Harper College

Chemical Hygiene Plan

Revised 2017

Arlene Koszyk
8/31/2017

Section 1 Table of Contents

Contents

Section 2 – Purpose and Scope

Introduction

William Rainey Harper College is morally and legally obligated to provide a safe working environment for all its employees and students. Since Harper employs workers engaged in the laboratory use of hazardous chemicals, the College will comply with the provisions of the Occupational Safety and Health Administration (OSHA) standard: 29 CFR§1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories. This standard is often referred to as the OSHA Lab Standard.

History of the OSHA Lab Standard

On November 25, 1983, the **Occupational Safety and Health Administration (OSHA)** published the **Hazard Communication Standard**, which applied to certain laboratories and to certain industrial manufacturers. This standard is often referred to as **HazCom**.

Hazard Communication was revised and the Final Rule issued in 2012 to align **HazCom** with the **Globally Harmonized System (GHS)**.

On January 31,1990 the Department of Labor published in the Federal Register an amendment identified as **29 CFR§1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories.** This standard is often referred to as the **OSHA Lab Standard.** The effective date of the Lab Standard was May 1, 1990. A part of that standard is the requirement for the development of a Chemical Hygiene Plan.

Purpose

The primary **purpose** of the **OSHA Laboratory Standard** is to provide a means to protect laboratory workers from exposure to hazardous chemicals. The Standard requires Harper College to develop a written plan, called the **Chemical Hygiene Plan**, which details how the College will control exposure to hazardous chemicals. The administrative and engineering controls utilized by Harper College are to be uniquely designed to fit Harper laboratories' specific circumstances and procedures. The **Laboratory Standard** also does not supersede or replace other OSHA regulations, such as those dealing with fire, electrical, or reporting.

The **Laboratory Standard** applies to all employers of laboratory workers, both private and public. In Illinois, the **Illinois Department of Labor** regulates **public** employers (such as Harper) and enforces all provisions of OSHA regulations including the Laboratory Standard. This authority is granted under Illinois Compiled Statute 820 ILCS 255 (Toxic Substances Disclosure to Employees Act), and Illinois Public Act 98-874 Occupational Health and Safety Act (formerly 820 ILCS 220 and 225).

Definition of a Hazardous Chemical

A **hazardous chemical** is any element, compound, or mixture that has physical or health hazards associated with it.

Definition of a Laboratory

A **laboratory** is a facility where the "laboratory use of hazardous chemicals" occurs. **Laboratory use** of hazardous chemicals means the handling or use of hazardous chemicals in which **all** of the following conditions are met:

1. **Chemical manipulations are carried out on a "laboratory scale"**; employees work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person,

2. Multiple chemical procedures or chemicals are used,

3. The procedures involved are not part of a production process.

Scope of the Chemical Hygiene Plan

At Harper College the Laboratory Standard shall apply to the laboratories of the Department of Chemistry and the Department of Biology. Currently the Department of Physical Science does not meet the Lab Standard definition of a laboratory, but it is possible that changes in curriculum would place that department under the Laboratory Standard.

The Chemical Hygiene Plan does not apply to uses of hazardous chemicals that do not meet the definition of laboratory use. Hazardous chemical usage not covered by the Chemical Hygiene Plan is subject to the full provisions of the OSHA Hazard Communication Standard and the Harper College Hazard Communication Program.

The Hazard Communication Program is covered in Section 7 of the Harper College Environmental Health & Safety Procedure Manual. The Chemical Hygiene Plan applies only to laboratory employees in the departments of Biology and Chemistry.

Introduction to the Chemical Hygiene Plan

Harper College is required to develop and carry out the provisions of a written **Chemical Hygiene Plan (CHP)** tailored to protect laboratory employees from the health and physical hazards of the chemicals present in the lab and to provide information and training needed to protect employees from those hazards. The CHP must be readily available to employees. Harper must review and evaluate the effectiveness of the plan at least annually and update the plan as necessary.

The basis of the plan is an evaluation of the hazards of the chemicals used in the laboratory. Harper must provide a workplace where laboratory procedures and equipment conform to generally accepted laboratory safety practices. Other requirements of the plan include (1) standard operating procedures that include safety considerations, (2) criteria for establishing control measures aimed at reducing employee exposure to hazardous chemicals, (3) verification that laboratory fume hoods and other engineering controls are operating properly, (4) provisions for employee information and training, (5) a detailing of circumstances where prior approval for use of a certain laboratory operation, procedure, or activity may be required, (6) provisions for medical consultation, (7) designation of employee responsibilities, and (8) provisions for additional employee protection for work with particularly hazardous substances.

Section 3 – Responsibilities

Board of Trustees

William Rainey Harper College is governed by an elected Board of Trustees. In addition to the seven members elected by voters of District 512 for six-year staggered terms, a non-voting student trustee is elected for a one-year term by the members of the student body.

The powers and duties of the trustees are set forth in the Illinois Community College Act that is contained in the Illinois Revised Statutes 110 ILCS 805. Those powers and duties are enumerated in the Policy Manual of the Board of Trustees, William Rainey Harper College.

- The Harper College Board of Trustees Policy Manual (2014 edition) contains a policy on environmental health (Policy 09.11.00):

The College strives to provide a safe educational and working environment in compliance with appropriate health and safety standards and legal requirements in order that Harper College students, employees and visitors may:

A. Work under safe and healthful conditions, free of recognized hazards;

B. Wear and use personal protective clothing and equipment; and

C. Have basic, and when necessary, specific health and safety training.

The College shall develop, implement and administer a comprehensive safety and risk management program to address potential injury and loss. Specific environmental health procedures and regulations shall be published in the Environmental Health and Safety Procedure Manual.

The chief administrator of Harper College is the President, Dr. Kenneth Ender. The Board of Trustees has given the President the authority to execute its policies. As such the College President has ultimate responsibility for the health and safety of employees, students and visitors to the College. The President shall provide the leadership, procedures and funding necessary to ensure a safe and healthful environment for the College.

Office of Environmental Health and Safety

The primary function of EHS of Environmental Health and Safety (EHS) is to ensure the safe operation of all aspects of Harper College. EHS has the authority to stop any activity that is immediately hazardous to life or health. EHS is responsible for providing technical information about federal, state, and local regulations including the Laboratory Standard. EHS provides technical information concerning the appropriate storage, handling and disposal of hazardous chemicals. EHS conducts exposure assessments and area inspections on a regular basis. EHS audits the maintenance and inspection of general ventilation, fume hoods, and other control devices.

Laboratory Safety Committee

The Laboratory Safety Committee shall review and evaluate the Chemical Hygiene Plan at least annually and update the Chemical Hygiene Plan as necessary. The Laboratory Safety

Committee shall review and evaluate laboratory safety inspections performed by the departmental CHO. Currently, the Laboratory Safety Committee consists of Chemistry and Biology department chairpersons and chemical hygiene officers, staff and faculty representatives from both departments, and representatives of EHS.

Chemical Hygiene Officer

The OSHA Laboratory Standard requires designation of a Chemical Hygiene Officer (CHO). The Department of Chemistry requires professional certification of its CHO; the current CHO is Arlene Koszyk. The Department of Biology CHO is Jennifer Jennings. The CHOs are responsible for implementation and maintenance of the Chemical Hygiene Plan as it pertains to their department. The CHO shall have health and safety training paid for by the College.

