snuffed out immediately, have someone sound the building fire alarm and call **911**. Give name and room number. At the same time proceed with an orderly evacuation of the building.

   c. Tag all fire extinguishers that have been used as empty. Call the facilities dispatcher (1-0077) to report the extinguisher as one that must be replaced.

   d. Prepare a report on all fires that cause damage or injury. Inform supervisor and the Chair of the Central Safety Committee.

Chemical Inventories

A. Laboratory Chemical Storage.

Chemical Inventories in research laboratories should be kept at the minimum level consistent with efficiency and safety. Unneeded chemicals should be turned over to the University's surplus program (administered by Environmental Health Services). Chemicals in the surplus program are available to all research groups and both should be checked for chemicals prior to ordering new reagents.

Flammable chemicals, those having flash points less than 38° C. should be stored in solvent cabinets. Chemicals should be stored according to functional group or reactive character and NOT alphabetically. Items stored in refrigerators should have secondary containment so as to protect the evaporator coils (aluminum) in the refrigerator. Oxidants should not be stored next to reducing agents and should have secondary containment.

Highly toxic chemicals and those known to be carcinogens should be stored in ventilated storage cabinets or, if not these are not available, then in hoods. These chemicals should be labeled "CAUTION: HIGH CHRONIC TOXICITY OR CANCER SUSPECT AGENT." These chemicals should be used only in a designated area with appropriate warning signs (see Chemical Biohazards in the CSU Biosafety Handbook)

Hoods should not be used for general chemical or equipment storage.

Cylinders of compressed gases should be chained to the bench top or wall except when being transported. Cylinders not in use should have the top cap screwed on tight. Small cylinders not equipped with caps should be stored in such a way as to prevent them being accidentally dropped to the floor when not in use. All cylinders that are in the laboratory for more than twelve months should have regular (bimonthly) inspections to check for leaks and corrosion. Cylinders should be returned to the manufacturer at the first sign of corrosion. Leaking cylinders should be immediately moved to the hood and the contents released and neutralized or rendered non-hazardous by the appropriate technique. The empty cylinder should then be returned to the manufacturer.

B. Inventories.

An inventory of the chemicals stored in the laboratory should be taken annually and reported to the building proctor, Tim Gonzoles. This information is further communicated to Environmental Health Services and to the local fire departments. This is a requirement of the Emergency Planning and Community Right-to-Know Act as well as the CSU Building and Fire Code.

Each laboratory maintaining a stock of chemicals should have on hand, in a loose leaf or other readily available form, a Material Safety Data Sheet (MSDS) for every chemical in the laboratory. The annual inventory is a good time to compare the items on the inventory with the MSDS available and request those MSDS that are not on hand. A copy of each MSDS should be supplied to the main office for filing and future reference.

Engineering Controls

All fume hoods are inspected annually.

Safety eye washes should be flushed once a month and safety showers once a semester. Repairs are made immediately to those found to be defective.

Fire extinguishers are inspected during an annual Facilities Services inspection of the building.

The building air is changed approximately six times every hour. Should the building air supply and hoods go off for an extended period of time, over ten minutes, the building should be evacuated.

Problems with the building should be brought to the attention of the building proctor.

APPENDIX I

Examples of Incompatible Chemicals*

Chemical	Is Incompatible With
Acetic Acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloric acid, peroxides, permanganates
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Acetone	Concentrated nitric and sulfuric acid mixtures
Alkali and Alkaline Earth metals	Water, carbon tetrachloride or chlorinated hydrocarbons, carbon dioxide, halogens
Ammonia (anhydrous)	Mercury (in manometers, for example), chlorine, calcium hypochlorite, iodine, bromine, hydrofluoric acid (anhydrous)
Aniline	Nitric acid, hydrogen peroxide
Arsenical materials	Any reducing agent
Azides	Acids
Bromine, Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, benzene, finely divided metals, turpentine
Calcium oxide	Water
Carbon (activated)	Calcium hypochlorite, all oxidizing agents
Carbon tetrachloride	Alkali metals
Chlorates	Ammonium salts, acids, powdered metals, sulfur, finely divided organic or combustible materials
Chromic acid & Chromium trioxide	Acetic acid, naphthalene, camphor, glycerol, alcohol, flammable liquids in general
Chlorine	see bromine
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Copper	Acetylene, hydrogen peroxide
Cumene hydroperoxide	Acids (organic or inorganic)
Cyanides	Acids
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Fluorine	Everything
Hydrocarbons (such as butane, propane, benzene)	Fluorine, Chlorine, bromine, chromic acid, sodium peroxide
Hydrocyanic acid	Nitric acid, alkali
Hydrofluoric acid (anhyd)	Ammonia (aqueous or anhydrous)

