



THE UNIVERSITY OF BRITISH COLUMBIA
Chemical & Biological Engineering

2022/23

UBC Chemical & Biological Engineering Safety Manual



CHEMICAL AND BIOLOGICAL ENGINEERING
2360 EAST MALL, Vancouver, BC
12/9/2022



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1. First Aid and Emergency Services/Contacts

In case of **EMERGENCY**: Police/Fire/Ambulance, call 911. Then call 604-822-2222

1st Aid Faculty/Staff	Call 604-822-4444 (24 hr. Campus Mobile First Aid)
1st Aid Students	Call 604-822-2222
Police	Emergency, call 9-1-1 / Non-emergency, call (604) 717-3321
Safety Coordinator: Erin Hagen	Off: 604.822.3857 / Cell: 778.938.1800
Director: Marlene Chow	Off: 604.827.3537 /Cell: 778.879.5105

The purposes of the first aid and emergency services are to:

- Ensure prompt and effective emergency response
- Minimize the effects of injuries/exposures and promote speedy recovery
- Provide workers with assistance when required

For Faculty and Staff: University “2-4444” Central First Aid System

The UBC Occupational First Aid Program provides first aid coverage for the UBC Main Campus 24 hours a day.

Calling 604-822-4444 (or 2-4444 on a campus phone) will summon the Emergency Vehicle, staffed by trained first aid attendants, to the location of the injured person.

The UBC Occupational First Aid attendants will:

- Provide treatment
- Record each injury in the treatment books
- Complete necessary forms to initiate a WorkSafeBC claim if required.

In any emergency situation, or in situations where serious illness or injury is suspected, **calling 911** is always appropriate. Workers will not be reprimanded for using 911.

1.1 Department 1st Aid

Some staff have had first aid training but it would be offered on a volunteer basis only. All campus security patrol personnel are also OFA Level 2 first aid attendants who can be reached at 604-822-2222. For serious injuries, call 911 then 604-822-2222.



1.2 Automated External Defibrillator (AED)

The university has installed an AED in CHBE on the ground floor on a post along the south wall near the middle of the atrium. The AED is a portable, safe and easy-to-use device which restores normal rhythm to the heart. The AED reads the heart rhythm and only delivers a shock if needed. Everybody, not only first aid attendants, should feel confident to use it in case of an emergency as it will only deliver an electric shock if the person's heart rhythm is not normal, and it will not do any harm.

Follow the steps below in the event of a sudden cardiac arrest :

- First call 911 to ensure the fire department and/or paramedics are dispatched immediately. Call Security/1st Aid at 604.822.2222
- Take the AED and follow the instructions step by step. The device will instruct you on how to use the device.
- Keep following the instructions of the AED until the ambulance arrives.

1.3 Building Emergency Response Plans and Procedures

The Department has established and implemented plans and procedures for potential emergency situations and documented in the [CHBE Building Emergency Response Plan \(BERP\)](https://apsc-chbe.sites.olt.ubc.ca/files/2022/05/CHBE-BERP-2022-final.pdf), link: <https://apsc-chbe.sites.olt.ubc.ca/files/2022/05/CHBE-BERP-2022-final.pdf>.

Emergency plans and procedures include response to workplace accidents/injuries, fire prevention, emergency evacuation, personal security, earthquakes and bomb threats. Emergency Directors and floor wardens are spread throughout the Department and are appointed by the Department Head. The Department Safety Coordinator coordinates the floor wardens, first aid attendants, Dept. Local Safety Team (LST) and supervisors to implement and regularly reviews these plans and procedures.

The Emergency Directors in CHBE are as follows:

NAME	AREA	CONTACT
Marlene Chow Director	CERC/CHBE/BRIC/GG	Off: 604.827.3537 Cell: 778.879.5105
Erin Hagen Coordinator	CHBE/CERC/GG	Off: 604.822.3857 Cell: 778.938.1800
Samy Larkam Manager	CERC/BRIC	



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For the complete list of Floor Wardens, refer to the [CHBE Building Emergency Response Plan 2022](https://apsc-chbe.sites.olt.ubc.ca/files/2022/05/CHBE-BERP-2022-final.pdf) at <https://apsc-chbe.sites.olt.ubc.ca/files/2022/05/CHBE-BERP-2022-final.pdf>.