The departmental chemical hygiene officer is responsible for:

1. Working with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices.
2. Monitoring procurement, use, and disposal of chemicals used in the lab.
3. Ensuring that appropriate audits are maintained.
4. Knowing the current legal requirements concerning regulated substances.
5. Seeking ways to improve the Chemical Hygiene Program.
6. Ensure that laboratory employees follow the chemical hygiene rules.
7. Providing regular, formal chemical hygiene and housekeeping inspections, including routine inspections of emergency equipment.
8. Determining the required levels of protective apparel and equipment for non-standard operations taking place in the laboratory and ensuring that required items are available and properly used.
9. Ensuring that storage is appropriate for any material being ordered and that appropriate information, such as a Safety Data Sheet (SDS), is provided for each chemical in use.

Laboratory Employees

Laboratory employees are **full-time and part-time faculty** and **staff** who work in the laboratories of the departments of Biology and Chemistry, included are **research students**. Laboratory employees are responsible for planning and conducting each operation in accordance with the college chemical hygiene procedures, developing good personal chemical hygiene habits, always using the appropriate personal protective equipment, and enforcing college safety policies as they apply to students and one another. Laboratory employees are required to report all accidents, near-misses, injuries, illnesses, and unsafe acts and conditions to the departmental Chemical Hygiene Officer.

Other College Employees and Outside Contractors

Other College employees who routinely visit or occasionally work in the laboratory and all contractors who might be exposed to laboratory hazards while on site are responsible for acting in accordance with the College Chemical Hygiene Plan. Therefore, the Departmental Chair or CHO will notify these people before work starts.

Students

While students are not covered under the provisions of the OSHA Laboratory Standard, students should be made aware of chemical health and safety hazards and should be provided with information and equipment to protect themselves from those hazards. Faculty should provide student training at the beginning of each course in which hazardous chemicals are used. Special safety instructions should be provided at the beginning of each class period.

Guests
Guests must be informed of the hazards and provided with appropriate personal protective equipment.

Culture of Safety
Over the years, special techniques have been developed for handling chemicals safely. Local, state, and federal regulations hold institutions that sponsor chemical laboratories accountable for providing safe working environments. Beyond regulation, employers and scientists also hold themselves personally responsible for their own safety, the safety of their colleagues and the safety of the general public. A sound safety organization that is respected by all requires the participation and support of laboratory administrators, workers, and students. A successful health and safety program requires a daily commitment from everyone in the organization. To be most effective, safety and health must be balanced with, and incorporated into, laboratory processes. A strong safety and health culture is the result of positive workplace attitudes—from the chief executive officer to the newest hire; involvement and buy-in of all members of the workforce; mutual, meaningful, and measurable safety and health improvement goals; and policies and procedures that serve as reference tools, rather than obscure rules. (from OSHA Lab Standard 1910.1450 Appendix A)

Harper College's science departments foster a culture of safety in which every person is responsible for his/her own safety as well as the safety of others.

Section 4 – Basic Safety Practices

Anyone observed not following the practices and precautions listed below should be reported to the departmental Chemical Hygiene Officer and/or the Department Chair:

1. Conduct yourself in a responsible manner when working in the laboratory.
2. Know the location of and how to use the emergency phone, fire extinguisher, fire blanket, eye wash, safety shower, and first-aid kit.
3. Always wear authorized safety goggles when working with hazardous chemicals. Aprons (or lab coats) and gloves must be worn when handling especially hazardous chemicals such as concentrated acids or alkalis.
4. Shorts and skirts above the knee, and sandals should not be worn when working in the lab. Clothes should cover the upper torso, no bare midriffs or backs. Confine loose clothing and tie back long hair.
5. Never bring anything to eat or drink into the laboratory.
6. Never store food or beverages for consumption in a laboratory refrigerator.
7. Don't wear or bring lab coats, aprons, or gloves into areas where food is consumed.
8. Don't smoke, chew gum or tobacco, handle contact lenses, apply cosmetics, or take medicine while in the laboratory. Wash your hands before conducting any of these activities. Additionally, be aware that open packages of gum, tobacco products, cosmetics, or medicine may absorb chemical vapors.
9. Students and staff must never work alone in the department while using hazardous chemicals.
10. Working alone in the laboratory is strongly discouraged, if work is required during non-business hours Harper College Public Safety must be notified. All unattended operations must have lights left on in the room, signage describing chemicals used in the operation, and an appropriate sign placed on the door with the name(s) and phone number(s) to call in case of failure of utility services or any other accident.
11. Know the properties of a chemical before handling it. Read the chemical name on reagent bottles twice—many chemicals have similar names.
12. Avoid unnecessary exposure to chemicals. Promptly remove chemicals if they contact your eyes, skin, or clothing.
13. Never taste a substance used in the laboratory. Never smell a substance by putting your nose over the container. Instead, use your hand to fan the vapors towards your nose.
14. Never heat a stoppered test tube or flask. Avoid pointing the open end of a test tube toward yourself or others.
15. Never pipet using mouth suction. Use a rubber bulb or a special pipetting device.
16. Never insert glass tubing or a thermometer into the hole of a rubber stopper unless it's been pre-split or properly lubricated.
17. Always add acid to water—never add water to acid.

18. Always wash your hands before leaving the laboratory

Section 5 Risk Assessment and Prior Approval

In order to protect the health and safety of laboratory employees, building occupants, the community at large, and the environment, certain laboratory activities will require prior approval by the departmental Chemical Hygiene Officer and/or Safety Committee. These activities include:

1. New laboratory experiments and research projects. Complete the Hazard Assessment Form, example below.
2. New procedures.
3. New equipment.
4. New chemicals, including (but not limited to) particularly hazardous substances.
5. New workspace.
6. Change or substitution of any component in an approved procedure.
7. Substantial change in chemical amounts.
8. Situations in which one must work alone.
9. Use of unauthorized personal protective equipment including safety goggles, safety glasses, and respirators.

For operations left unattended, the Safe Operation Card (example follows the Hazard Assessment form example) must be filled out and posted at entrances to the laboratory where the operation is present.

Hazard Assessment Form

Harper College — Chemistry Dept. Hazard Assessment Form — Page 1 of 7

Name of Instructor and Student (if applicable)	Course Number	Demonstration, Experiment, or Project?

Describe the demonstration, experiment, assay, reaction, etc. Attach additional sheets if necessary.

Where will this experiment be conducted? Provide room # if applicable.

open laboratory	outdoors	other (specify)
fume hood	classroom (non-laboratory)	

Experiment will be performed by:

students	professor only	other (specify)

G:\CHM\ChemicalHygienePlan\HazardAssessment2015.docx

Harper College — Chemistry Dept. Hazard Assessment Form — Page 2 of 7

Instructions: Pages 3-5 are extra copies of this page. Print how many copies you will need of this page, then print pages 6 and 7.

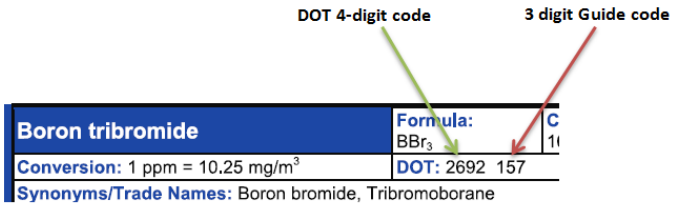
	SDS section 2 Hazard Statements	SDS section 2 Precautionary statements	SDS section 7 Handling and Storage	SDS section 8 Personal Protective Equipment	SDS section 10 Stability and Reactivity (conditions to avoid)	SDS section 11 Toxicological Information (lowest LD_{50} and route of exposure)
Chemical Name						
Chemical Name						
Chemical Name						

G:\CHM\ChemicalHygienePlan\HazardAssessment2015.docx

Safe Operation Card

Harper College Safe Operation Card Chemistry Dept. Page 1 of 2

Instructions: This Safe Operation Card (Page 2 of this document) must be filled out and placed on entrances where any unattended chemical operation occurs. Fill in Column 1 with Chemical Name; look up chemical in NIOSH Pocket Guide to Chemical Hazards, Column 2 fill in 4-digit DOT code, Column 3 fill in 3 digit Guide Code. Names and codes can be filled in using dark marker in large print, or (best) fill in electronic form, print copies to post on each room entrance where operation is conducted. Must be signed and dated by instructor responsible.