Chemical	Is Incompatible With
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, alcohols, acetone, organic materials, aniline, nitromethane, combustible materials
Hydrogen sulfide	Fuming nitric acid, oxidizing gases
Hypochlorites	Acid, Activated carbon
Iodine	Acetylene, ammonia (aqueous or anhyd), hydrogen
Mercury	Acetylene, fulminic acid, ammonia
Nitrates	Sulfuric acid
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, copper, brass, any heavy metals
Nitrites	Acids
Nitroparaffins	Inorganic bases, amines
Oxalic acid	Silver, mercury
Oxygen	Oils, grease, hydrogen, flammable liquids, solids, or gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils
Peroxides, organic	Acids (organic or mineral), avoid friction, store cold
Phosphorus (white)	Air, oxygen, alkalis, reducing agents
Potassium & sodium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate & perchlorate	Sulfuric and other acids
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid
Selenides	Reducing agents
Silver	Acetylene, oxalic acid, tartartic acid ammonium compounds, fulminic acid
Sodium	see potassium
Sodium nitrite	Ammonium nitrate and other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate (similar compounds of light metals, such as sodium, lithium)
Tellurides	Reducing agents

* Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Research Council, pg. 73-74, 1981

APPENDIX II

City of Fort Collins Waste Disposal Limits

The city of Fort Collins has set certain limits on what may be discharged into the sanitary sewer system. And the city monitors this by taking samples at random times. The portions of the law that apply to the chemistry department are shown below.

112-75-A-3 Waters having a pH less than 6.0 or greater than 9.0 may not be discharged to the sewer.

112-75-A-6 Wastes containing concentrated dyes may not be discharged to the sewer system.

112-75-A-9 Any liquid or vapor having a temperature higher than 65.5° C at the point of entrance to the public sewer may not be discharged.

112-75-A-10 Waste containing free, floating or insoluble oil may not be discharged to the sewer system.

112-75-A-14 Chemicals which cause noxious or malodorous conditions which either singly or by interaction with other wastes are sufficient to be hazardous to personnel in the maintenance and repair of the sewer utility may not be discharged to the sewer. This would include sulfides, cyanides, sulfites, nitrites, etc.

112-75-A-17 Waters or wastes having the following substances with a concentration greater than that shown may not be discharged to the sewer system.

Phenolic compounds as phenol	5.0 mg/l
Hydrogen sulfide	5.0 mg/l
Ammonia nitrogen as urea	10.0 mg/l
Cyanides	1.0 mg/l
Sulfur dioxide	5.0 mg/l
Nitrous oxide	5.0 mg/l

112-75-A-18 Water or wastes having a twenty-four hour proportionate composite sample concentration in excess of the following:

Hexavalent Cr as Cr	0.25 mg/l
Copper as Cu	3.0 mg/l
Nickel as Ni	5.0 mg/l
Cadmium as Cd	0.05 mg/l
Zinc as Zn	2.0 mg/l
Iron as Fe	15.0 mg/l
Lead as Pb	0.25 mg/l
Arsenic as As	0.25 mg/l
Manganese as Mn	0.25 mg/l
Selenium as Se	0.05 mg/l
Silver as Ag	0.25 mg/l
Mercury as Hg	0.025 mg/l

112-75-B Any discharge to the sewer system in which the concentration of any prohibited substance exceeds five (5) times the twenty-four hour concentration is prohibited.