2. Department Safety Governance

2.1 Purpose

To establish the Chemical and Biological Engineering Department's policies to provide a safe, healthy and secure environment for all members of faculty and staff, students and visitors, by developing and enforcing preventive specific rule measures. Compliance with the Workers Compensation Act, WHMIS and related legislation is the minimum standard acceptable. All students and members of faculty and staff are encouraged to strive to exceed these minimum legal standards and to eliminate unnecessary risks.

This document outlines some specific safety measures to govern the work within the department. It is expected that all personnel working in these facilities will follow the policies in this document.

CHBE strives to maintain a safe, healthy and secure working environment for work and study. Safety is everyone's responsibility.

2.2 Scope

This document outlines the Health, Safety and Environment (HSE) policy for the Chemical and Biological Engineering Department at the University of British Columbia, Vancouver Campus.

2.3 UBC Health and Safety Responsibilities ¹

It is the responsibility of the University acting through administrative heads of unit to:

- Provide a safe, healthy and secure working environment.
- Ensure regular inspections are made and take action as required to improve unsafe conditions.
- Ensure that health, safety, and personal security considerations form an integral part of the design, construction, purchase and maintenance of all buildings, equipment and work processes;
- Provide first aid facilities where appropriate.
- Support supervisors and safety teams in the implementation of an effective health, safety and security program.
- Ensure compliance with WCB and other applicable legislation.
- Establish department or building HSE teams.
- Communicate with the university community or affected groups about events or situations when potentially harmful conditions arise or are discovered.
- Ensure adequate resources are available to implement appropriate procedures. It is the responsibility of supervisors (staff and researchers) to:

¹ [UBC Health and Safety Policy](https://universitycounsel.ubc.ca/files/2022/05/Health-and-Safety-Policy_SC1.pdf) https://universitycounsel.ubc.ca/files/2022/05/Health-and-Safety-Policy_SC1.pdf



- Formulate specific safety rules and safe work procedures for their area of supervision.
- Ensure that all employees under their supervision are aware of safety practices and follow safety procedures.
- Provide training in the safe operation of equipment.
- Inspect regularly their areas for hazardous conditions.
- Correct promptly unsafe work practices or hazardous conditions.
- Be responsive to concerns expressed about personal security and investigate any accidents, incidents or personal security concerns which have occurred in their area of responsibility.
- Report any accidents or incidents involving personal security to the appropriate University authority.
- Participate, if requested, on department or building HSE teams.
- Ensure health and safety rules are posted in the work areas and specific work procedures are to be made accessible to all employees in the areas where they apply.

It is the responsibility of individual students and members of faculty and staff to:

- Observe safety rules and procedures established by supervisory staff, administrative heads of unit and the University.
- Be safety-conscious in all activities, be it work, study or recreation.
- Report as soon as possible any accident, injury, unsafe condition, insecure condition or threats to personal security to a supervisor or administrative head of unit.
- Use properly and care for adequately personal protective equipment provided by the University.
- Participate, if elected or appointed, on departmental or building HSE teams.
- Complete all required Department safety training.

2.4 CHBE Local Safety Team (LST)

The CHBE/CERC/BRIC LST is a joint team comprised of worker and employer representatives working together to identify and resolve health and safety problems in the various areas of the Department. It is an organizational unit that coordinates health and safety activities, and monitors the status of the health and safety program. The role of the LST is to:

- Assist in creating a safe and healthy workplace.
- Recommend actions that will improve the effectiveness of the HSE Program .
- Promote compliance with WorkSafeBC and internal requirements.
- Recommend changes to senior management, the department head and/or the Applied Science Joint Occupational Health & Safety Committee (JOHSC).
- CHBE/CERC/BRIC LST members review accident and injury reports to ensure that established rules and procedures are providing the Unit with the safest work practices.
- Review recommendations from the Applied Science JOHSC, faculty, staff or students concerning health and safety issues and endorse/carry them out when and where appropriate.