Harper College Safe Operation Card Chemistry Dept. Page 2 of 2

Room	
Instructor Name/Phone	
Date(s) of Operation	

Column 1 Chemical Name	Column 2 DOT code	Column 3 Guide Code

Particularly Hazardous Substances

Currently there are no particularly hazardous substances in used in lab classrooms, however they are possibly used in research. The OSHA Laboratory Standard requires laboratories to have procedures in place for handling hazardous substances (flammables, corrosives, toxins, etc.) that are routinely used in the laboratory. Furthermore, the OSHA Laboratory Standard requires additional provisions for employee protection while working with "particularly hazardous substances". These substances include select carcinogens, reproductive toxins, and highly toxic materials.

A. **Select Carcinogens.** A select carcinogen is any substance that meets **one** of the following criteria:
   - It is regulated by OSHA as a carcinogen; or
   - It is listed under the category "known to be carcinogens" in the current Report on Carcinogens published by the National Toxicology Program (NTP) (**latest edition**); or
   - It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (**latest edition**); or
   - It is listed in either Group 2A ("probably carcinogenic to humans") or 2B ("possibly carcinogenic to humans") by IARC or under the category "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor evidence in experimental animals.

B. **Reproductive Toxins.** Reproductive toxins are any substances that have an adverse effect on various aspects of reproduction, including fertility, gestation, lactation, and general reproductive performance. They include chemicals that cause chromosomal damage (mutagens) and physical defects in a developing fetus during pregnancy (teratogens).

C. **Highly Toxic Materials.** A substance administered orally having an LD_{50} of less than 50 mg/kg of body weight is considered highly toxic. A substance administered by continuous skin contact having an LD_{50} of less than 200 mg/kg of body weight is considered highly toxic. A substance administered by continuous inhalation having an LC_{50} of less than 200 ppm of gas or vapor or less than 2 mg/L of mist, fume, or dust is considered highly toxic. See Appendix 2, Toxicity Classifications, for more information about toxicity classifications.

   The following provisions shall be considered when working with particularly hazardous substances:

   1. **Establishment of a designated area.** A designated area may be defined as a fume hood, glove box, isolation cabinet, work area, or entire laboratory. The purpose of the designated area is to isolate the worker from particularly hazardous substances during transfer operations, weighing, dilution, reacting, sieving, purifying, or distilling. The designated area must be maintained; that is, there must be ventilation efficiency, proper safety equipment, proper personal protective equipment, and decontamination procedures. The designated area must be placarded with appropriate warning signs.

   2. **Development of Standard Operating Procedures.** For work involving particularly hazardous substances, standard operating procedures should be

developed that identify use of containment devices such as fume hoods or glove boxes, decontamination procedures, emergency procedures, storage procedures, inventory control, and waste disposal.

Employee Qualifications for Working with Particularly Hazardous Substances.
Information and training are required under the Laboratory Standard. By definition, training is required for all of the physical and health hazards listed by OSHA under the Hazard Communication Standard, 29 CFR 1910.1200. Any employee must be given training in working with any substance defined above (carcinogens, reproductive toxins, and highly toxic chemicals). Training must include safe handling procedures, the use of personal protective equipment, and the use of the safety equipment in the designated area.

Section 6 – Personal Protective Equipment (PPE), Engineering Controls, and Apparel

Hazardous chemicals can cause harm when they enter the body in sufficient amounts via inhalation, ingestion, injection, or skin absorption. Harmful effects can also occur by eye or skin contact alone. The nature of the hazardous chemical and the routes by which it enters or contacts the body determines the type of controls that are needed.

Whenever possible, substitution of less hazardous chemicals should be used as a primary method of preventing adverse effects due to chemical exposure. Properly exhausted fume hoods, other local exhaust ventilation, glove boxes and other special purpose hoods must be used when there is a likelihood of excessive exposure to air contaminants generated by laboratory activity. Used in conjunction with good work practices, properly designed and operated exhaust ventilation is effective in minimizing air contaminant exposure.

Exposure Control Measures are the actions taken by Harper College to prevent the inhalation, ingestion, injection, or skin absorption of hazardous chemicals. The OSHA Hierarchy of controls is followed in order to limit exposure:

Elimination or Substitution of the Hazard

The first method used to limit chemical exposure should be the consideration to eliminate the hazard. Planning should include substitution of hazardous substances with nonhazardous or less hazardous chemicals where possible. Planning should also include using the smallest amount of material that is needed for the experiment and the consideration of microscale procedures. It is important to plan for careful management of the substances throughout their life cycle – from acquisition and storage through safe disposal.

Engineering Controls

Engineering controls include proper laboratory design, adequate ventilation, and the use of other safety devices. Ventilation is the most common and most important form of engineering control used to reduce exposure to hazardous chemicals. There are two types of ventilation: general ventilation and local exhaust.

General ventilation is that provided by the building heating and ventilation system which provides fresh air and can dilute airborne contaminants. Local exhaust ventilation systems are intended to capture an emitted contaminant at or near its source before the contaminant has the opportunity to disperse into the workplace air. In laboratories, chemical fume hoods are the most common local exhaust devices. Fume hoods reduce worker exposure to hazardous dusts, fumes and vapors. General ventilation and local exhaust ventilation are discussed further in Section 16, Laboratory Design and Ventilation.

Administrative Controls

Administrative controls are procedural measures that can be taken to reduce or eliminate hazards associated with the use of hazardous materials. Administrative controls include the following:

1. Institutional Safety Policy.
2. Enforcing rules.
3. General safety procedures.
4. Safety Committee.
5. Self-inspection by laboratory workers and supervisors.
6. Health and safety training and information.
7. Reference materials.
8. Chemical use and procedure approval and/or review.
9. Careful planning of experiments and procedures with safety in mind. Planning includes the development of written work procedures for safe performance of the work.
10. Substitution of less toxic materials for toxic materials.
11. Restriction of access to areas in which hazardous materials are used.
12. Use of signs or placards to identify designated and restricted areas.

A **"designated area"** means an area that may be used for work with particularly hazardous substances. A designated area may be the entire laboratory, an area of a laboratory, or a device such as a fume hood.