The city of Fort Collins does not specify what chemicals may be discharged to the system and in the absence of such information "Prudent Practices for Disposal of Chemicals from Laboratories" may be taken as a guide. The following information is taken from that source. Notes in parentheses are modifications for Fort Collins laws.

Organic compounds

Organic compounds that are discharged to the sewer system should be water soluble to at least 3%, present a low toxicity hazard and be readily biodegradable. The following may be used as a guide.

Alcohols - Alcohols with less that 5 carbon atoms, alkanediols with less than 8 carbon atoms, glycerol, sugars and sugar alcohols, alkoxyalkanols with less than 7 carbon atoms.

Aldehydes - Aliphatic aldehydes with less than 5 carbon atoms.

Amides - Primary and Secondary aliphatic amides with less than 5 carbon atoms, tertiary aliphatic amides with less than 11 carbon atoms.

Amines - (Amines should be neutralized to a legal pH) Aliphatic amines with less than 7 carbon atoms, aliphatic diamines with less than 7 carbon atoms, benzylamine and pyridine.

Carboxylic acids - (Acids should be neutralized to a legal pH) Alkanoicacids with less than 6 carbon atoms, alkanedioic acids with less than 6 carbon atoms, hydroxyalkanoic acids with less than 6 carbon atoms, aminoalkanoic acids with less than 7 carbon atoms. Ammonium, sodium and potassium salts of the above acids classes with less than 21 carbon atoms. Chloroalkane-dioic acids with less than 4 carbon atoms.

Esters - Esters with less than 5 carbon atoms, isopropyl acetate.

Ethers - Tetrahydrofuran, dioxolane, dioxane.

Ketones - ketones with less than 6 carbon atoms.

Nitriles - Acetonitrile, propionitrile.

Sulfonic Acids - Sodium or potassium salts of most are acceptable.

Inorganic Chemicals

This list is of the low-toxic-hazard ions. The ions in parentheses are those which Fort Collins has special controls on disposal concentrations. Again solutions should be neutralized to the legal pH range before discharging to the sewer.

Cations: Al^{3+}, Ca^{2+}, (Cu^{2+}), ($Fe^{2+,3+}$), K^{+}, Li^{+}, Mg^{2+}, Na^{+}, (NH_4^{+}), Sn^{2+}, Sr^{2+}, $Ti^{3+,4+}$, (Zn^{2+}), Zr^{2+}

Anions: BO_3^{3-}, $B_4O_7^{2-}$, Br^{-}, CO_3^{2-}, Cl^{-}, (HSO_3^{-}), OCN^{-}, I^{-}, NO_3^{-}, PO_4^{3-}, SO_4^{-}, SCN^{-}

Laboratory destruction of hazardous chemicals.

Many chemicals in small quantities may be safely destroyed in the chemical laboratory. It is not possible here to give all the procedures, however, a good source is "Prudent Practices for Disposal of Chemicals from Laboratories", put out by the National Research Council.

APPENDIX III

Use of Chemical Health Hazards*

Chemicals that pose a carcinogenic, teratogenic, neurotoxic, spontaneous abortion or sexual dysfunction risk are considered to be health hazards. Use of these chemicals may require special safeguards, training and/or permission.

Chemicals that are currently (1991) controlled as chemical health hazards are shown below along with the approval level.