The CHBE Department management provides all necessary resources to ensure that the LST is able to function effectively. These include:

- Training for team members.
- Administrative support.
- Adequate time for team members to carry out responsibilities.
- Open two-way communication channels.
- Makes decisions based on recommendations from the CHBE/CERC/BRIC LST.

2.5 Dept. Health and Safety Team Membership

Name	Representation	Contact
Marlene Chow Co-chair	Management	778-879-5105 Marlene.chow@ubc.ca
Chester Upham Co-chair	Faculty	
Erin Hagen Safety Coordinator	CUPE 116	778.938.1800 erin.hagen@ubc.ca
Serge Milaire	CUPE 116	smilaire@chbe.ubc.ca
Jonathan Doan	Development Office - Management	jonathan.doan@ubc.ca
Samy Larkam	CERC – Management	samy.larkam@ubc.ca
Fatima Alafifi	CUPE 2278	falafifi@mail.ubc.ca
Roza Vaez Ghaemi	CUPE 2278	roza.ghaemi@ubc.ca
Layal Jbara	CUPE 2278	lmj44@mail.ubc.ca
Sarah Chen	CERC	sarah@cerc.ubc.ca

2.6 CHBE Local Safety Team Meetings

The CHBE/CERC/BRIC LST meets on the first Tuesday of the month. All meeting discussions and decisions are recorded in the Local Safety Meeting Minutes which are available as described in Section 3.1.



3. Documentation

3.1 CHBE/CERC/BRIC LST Minutes

LST Meeting Minutes are distributed to the Applied Science JOHSC SharePoint site, the Department Head, the Department Director, the local LST Team, the APSC Safety Officer, and are posted in hard copy on the LST bulletin boards (in the atrium hallways near the elevators).

3.2 Dept. Safety Documentation

The Health and Safety records maintained by the department are as follows:

- CHBE Safety Documentation
 - Department Safety Plan – on department website and drives (UBC server)
 - The Building Emergency Response Plan (BERP) – on department website and drives (UBC server)
 - CHBE/CERC/BRIC LST - on department website and on department website and drives (UBC server)
- Employee Mandatory Training Records
 - Most mandatory training is on the SRS training servers and department drives (UBC server).
 - Mandatory site-specific training checklists (for each work area/laboratory) are in labs and/or Lab drives
- Onboarding checklist sheets used when an employee is hired, Department Canvas and drives (UBC server)
- Records of meetings and crew talks (health and safety issues discussed)
 - Safety issues discussed with lab managers documented in lab meeting minutes
- Inspection reports and records of actions taken to solve problems
 - General Lab inspections (annual) compiled and stored electronically on Department drives (UBC server) and on the Applied Science JOHSC SharePoint site.
 - Issues/actions also discussed/documented in CHBE/CERC/BRIC LST Meeting Minutes posted on the department safety bulletin boards, sent to the JOHSC SharePoint site, and on department drives (UBC servers).
- Accident investigations reports - UBC CAIRS reports (<https://www.cairs.ubc.ca>) are discussed by both the CHBE/CERC/BRIC LST and the APSC JOHSC committee and housed electronically on the universities SRS servers, the department safety drives (UBC server) and hardcopies in the CHBE Safety Coordinator office
- Emergency contact information - Contact information for faculty, staff, graduate student, Postdoctoral Fellows, Research Associates, and visitors in their Workday personnel files Student Information System (SISC).
- LST meeting minutes – Indicating steps taken to address health and safety issues.
 - Saved to CHBE drive (UBC server) and on the JOHSC SharePoint site
- Equipment log books and maintenance records
 - Log books are stored with/near the equipment. Archived logs are stored in the lab managers office.