The designated area shall be placarded, temporarily, with an appropriate warning sign during use of the particularly hazardous substance. Appropriate sign will be a Safe Operation Card listing chemicals in use, posted on all entrances to the room in which the particularly hazardous substance is in use.
A **"restricted area"** means an area where chemicals and/or waste are stored or where preparatory work is done. Access is limited to authorized personnel. The following table identifies the restricted areas and authorized personnel in the Chemistry and Biology Departments:

		Full Time Faculty	Part Time Faculty	Administrators	Lab Techs/ Assistants	Physical Plant	Public Safety	Student Aides	Supervised Students
Z304 and 304a	Chemical Storage Rooms	X		X	X		X		
Z306	Chemistry Prep Room	X	X	X	X	X	X		
Z314, 345, 355	Chemistry Work Rooms	X	X	X	X	X	X		
Z302, 312, 316, 343, 347, 353	Chemistry Student Laboratories	X	X	X	X	X	X	X	X
Z224A	Micro Prep Room	X	X	X	X	X	X	X	
Z225A	Storage Room	X	X	X	X	X	X	X	
Z227A	Zoology Prep Room	X	X	X	X	X	X	X	
Z228A	Prep Room	X	X	X	X	X	X	X	
Z228B	Animal Room	X	X	X	X	X	X	X	
Z228C	Chemical Storage Room	X	X	X	X	X	X	X	
Z233	Storage Room	X	X	X	X	X	X	X	
Z223	Botany Prep Room	X	X	X	X	X	X	X	X
Z223A	Solarium	X	X	X	X	X	X	X	X
Z224	Micro Lab	X	X	X	X	X	X	X	X
Z224B	Incubator Room	X	X	X	X	X	X	X	X
Z225	Botany Lab	X	X	X	X	X	X	X	X
Z226	Environmental Lab	X	X	X	X	X	X	X	X
Z226A	Environmental Prep Room	X	X	X	X	X	X	X	X
Z227	Zoology Lab	X	X	X	X	X	X	X	X
Z228	Physiology Lab	X	X	X	X	X	X	X	X
Z230	Anatomy Lab	X	X	X	X	X	X	X	X
Z231	Principles Lab	X	X	X	X	X	X	X	X
Z231A	Principles Prep Room	X	X	X	X	X	X	X	X
Z232	Cadaver Room	X	X	X	X	X	X	X	X
Z237	Principles Lab	X	X	X	X	X	X	X	X
Z129A	Chemistry Prep Room	X	X	X	X	X	X		
Z131A	Chemistry Prep Room	X	X	X	X	X	X		

Personal Protective Equipment

The use of Personal Protective Equipment (PPE) is necessary when feasible engineering and administrative controls are unavailable or if there is a need to supplement those controls.

Harper College must supply appropriate Personal Protective Equipment. Harper must also ensure that employees are trained in all necessary aspects of its proper use and care. This training must be documented. It is the responsibility of the employee to be certain that the appropriate equipment is worn when necessary.

Hazards Assessment. The departmental Chemical Hygiene Officer is responsible for determining which personal protective devices are required for each task performed by employees. This is accomplished by completing a Hazard Assessment Guide (see Section 5, Hazard Assessment Guide).

The following types of PPE are used to minimize inhalation and physical contact exposures:

1. **Protective clothing:** lab coats and aprons.
   The employee provides the normal clothing worn in the laboratory. Clothing should be worn to minimize exposed skin surfaces from splashed chemicals. Therefore, all lab employees should wear long-sleeve/long-legged clothing and avoid short-sleeved shirts, short trousers, or skirts. Employees must also wear shoes with closed toes rather than open-toed shoes or sandals. Even when there is minimal danger of skin contact with a hazardous substance, lab coats or aprons should be used.

   Garments contaminated with hazardous materials must not be taken home by employees for laundering. They will be evaluated by the departmental Chemical Hygiene Officer as to whether they should be laundered on-site or by a commercial laundry that has been warned of potential hazards. Contact the Manager of Environmental Health and Safety for further instructions.

2. **Gloves**
   Hands are the most likely part of the body to come into contact with chemicals. Gloves must be worn when skin contact with chemicals results in irritation, burns, or absorption of the chemical into the blood stream. Gloves must be comfortable and sufficient in length to provide adequate protection. Depending on its intended use, a glove may be designed to provide dexterity, strength, low permeability, resistance to penetration by sharp objects, and protection from temperature changes. Glove material must be compatible with the chemical used. Consult the SDS for the chemical and the glove manufacturer's literature. Additional specific information can be found in Section 8 of the Safety Data Sheet for the chemical being used.

   Some individuals are allergic to latex, so for this reason only latex free gloves should be used in the labs.

3. **Eye and Face Protection:** chemical splash goggles, safety glasses, and face shields.

   The departmental Chemical Hygiene Officer has the responsibility to assess the potential for eye/face injuries, to train employees on the uses and limitations of PPE, and to ensure that the appropriate eye/face PPE is available and used by laboratory personnel.

   All eye/face devices must meet the requirements set forth in the ANSI Occupational and Educational Eye and Face Protection Standard (Z87.1).

   Chemical Splash Goggles form the necessary liquid-proof seal around the eyes when working with liquid chemicals. Splash-proof goggles provide superior protection against dust, flying objects, splash, spray, and mist hazards. They should be the <u>first choice</u> for primary eye protection.

   Safety Glasses with Side Shields should be used only when working with solid materials such as dust and flying object hazards. These glasses should not be used when working with liquid chemicals.

Face Shields are worn together with safety goggles to provide maximum protection. For more hazardous chemicals, corrosives, and hot chemicals, both face shield and safety goggles should be used.

Illinois Compiled Statute 105 ILCS 115 requires wearing of protective eyewear by teachers, students, and visitors in laboratories where chemicals are used.

It is the policy of the Harper College Chemistry Department that eye protection is to be worn at all times when in a laboratory.

SCHOOLS
(105 ILCS 115/) Eye Protection in School Act.

(105 ILCS 115/0.01) (from Ch. 122, par. 698.10)
Sec. 0.01. Short title. This Act may be cited as the Eye Protection in School Act.
(Source: P.A. 86-1324.)

(105 ILCS 115/1) (from Ch. 122, par. 698.11)
Sec. 1. Every student, teacher and visitor is required to wear an industrial quality eye protective device when participating in or observing any of the following courses in schools, colleges and universities:
(a) vocational or industrial arts shops or laboratories involving experience with the following: hot molten metals; milling, sawing, turning, shaping, cutting, grinding or stamping of any solid materials; heat treatment, tempering or kiln firing of any metal or other materials; gas or electric arc welding; repair or servicing of any vehicle; caustic or explosive materials;
(b) chemical or combined chemical-physical laboratories involving caustic or explosive chemicals or hot liquids or solids.
Such devices may be furnished for all students and teachers, and shall be furnished for all visitors to such classrooms and laboratories.
The State Board of Education shall establish nationally accepted standards for such devices.
(Source: P.A. 88-9.)

Section 7 – Employee Information and Training

General

The College shall provide employees with information and training to ensure they are aware of the hazards of chemicals in their work area and know how to protect themselves from these hazards.

All employees will be informed of and trained about the hazards of chemicals in the work area at the time of their initial assignment and prior to (a) work involving new exposure situations (b) changes to standard operating procedures and (c) changes to the Harper College Chemical Hygiene Plan. Refresher training will occur periodically, dependent upon the hazard; however, the time between training sessions will not exceed four years.

Employee Information

The appropriate CHO or Chair shall inform employees of, and provide access to the following information:

1. Contents and appendices of OSHA Laboratory Standard 29 CFR 1910.1450.
2. Location and contents of the Harper College Chemical Hygiene Plan and its appendices.
3. Signs and symptoms associated with exposure to hazardous chemicals.
4. Location and availability of safety reference materials, including SDSs, for hazardous chemicals.

Employee Training

At a minimum, employee training shall include:

1. Methods and observations that may be used to detect the presence or release of hazardous chemicals.
2. Physical and health hazards of chemicals in the work area.
3. Protective measures used to reduce hazards or exposures.
4. Applicable details of the Harper College Chemical Hygiene Plan as it relates to their job.
5. The Harper College Hazard Communication Plan

Information and Training Responsibilities

The Office of Environmental Health and Safety will provide general safety training and hazardous waste training to departments upon request and as otherwise scheduled. The departmental Chemical Hygiene Officer will document and maintain records of such training and will track refresher training. (See Appendix 3, Employee Laboratory Safety Training Record).