Compound	Use Condition	Principal Investigator Approval Level	Laboratory or Branch Chief Approval Level	Institutional Biosafety Committee Approval Level
Benzene	Storage	≤10 L	>10 L	- - -
Carbon tetrachloride	Normal Operation[1]	≤1 L	> 1 L	- - -
Chloroform	Complex Operation[2]	< 0.1 L	0.1 to 1 L	> 1 L
1,2-Dibromo-3-chloropropane				
1,1-Dimethyl-ethylenimine				
p-Dioxane				
Ethylene Dibromide				
Proplyenimine				
Ethionine	Storage	≤1000 g	>1000 g	- - -
3'-Methyl-4-aminoazobenzene	Normal Operation	≤100 g	> 100 g	- - -
Urethane	Complex Operation	<10 g	10 to 100 g	< 100 g
Bromoethyl methansulfonate	Storage	<1 L	1 to 10 L	>10 L
Chloromethyl methyl ether	Normal Operation	< 0.l L	0.1 to 1 L	> 1 L
Diepoxybutane	Complex Operation	< 0.10 L	0.01 to 0.1 L	> 0.1 L
1,1-Dimethylhydrazine				
1,2-Dimethylhydrazine				
Ethylenimine				
Ethyl methanesulfonate				
Hydrazine				
Methylhydrazine				
Methyl methanesulfonate				
N-Nitro-sodiethylamine				
N-Nitro-sodimethylamine				
N-Nitrosodi-n-butylamine				
N-Nitrosodi-n-propylamine				
N-Nitroso-N-ethylurethane				
N-Nitroso-N-methylurethane				
N-Nitrosopiperdine				
Polychlorinated biphenyls				
β–□Propiolactone				

Compound	Use Condition	Principal Investigator Approval Level	Laboratory or Branch Chief Approval Level	Institutional Biosafety Committee Approval Level
N-Acetoxy-2-acetylaminofluorene 2-Acetylaminofluorene Aflatoxins 2-Aminofluorine Benzanthracene Benzopyrene Chlorambucil Cycasin Diazomethane Dibenzanthracene 7,12-Dimethylbenzanthracene 4-Dimethylaminazobenzene 3,3'-Dimethylbenzidine 1,4-Dinitrosopiperazine N-Hydroxy-2-acetylaminofluorene 3-Methylcholanthrene 4,4'-Methylene bis(2-chloraniline) 1-Methyl-3-nitro-1-nitrosoquanidine 1-Naphthylamine N-[4-(5-Nitro-2-furyl)-2-thiazoyl]formamide N-Nitroso-N-ethylurea N-Nitroso-N-methylurea 4-Nitroquinoline-1-oxide Procarbazine 1,3-Propane sulfone m-Toluenediamine Uracil mustard Vinyl chloride	Storage Normal Operation Complex Operation	<100 g <10 g <1 g	100 to 1000 g 10 to 100 g 1 to 10 g	>1000 g >100 g >10 g
Bis(chloromethyl) ether	Storage Normal Operation Complex Operation	- - - - - - - - -	≤1 L ≤0.01 L - - -	> 1 L > 0.01 L Any quantity
4-Aminobiphenyl Benzidine 3,3'-Dichlorobenzidine 3,3'-Dimethoxybenzidine 2-Naphthylamine 4-Nitrobiphenyl	Storage Normal Operation Complex Operation	- - - - - - - - -	≤100 g ≤1 g - - -	> 100 g > 1 g Any quantity

Note: Approval levels apply to Principal Investigators who have successfully completed the NIH or CSU course in the recognition of chemical hazards in the laboratory.

[1]Normal Operation: Any operation involving simple manipulations or reactions, where the potential for release of the material is remote (e.g., dilutions, use of analytical standards, etc.)

[2]Complex Operation: Any operation involving the manipulation, handling or reaction of materials where the potential for release of the material is significant. (e.g., rapid, exothermic reactions, etc.)

APPENDIX IV

Additional information on handling chemicals located in

Prudent Practices for Disposal of Chemicals from Laboratories, by National Research Council.

Hazardous Laboratory Chemicals Disposal Guide, by M. A. Armour.*

Destruction of Hazardous Chemicals in the Laboratory, by George Lunn and Eric B. Sansone.

Matheson Gas Data Book, Sixth Edition, by William Braker and Allen L. Mossman.

The Sigma-Aldrich Library of Chemical Safety Data, two volumes, edited by Robert E. Lenga.

*Additional copies of Hazardous Laboratory Chemicals Disposal Guide, by M. A. Armour have been placed in the corridors in B and C wings.

APPENDIX V

ACCIDENT REPORTING FORMS

This form is available in the CBE main office, Glover 100.