The Department Chairperson must identify employees who require training and ensure that they complete training, including refresher training. The departmental Chemical Hygiene Officer will provide on-the-job, lab-specific safety training to laboratory workers.

Training Requirements

	Required Training	Provided By
Faculty (Chemistry & Biology Depts.)	Hazard Communication (HazCom)	Online GHS training from Harper's EHS (on initial employment)
	OSHA Lab Standard	safety training module in Blackboard
	Chemical Hygiene Plan (without Appendices)	safety training module in Blackboard
Laboratory Staff (Chemistry Department)	Hazard Communication (HazCom)	Online GHS training from Harper's EHS (on initial employment)
	OSHA Lab Standard	safety training module in Blackboard
	Chemical Hygiene Plan	safety training module in Blackboard
Research Students	Chemical Hygiene Plan (without Appendices)	safety training module in Blackboard
Laboratory Staff (Biology Department)	Hazard Communication (HazCom)	Online GHS training from Harper's EHS (on initial employment)
	Chemical Hygiene Plan	safety training module in Blackboard

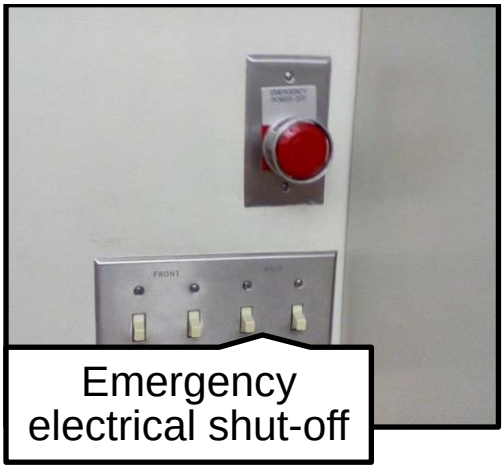
Section 8 - Laboratory Equipment

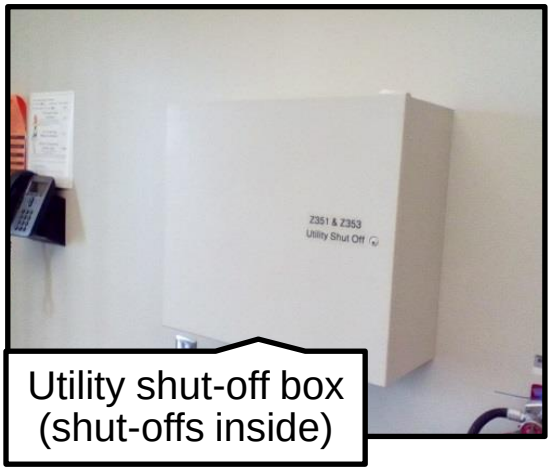
Laboratory equipment including (but not limited to): ring stands, clamps, Bunsen burners, melting point apparatus, UV lamps for visualization of thin layer chromatography, balances, ovens, hot plates, heating mantles, are regularly inspected and tested to ensure safe working order and safe operation. Repairs are made if possible to render equipment safe and usable. If a piece of equipment is not repairable it shall be discarded and replaced. Any items needing repair or disposal should be given to laboratory staff, who will either repair the item or ensure its proper disposal.

Section 9 – Safety Equipment

Each laboratory room, work room, and preparation room on the third floor of Z building is equipped with a safety shower and eyewash station, fire blanket and fire extinguisher (see photo below). In addition, a safety shower/eyewash station and fire extinguisher are located outside the flammable storage area Z304a in corridor Z301b. Per ANSI Standard Z358.1 the eyewashes and showers are flushed weekly and the temperature of the eyewash water is tested using a calibrated thermocouple/digital thermometer unit. If water temperature is found to be outside the specified range (60 – 100 degrees Fahrenheit), Physical Plant is notified. The fire extinguishers are inspected and serviced yearly by an outside contractor. Fire blankets are checked at the end of each semester for presence and condition.

Utility shut-offs are located in each discussion room adjacent to the lab rooms with the exception of rooms Z347 and Z349, the utility shut-off for lab Z347 is located in storage room Z345a . These shut-offs can stop the supply of house compressed air, vacuum, water and natural gas to the laboratory room in an emergency. Electrical shut offs are a large red button located in each laboratory room near the discussion room door to the laboratory room.


Emergency electrical shut-off



Utility shut-off box (shut-offs inside)


safety shower, eyewash, fire extinguisher and fire blanket

Section 10 – Housekeeping

Housekeeping has a direct relationship to safety and must be given priority equal to that of other procedures. Lack of good housekeeping reduces work efficiency and may lead to accidents. Faculty and staff must adhere to the following:

1. Access to emergency equipment such as showers, eyewashes, fire extinguishers, exits and utility shut-offs shall never be blocked or obstructed.
2. Each laboratory shall have a broken glassware disposal box along with a broom and dustpan for cleaning up broken glass. Broken glass should never be disposed in regular trash containers.
3. Chemical containers should be regularly inspected for proper labeling and container integrity. Peeling, obscured or deteriorated labels should be replaced, as well as leaking or defective containers and closures.
4. At the end of each work day, contents of unlabeled containers are considered waste and disposed of appropriately.
5. Chemicals should be placed back in storage at the end of the work day and not stored on lab benches or fume hoods. An exception to this rule is chemicals being used in experiments lasting several days in the same laboratory room, in this case chemicals may be left in the laboratory for short periods of 1 -2 weeks.
6. All work areas shall be kept clean of clutter, excess glassware, chemicals, and other debris. Students shall be instructed to clean up work areas, and each instructor is responsible for cleaning up the laboratory after his/her lab period.
7. All aisles and corridors shall be kept clear of chemicals, equipment, supplies, boxes and debris.
8. Overhead storage must be kept less than 24” from the ceiling to ensure proper fire sprinkler operation.
9. Food and drink for human consumption shall not be kept in the same refrigerator used to store chemicals and laboratory samples. Eating areas must be clearly separated from laboratory and chemical storage areas.

Section 11 – Chemical Management

Methods of procurement, receipt, unpacking, and distribution of chemicals establish a means by which chemical purchases and deliveries can be reviewed and approved. A pre-purchase review is used to evaluate new hazards introduced by the procurement of a chemical not previously used in the department. A pre-purchase review can also be used to minimize the quantities of chemicals purchased, thereby reducing the magnitude of risk. Minimum quantities of chemicals consistent with normal laboratory needs and requirements should be maintained. Unused chemicals that are no longer needed should be disposed in an appropriate manner. The following procedures outline the procurement, receipt, unpacking, and distribution of chemicals used in the Department of Chemistry and Department of Biology and apply to the Chair of the Chemistry or Biology Department, faculty, Laboratory Technicians and the departmental Chemical Hygiene Officer (CHO).

Detailed procedures for procurement, receipt, unpacking and distribution of chemicals may be found in the Standard Operation Procedure Chemical Management.

Section 12 – Emergency Procedures for Accidents and Spills

Emergencies

Emergency incidents may occur where evacuation of the floor or building is necessitated or emergency responders may be summoned. Emergency procedures for Harper College may be found on the Employee Portal, Emergency Procedures Manual. This manual is located in hard copy form as an orange booklet near telephones in all rooms.

Accidents and Spills

Accidents and spills of chemicals and reagents can and do occur in the laboratory. Faculty and laboratory personnel handling chemicals should be ready to take appropriate action should a spill occur. The best way to handle spills is to eliminate or decrease the risks associated with spills by using prudent practices when handling chemicals and equipment.

Adhesive bandages are supplied for covering minor skin wounds (marked First Aid drawer near safety shower station). More serious injuries should be referred to Health Services, Room A364. Refer to the Emergency Procedures Manual for more detailed instructions.

Figure 1 Spill Cleanup and First Aid station in a lab

Broken glass should be cleaned up using the provided dustpan and broom and disposed in the broken glass disposal box. Spilled chemical solutions or solvents may be cleaned up as follows:

Small (< 100 mL) spill: absorb liquid with paper towels (located near lab sinks); aqueous solution dispose paper towels in trash, solvents allow towels to dry in fume hood before disposing in trash.

Large spill (> 100 mL): Spill cleanup supplies are located in labs near safety shower/eyewash stations. Use absorbent material (either granular or pad) to surround and contain the spill from spreading further. Allow 3-5 minutes for liquid to be absorbed, don nitrile gloves, and pick up granular absorbent with scoops provided in spill supplies, absorbent pads may be picked up with gloved hands. Place absorbent materials in bag provided in spill supplies, double bag and close bag securely. Bag should be given to laboratory staff for disposal.

Spill containment and disposal for research operations shall be determined by the CHO and instructor conducting the research, and containment and clean up procedures and

materials shall be in place prior to beginning the research project.

All incidents involving personal injury or disruption, no matter how minor, should be documented via an Incident Report. Student incidents may be reported using the Harper Student Incident/Injury Report; employees should report incidents via the Incident Injury Report.

Section 13 – Chemical Waste

Regulatory Overview

The U.S. Environmental Protection Agency regulates hazardous waste under the Resource Conservation and Recovery Act, commonly known as RCRA. Enacted in 1976 and modified in 1978, 1980, and 1984 (by the Hazardous and Solid Waste Amendments) RCRA established a "cradle-to-grave" system for managing hazardous wastes. This means that from the time a hazardous waste is created until it is finally destroyed; a paperwork trail makes sure someone is responsible for safeguarding it. The law also provides specific requirements for those who generate, transport, treat, store, or dispose of hazardous wastes. Training personnel in hazardous waste management and emergency procedures is required under RCRA.

Other regulations such as the Clean Air Act and the Clean Water Act govern the disposal of waste into the air and the sewer system. Consult the departmental Chemical Hygiene Officer for identification, collection, storage and disposal of laboratory wastes.

Waste Identification

Common laboratory wastes include:

1. **Spent solvents, acids, bases and oxidizers** used in extractions, cleaning or other processes.
2. **Unused reagents and other chemicals** that are no longer needed, do not meet specifications, are contaminated, have exceeded their storage life or are otherwise unusable in the lab.
3. **Waste oils.**
4. **Other miscellaneous materials,** including broken thermometers, heavy metal salts, toxins, etc.

   Laboratory waste regulations require that hazardous waste be accurately identified. **Hazardous wastes** may be identified as either **"listed wastes"** (appear on lists of specific chemicals defined as hazardous waste issued by the EPA) or **"characteristic wastes"** (exhibit a hazardous characteristic including ignitability, corrosivity, reactivity and toxicity). The departmental Chemical Hygiene Officer identifies and labels hazardous waste. The Manager of Environmental Health and Safety is available to assist with hazardous waste identification and disposal.

Mixed waste, a mixture of a listed hazardous waste and a solid (non-hazardous) waste, is considered a hazardous waste. However, if the hazardous waste contained in the mixture is hazardous solely because it exhibits a hazardous characteristic, and the resultant mixture no longer retains that characteristic, it is not considered a hazardous waste.

Nonhazardous and Nonregulated Waste

Waste that is not regulated by RCRA because it does not exhibit any of the hazardous characteristics (ignitability, corrosiveness, reactivity, or toxicity) as defined by the EPA and is not listed as hazardous by the EPA should be segregated from hazardous waste. The common laboratory wastes usually not regulated as hazardous include:

1. **Certain salts** such as potassium chloride and sodium carbonate.
2. **Natural products** such as sugars and amino acids.
3. **Inert materials** such as uncontaminated chromatography resins and gels.
4. Alkaline batteries

When safe and allowed by regulation, disposal of nonhazardous waste via the normal trash or sewer (down the drain of laboratory sinks) can substantially reduce disposal costs. This is the kind of waste segregation that makes economic as well as environmental sense. Always check with the departmental Chemical Hygiene Officer prior to disposing any chemical in the normal trash or down the drain in laboratory sinks.

Storage and Disposal of Hazardous Waste

Regulations require that hazardous wastes be accumulated and stored in properly managed containers in designated areas. There are two types of areas on campus where hazardous waste may be stored.

1. Satellite Accumulation Area (SAA) An SAA is a small storage area within a room, (but not a dedicated storage room) for chemical wastes and hazardous wastes at or near the point where the waste is created. An example of SAAs on campus would be waste containers in a laboratory, shop, or studio. An example of an SAA in the chemistry department would be a red organic waste jug stored in a laboratory fume hood.

2. Exempt Storage Area (ESA) Waste that is removed from the satellite accumulation area (SAA) may be stored in a designated Exempt Storage Area (ESA). This is a central storage area in a department or shop that has been designed to store chemicals. These ESAs contain unused product as well as waste; shelves or areas within the area should be labeled and designated for waste storage. The Exempt Storage Areas in chemistry and biology are Z304 and Z304a and Z228c, respectively.

3. If the waste in this area is classified as “hazardous waste,” the container must be labeled as such and with the date the filled container was placed in the ESA. A log should be kept as to the date, type, and quantity of waste in the ESA.

The departmental Chemical Hygiene Officer will determine, store, and label hazardous wastes and will contact the Manager of Environmental Health and Safety for pick up and disposal by a professional waste hauler. **Disposal of hazardous wastes in laboratory sinks, in the normal trash or by evaporation into the atmosphere is strictly prohibited by law.**

Storage and Disposal of Nonhazardous Waste

The local municipality regulates the **disposal of non-hazardous waste in the normal trash.** Certain precautions should be observed when disposing of non-hazardous waste. Because

custodians, who usually empty the trash containers, are not usually familiar with laboratory operations, no objects that could cause harm to them should be disposed of in those containers. Sharp metal and broken glassware, even though they may be considered non-hazardous trash, should be collected in specially marked containers. Empty chemical bottles should be rinsed and collected into a large cardboard box and clearly labeled “empty chemical bottles” and stored with normal trash for pick up.

The Metropolitan Water Reclamation District regulates the **disposal of non-hazardous waste into the sewer system** (down the drain of laboratory sinks). Certain chemicals may be permissible for sewer disposal. These include aqueous solutions that readily biodegrade and low-toxicity solutions of inorganic substances. Water-immiscible chemicals, strong oxidizers, strong reducing agents, and organic solvents should never go down the drain. Water-miscible flammable liquids are prohibited from disposal in the sewer system.

Labeling and Management of Hazardous Waste

Containers for accumulation and storage of hazardous waste must be labeled with the following information:

1. the words “Hazardous Waste”;
2. the waste type in words (spent non-halogenated solvents, waste oil, solid metal waste, etc.); and
3. the date upon which the container became filled.