Accident Report

1. List the name, address, and telephone number of the person(s) experiencing the accident:____

_____

_____

_____

2. List the name, address, and telephone number of the person(s) injured: _____

_____

_____

_____

3. List the name, address, and telephone number of all witnesses, if any: _____

_____

_____

_____

4. List the building, room number and location in room where the accident occurred: _____

_____

_____

5. If accident occurred in an instructional course, list the course number and section: _____

_____

6. If accident occurred in a research group, list the name of the preceptor: _____

_____

7. Give the date and time of the accident: _____

8. Describe briefly, but sequentially, all the known facts concerning events leading up to and following the accident. These facts may be established with participants or witnesses. Avoid opinions and conclusions.

_____

_____

_____

9. If the accident resulted in injury, describe briefly the nature and extent of the injury, the type of first aid rendered and by whom, whether or not an ambulance was called and used, and the time involved. Also indicate the condition of the injured after treatment.

_____

_____

_____

10. If the accident resulted in a fire, how was the fire extinguished, was the fire alarm sounded, was the fire department called, how soon did the fire department arrive, and if hand fire extinguisher were used, were they submitted for refill?

_____

_____

_____

11. If the accident resulted in property damage, describe briefly the extent of damage. _____

_____

_____

_____

12. Give the name, address and telephone number of person preparing the report if someone other than listed under item 1 above. _____

_____

_____

13. Show a copy of this completed report your supervisor.

This form is available in the CBE main office, Glover 100.

Colorado State University Incident Report or Worker's Compensation Report

(See Instructions on Back of This Form)

Mark if this is an Incident Report or a Workers' Comp claim: **Incident Report ( ) Workers' Comp. ( )**

This form is needed when an employee is injured while in the course of employment. Employee should complete Part I & II in full; Supervisor should complete and sign Part III. If employee is not able to complete form, supervisor should do so. Submit to Environmental Health Services (department 6021), 141 General Services Building, within four days of injury.

Part I – EMPLOYEE MUST COMPLETE THIS SECTION OF THE REPORT

Employee's Name (First, Middle, Last) 1	CSUID 2	Sex 3	Home Phone No 4

Employee' Street Address 5	City 6	State 7	Zip 8	Job Title 9

Birthday (mo / day / yr) / / 10	Marital Status 11	Primary Language -English ( ) Spanish ( ) Other ( ) 12	CSU Health Insurance None ( ) Your Policy ( ) Spouse Policy ( ) 13

Wages: a) Hourly _____(if paid hourly) OR b) Weekly_____(if salaried) 14	Course Name & No. if Student Intern 15

Employment Classification: a) Fac or AdminPro ( ) b) State Classified ( ) c) Non-Student Hourly ( ) d) Work Study ( ) e) Student Hourly ( ) f) Student Intern ( ) g) Graduate Student ( ) h) Other ( ) Specify 16

Part II – INJURY INFORMATION – EMPLOYEE MUST COMPLETE THIS SECTION OF THE REPORT

Injury Date (mo/day/yr) / / Time of Injury (hr:min) _____:_____ AM ( ) PM ( ) 17

What happened to cause this injury or illness? Describe employee's activities when injury or illness occurred with details of how event or exposure occurred; include name(s) of other individuals involved, tools, machinery, objects, vapors, chemicals, radiation, unnatural motions of employee, unsafe/hazardous conditions, etc. Also specify the items which directly injured the employee and caused the accident or illness. (If additional space is needed, use back of this form) 18

Injury Description (State exactly the part(s) of the body affected and the nature of the injury or disease 19

Name of Witnesses 20

Name of employer representative notified 21

Place of accident/exposure (Bldg. Name and Room Number), City, County, State, Zip Code 22

Treatment received: 911 called ( ) Emergency Room ( ) Minor-Clinic ( ) Admitted to Hospital ( ) Surgery ( ) Incident Report Only ( ) 23