All hazardous waste containers must be closed at all times, unless waste is being added or removed. Containers must be in good condition. There may not be rusting, dents or other conditions that could cause leaks. Containers must be clearly labeled and have labels facing forward. Flammable waste jugs must have the flame arrestor in place and in good condition. Containers must be compatible with the hazardous waste stored within them. The use of household food containers is not acceptable. Containers must be inspected by laboratory personnel to ensure that they are properly labeled, in good condition, and meet the criteria described above.

Waste Minimization

Federal law requires generators of hazardous waste to implement measures to limit and reduce the volume and toxicity of hazardous waste. Laboratory waste minimization techniques include:

1. Process/equipment adjustment or modification;
2. Toxic material substitution;
3. Waste segregation, separation, concentration; and
4. Recycling.

The exercise of prudence in ordering new chemicals will also ensure that excess chemicals do not become subject to disposal as hazardous waste. Always check the inventory prior to purchasing any new chemicals. Only purchase the quantities that are needed. Furthermore, always obtain and review Safety Data Sheets (SDSs) for any new substances. SDSs contain disposal instructions as well as toxicity information that may be considered before actually purchasing a new chemical.

For specific procedures for disposal of wastes generated in the Harper College Chemistry Department, see Standard Operation Procedure **Waste Disposal**.

Section 14– Compressed Gas Safety

Gas cylinders contain either gases or liquefied gases. A variety of hazards may be present, including pressure. Puncture, heat, faulty valves or regulators, or other factors may result in a rapid release of the entire contents. Toxic and corrosive gases represent a significant hazard since physical and health hazards are typically compounded by the pressure hazard. Carefully observe these special precautions:

1. Always read the label on the gas cylinder to ensure that you are using the proper gas.
2. Cylinders of compressed gases must be handled as high energy sources. Handle cylinders carefully and do not roll, slide, or drop. Do not lift a cylinder by its cap.
3. Transport large cylinders on wheeled carts approved for this purpose. Cylinders must be capped and secured by a support strap or chain. Do not attempt to take a loaded cylinder cart up or down a stairway.
4. All uncapped cylinders must be secured independently (not ganged behind a single chain) to a solid element of the lab structure. Carts are not acceptable for supporting uncapped or in-use cylinders.
5. Never tamper with cylinder valves, force connections, or use homemade adapters. Use only approved equipment. Never repair or alter cylinders, valves, or safety relief devices.
6. Avoid using a wrench on valves equipped with handwheels. Never hammer a valve to open or close it. Either of these actions can cause the wheel valve assembly to leak.
7. Check for gas leaks using a soapy water solution around connections.
8. Never use oil or grease on oxygen tank valves or fittings.
9. Never completely empty a compressed gas cylinder. A small amount of pressure prevents contamination on refill.
10. When a compressed gas cylinder is "empty", turn off the cylinder valve, label the cylinder as empty, and replace the cap.

Section 15- Biological Safety

The Harper Biology Department works with small quantities of chemicals. They do not use blood or other potential infectious bodily fluids, thus they are not expected to be exposed to Bloodborne Pathogens in the classroom. The Biology Department does not currently conduct any live animal research. The Department only conducts dissection on preserved animals, so hazards could include cuts from scalpels or other sharp instruments, caution should be exercised when using these instruments.

Microorganisms

The Biology Department uses only microorganisms classified as Biosafety Level 1 (BSL-1) or Biosafety Level 2 (BSL-2). BSL-1 includes microorganisms that are **not** known to cause disease in healthy humans, however they may cause infection in the young, the aged and the immunodeficient or immunosuppressed individuals. BSL-2 microorganisms pose a moderate risk of individual infection, but a low risk of community infection. Standard microbiological safety practices should be followed including the use of gloves and regular hand washing.

Section 16 – Exposure Monitoring

Personnel monitoring may be conducted if there is reason to believe that the exposure level of any chemical that may exceed the action level or Permissible Exposure Limit (PEL). Monitoring will be performed by EHS personnel or designee. Results of the monitoring will be discussed with the affected employee(s).

Section 17 – Laboratory Design and Ventilation

Laboratory Design

The Harper Chemistry Department laboratories have been designed to provide adequate workspace for student experiments, good flow of movement between lab benches, hoods, safety equipment, and exits. Sinks are available at the ends of lab benches for glassware cleaning and hand washing. Each laboratory room has an ADA (Americans with Disabilities Act) compliant work station and fume hood.

Figure 2 Typical Laboratory in Harper Chemistry Department

Ventilation

General Ventilation — prudent practices include the following recommendations for building ventilation design and maintenance:

1. The general ventilation system for laboratory operations should be designed such that the laboratory air is continuously replaced. The general ventilation system should provide the laboratories with clean air that has a reasonable temperature and proper humidity, is particle-free and does not contain any radon or toxic vapors. The American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) recommend 20 cubic feet per minute per person of fresh air in laboratories. Air entering the laboratory should enter gently, with minimal turbulence and at a velocity of less than 50 linear feet per minute from any air supply source grill.

2. All air from laboratories should be exhausted outdoors and not be recirculated. The outside air intakes for the building should be in a location that reduces the possibility of re-entrainment of laboratory exhaust.

3. The general ventilation system for laboratory operations should be designed such that the laboratory is slightly under negative pressure relative to other parts of the building.

Air should flow from the offices, corridors and support spaces into the laboratories. This prevents odors and vapors from leaving the lab and moving to other parts of the building.

4. The general ventilation system for laboratory operations should be designed to provide 6 to 12 air changes per hour. The design should also ensure that the air in the room is thoroughly mixed. The higher exchange rates, typically 10 to 12 air changes per hour is considered the new trend in recommendations and guidelines for air exchanges for laboratory operations, considering the greater awareness associated with the use of chemicals in the laboratory. However, increased cost of energy has caused conflict between the desire to minimize the costs of heating and cooling and the need to provide laboratory workers with adequate ventilation. In any case, the health and safety of individuals should never be compromised for economic reasons.

5. The Utilities Department Supervisor shall coordinate the maintenance and inspection of general ventilation. Laboratory ventilation should be verified as needed by professional engineering analysis (testing and balancing report). Exhausted air should be discharged into the prevailing air currents above the building. Particulate filters should be fitted on the air intake side with airflow monitors to ensure maximum airflow. A filter replacement schedule should be established.

6. The general ventilation system for laboratory operations should not be considered sufficient to prevent the accumulation of chemical vapors. Work done with chemicals with low TLVs or high vapor pressures requires local exhaust such as a fume hood.

Local Exhaust (Fume Hoods)
Local exhaust ventilation systems are intended to capture an emitted contaminant at or near its source before the contaminant has the opportunity to disperse into the workplace air. In laboratories, chemical fume hoods are the most common local exhaust devices. Fume hoods reduce worker exposure to hazardous dusts, fumes and vapors.

Fume hoods are certified annually for proper operation by a professional outside agency, coordinated by the Office of Environmental Health and Safety. They are continuously monitored by an electronic sensor. If there are problems with a hood, call the Physical Plant (extension 6350).

When using a fume hood the worker should be aware that:

1. The fume hood is a safety backup device to the condensers, traps, or other devices to trap and collect the hazardous vapors and fumes.
2. A hood is not designed to withstand explosions or as a means of disposal for volatile chemicals.
3. The hood sash is to be closed or lowered at all times except when adjusting the apparatus inside.
4. Work is to be kept at least 6 inches inside the hood face. (This simple step reduces vapor concentrations at the face of the hood by as much as 90 percent.)
5. The design of the hood is usually for substances of specific characteristics: venting at the top is for chemicals of low vapor density and venting at the bottom is for high vapor density chemicals.

6. Hoods are not storage areas for chemicals and equipment. Only one hazardous waste container may be stored in a hood.
7. The hood must remain "on" at all times when a chemical is inside the hood, regardless of whether any work is being done in the hood.

A. Procedures
   1. Close laboratory doors when beginning lab and keep them closed throughout the lab period.
   2. Check the reading on the SureFlow Fume Hood Face Velocity Controllers to ensure that they are set to 100 linear feet per minute. Hit the "Set Back" button to switch from 60 linear feet per minute to 100 linear feet per minute.
   3. Use the fume hood when working with volatile chemicals, chemicals that have a Threshold Limit Value less than 50 ppm, or chemicals that have a standard requiring monitoring if the action level will be routinely exceeded or if noxious fumes are generated if working at the bench.
   4. Set the baffles by aligning the black knob on the exterior right of the fume hood with the position indicator to match the exhaust requirements. Use **"Normal"** for typical work utilizing general procedures. Use **"Open"** for procedures with high heat loads or lighter than air gases. Use **"Closed"** for fumes generated at work surface or heavier than air gases.
   5. Work six inches inside the hood. Adjust equipment then lower the sash so that only forearms are exposed and face is shielded by sash. Where hoods have both vertical and horizontal sashes, if using the vertical sash reach around sash and be sure to stand so that face, neck and chest is not exposed.
   6. If alarm sounds on SureFlow hood monitor, investigate the alarm. The following conditions may cause the alarm to sound: opened laboratory doors, blocked sensor (black hole on the side wall inside the fume hood), sash opened above the sensor, damper failure. The alarm can be muted temporarily by pressing the "Mute" button. Call Physical Plant at extension 6350 for further assistance.
   7. Z343 and Z347 laboratories have had their ventilation systems modified; there is additional exhaust ventilation in the ceiling above the benches and additional air supply diffusers in the front of the room under the white boards. This additional ventilation is tied into the fume hood ductwork so in order for this bench exhaust to work effectively, the fume hood sashes must be closed and at most only one or two sashes should be open. Also no garbage cans or carts should be parked in the front of the air diffusers. For Bunsen burner work and those experiments where bench ventilation is needed, faculty should instruct their students to keep sashes closed and to only open sashes to get the equipment that they need and then immediately close the sash.
   8. Do not prop open doors to control temperature. If the laboratory is too hot or too cold, call Physical Plant at extension 6350.
   9. The pass-through hoods between labs and work rooms in the chemistry department have a safety feature that only allows one sash to be opened at a time. If the sash cannot be opened, the black button must be pushed in.
   10. The laboratory hoods are equipped with **variable air volume control (VAV)** systems which maintain 100 ft/min face velocity controlled and monitored by the TSI technology. The pass-through hoods have a **constant volume (CV)** system where the TSI controller is programmed to a specific set point (600 cubic feet per minute in setback mode and 1000 cfm in normal mode). The set point maintains the same volume of exhaust from the hood, but the face velocity varies

depending on the height of the sash (the face velocity increases as the sash is lowered). The departmental CHO and/or outside contractor should verify the face velocity by measuring with hand-held vaneometer or velometer.

11. If conducting animal dissections or other work involving nuisance odors in labs in the department of biology set the black exhaust knob to **EXHAUST** mode.

B. Maintenance Schedule
   1. Before each use faculty and staff should visually note that the hood is operating properly by checking that the face velocity is at 100 fpm and the green light on the SureFlow monitor is lit.
   2. At the end of each use and after spills faculty and staff should wipe the bench top inside the hood.
   3. At the end of each use faculty and staff should close the sash completely to decrease noise and conserve energy.
   4. Annually, the Manager of Environmental Health and Safety will hire an outside contractor to test and certify the laboratory exhaust. The departmental Chemical Hygiene Officers will maintain these records.

Section 18 – Medical Consultation and Examination

Health Services will provide medical attention or will refer employees to a designated occupational health clinic or hospital for any of the following:

1. The employee shows signs or symptoms of overexposure to a hazardous chemical. Evidence of exposure may include, but is not limited to:
   i. direct skin or eye contact with the hazardous chemical
   ii. detectable odor, especially if the chemical in question has a lower TLV than odor threshold
   iii. headache, rash, nausea, coughing, tearing, irritation or redness of eyes, irritation of nose or throat, dizziness, loss of motor dexterity or judgment
   iv. disappearance of some or all of the symptoms when the person is taken away from the chemical area into fresh air
   v. reappearance of symptoms soon after the person resumes working with the chemical
   vi. complaints from more than one person working in the same area
2. Exposure monitoring reveals an exposure level routinely above the action level or PEL.
3. An event takes place in the work area, such as a spill, leak, explosion, or other occurrence resulting in the likelihood of exposure to a hazardous chemical.

All medical examinations and consultations will be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

If an employee seeks medical attention for possible overexposure to hazardous chemicals, the departmental Chemical Hygiene Officer must complete an Incident Injury Report. If possible, provide the following information to the attending physician:

1. The identity of the hazardous chemical(s) to which the employee has been exposed.
2. A description of the conditions under which the exposure occurred.

3. The signs and symptoms of exposure that the employee is experiencing, if any.

The health care provider (Health and Psychological Services, designated occupational health clinic, or hospital) should provide the employee a written opinion of the following:

1. Results of the exam, including any tests conducted.
2. Any medical condition determined by the exam that may place the employee at increased risk because of the exposure.
3. Any recommendation for follow-up examination or treatment.
4. A statement that the employee has been informed of the results of the examination and/or consultation.
5. The written opinion shall not reveal any condition not related to the exposure.

Section 19 – Recordkeeping

Records

William Rainey Harper College will maintain the following records:

1. Incident Investigation Reports
2. Medical examinations and consultations
3. Exposure monitoring
4. Training
5. Fume Hood Evaluations
6. Control system repair and maintenance
7. Laboratory inspections
8. Employee safety complaints
9. SDSs
10. Hazardous waste pick-up and disposal records

Retention and Storage

A. Incident Investigation Reports must be completed and maintained in the department files for the duration of the worker's employment. All complaints of exposure to a hazardous chemical and any other laboratory accidents and incidents must be documented by completing the Incident Injury Report.

B. Medical examinations and consultation records, including test results and physicians' written opinions, must be maintained in Health Service's files. These records must be kept and made available for the duration of the worker's employment plus an additional 30 years. These records are maintained in accordance with 29 CFR 1910.1020 "Access to Employee Exposure and Medical Records."

C. Exposure monitoring records, including sampling results and reports, must be maintained in the department's files. These records must be kept, transferred, and made available for the duration of the worker's employment plus an additional 30 years. These records are maintained in accordance with 29 CFR 1910.1020 "Access to Employee Exposure and Medical Records."

D. Training records, including handouts, agendas, signed attendance sheets, and certificates of successful completion, must be maintained in the department's files for the duration of the worker's employment plus three years. (See Appendix 3, Employee Laboratory Safety Training Record.)

E. Fume hood certificates and repair, records must be maintained in the departmental files. The evaluations must be conducted annually. These records must be maintained for a minimum of three years.

F. Laboratory inspection records, including (but not limited to) eye washes and safety showers must be maintained in the department's files. The records must be maintained for a minimum of three years.

G. Employee safety complaints, including (but not limited to) chemical exposure, inoperative control devices, and defective personal protective equipment, must be maintained in the department's files for the duration of the worker's employment.

H. Safety Data Sheets (SDSs) for every chemical in the laboratory inventory must be maintained in Department files.

I. Hazardous waste pick-up and disposal records, including manifests, must be maintained in Office of Health and Safety's files and Department files.