Name & Address of Treating Doctor and/or Hospital 24

Employee Signature: 25	Date: 26

PART III – SUPERVISOR MUST COMPLETE THIS SECTION OF THE REPORT

Employee's normal schedule: ____hrs/day, _____days/week Shift Start /End time: / Was employee on this schedule when injured Y( ) N ( ) 27

Last Day Worked: / / 28	Date returned to work: / / OR Estimated date of return: / / 29

Modified work available: Y ( ) N ( ) If NO, Why? 30	Did injury cause death Y ( ) N ( ) Date of death : / / 31

If death, Name, relationship, and address of closest dependent 32

Auto Accident ( ) Possible Drug/Alcohol Violation ( ) Possible Safety Violation ( ) Employer Questions Liability ( ) 33

If Employee is State Classified, at time of injury the Sick Leave Balance is: the Annual leave balance is : 34

Department & work unit 35

Supervisor Printed Name 36	Supervisor Phone 37

Supervisor Signature 38	Date 39

Revised 9/13/06

Colorado State University Incident Report or Workers' Compensation Report Form Instructions

This section is completed by the employee:

Mark if this record will be an incident report or a workers' compensation claim.

Incident Report – The employee is reporting an incident but may not intend to see a physician or seek medical attention. The form will be filed with Environmental Health Services and can be used as a workers' compensation claim at a later date.

Workers' Comp. claim – The employee is submitting the record to be reported as a workers' compensation claim and will be seeing a physician or seeking medical attention.

1-3) Provide name, CSUID number and gender.
4-8) Provide current home phone, address, city, state and zip code.
9) Provide Job title as shown on personnel records.
10) Provide birth date.
11) Marital status must show single, married, divorced, or widowed, as the case may be. A divorced or widowed person should not be shown as single.
12) Check the primary language spoken. If other, write language spoken under primary language in box 12.
13) Check if you have no CSU insurance (None), or if you have CSU insurance and you are the primary insured (Your Policy) or if you have CSU insurance through your spouse (Spouse Policy).
14) Provide hourly wages if paid hourly or weekly wages if salaried. To determine weekly wage, for this purpose, multiply monthly wage by twelve (12) and divide by fifty-two(52).
15) Provide course name and number if you are a student intern.
16) Check your classification or other and specify if other classification.
17) Provide the injury date and time.
18) Describe what happened, details of how incident occurred. Include your activities, other individuals involved, tools, machinery, objects, vapors, chemicals, radiation, unnatural motions, unsafe/hazardous conditions, etc. Provide specific items which directly injured you.
19) Provide a description of the injury. Include part(s) of the body affected and the nature of the injury or disease.
20) Provide the names of any witnesses.
21) Provide CSU representative you notified of the incident.
22) Provide place of incident. Include building name, room number, city, county, state and zip code.
23) Check the treatment received. Check all that apply.
24) Provide name and address of treating doctor and/or the hospital.
25-26) Sign and provide the date Part I and Part II were completed, not the date of injury.

This section is completed by the supervisor:

27) Provide the normal schedule of employees work in hours per day, days per week, shift start and end time. Check "Y" if the employee was working this schedule when injured or "N" otherwise.
28-29) Provide the last day worked and either the date returned to work or the estimated date of return.
30) Check if modified work is available and provide a reason why if no modified work is available.
31) Check if incident caused death and provide the date of death. If the incident resulted in death, the death must be reported immediately to EHS.
32) Provide the name, relationship and address of closest dependent.
33) Check if the incident was related to an auto accident, possible drug/alcohol violation, safety violation or if you question liability. If any of these questions are answered yes, please attach a concise explanation of the circumstances so that the case can be properly evaluated. If failure to obey safety rules is reported, the explanation should show an actual written rule known to the employee and enforced by CSU or the department was violated.
34) If employee is State Classified, provide the sick leave balance and annual leave balance at time of incident.
35) Provide employees current work phone, work unit and employee's primary department to which assigned.
36-37) Print your name and provide your telephone number.
38) Signature of employee's supervisor. Supervisor, by signature, indicates concurrence with information as contained in the report form unless an addendum is attached.
39) Provide the date when the supervisor reviewed the report and completed Part III.