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- Maintenance records stored in the Shop Supervisors office and/or Lab Manager's office.
- Health and safety forms and checklists
 - CHBE/CERC/BRIC LST forms and procedures/checklists on the department website and drives (UBC server).
- Personal health records
 - Medical certificates, hearing tests, and first aid records (personnel records)
- Lab manuals, including lab safety regulations
 - Lab manuals in lab directories



4. Orientations, Training and Supervision

4.1 CHBE Requirements

WorkSafeBC requires Departments to provide proper direction and instruction to workers in the safe performance of their duties. Through training and supervision, employees and students are made aware of hazards and safe work procedures to follow in order to protect themselves.

To meet this requirement, the Chemical and Biological Engineering Department provides:

1. Worker employee online orientation
2. UBC SRS Training courses
3. On-the-job training
4. Worker supervision
5. Orientation and training records

4.2 Department New Employee Orientation

The Department provides online orientation for all new or transferred employees. CHBE requires new employees complete the:

1. [Chemical and Biological Engineering Department Safety Orientation](#)
2. [UBC New Worker Safety Orientation](#)
3. [Preventing and Addressing Workplace Bullying and Harassment Training](#)
4. [Workplace Violence Prevention Training](#)
5. [Privacy & Information Security Fundamentals](#) – Part 1 and Part 2

For workers in labs, additional training requirements:

6. [Chemical Safety](#) – Online and in-person.
7. [Biosafety Training](#) (If in bio lab)
8. [Laser Safety Training](#) (If using lasers)
9. [Radiation Safety Training](#) (if using sealed source radiation source)

For workers handling dangerous goods

10. [Transportation of Dangerous Goods by Ground and Air](#)

For faculty and staff who have supervisory roles:

11. [Safety Supervision at UBC](#)

Supervisors conduct Department orientation sessions for employees in their areas in accordance with Unit Orientation and Training Guidelines.



Undergraduate students are required to complete [Introduction to Laboratory Safety - Research Safety \(ubc.ca\)](#) and receive lab safety instruction with each course. They also receive additional safety orientations/information in various lab courses /classes (CHBE 263, CHBE 264, CHBE 362, CHBE 364, CHBE 365, CHBE 366, CHBE 464).

4.4 On-the-Job Training

On-the-job, site-specific training is provided by supervisors of workers and when new procedures are introduced. On-the-job, site-specific training includes:

- Using written work procedures and health and safety instructions to demonstrate the job
- Explaining health and safety aspects of performing the job
- Explaining who to contact for help
- Completing the Site Specific Safety Checklist appropriate for the area they are working in.

On-the-job training is initiated immediately when a new employee commences work, and prior to implementing a new work process or modified work process.

4.5 Worker Supervision

Supervisors ensure that work is carried out as expected by maintaining supervision over the work activities in the Department. Workers are kept up-to-date on management decisions and action plans through periodic staff meetings, Department memos, newsletters and internal e-mail. All employees are expected to work according to established safe work procedures. Supervisors immediately rectify any unsafe actions in accordance with proper corrective procedures. To effectively meet their responsibilities, supervisors take the “Safety Supervision at UBC” online training course (<http://wpl.ubc.ca>) and are trained in the following areas:

- Techniques of effective supervision and instruction, including motivation and communication, on an ongoing basis
- Incident/Accident Reporting and Investigations and how to take corrective and preventive action
- Workplace health and safety inspections of their area

4.6 Orientation and Training Records

The Department maintains records of orientation and training to verify that employees have received adequate instruction to work safely and SRS training records are in Workday. The laboratory managers/supervisors sign site specific lab training records (upon completion of the employee’s training). The records of lab training completed are stored in the lab and/or on the lab drives.



5. Accident/Incident - Reporting and Investigations

The purpose of accident reporting and investigating is to identify deficiencies in the management of health and safety, take steps to correct these deficiencies, and prevent similar incidents from occurring in the future. These reports are of utmost importance in improving our safety environment and are not used as tools of persecution. An employee must report all incidents/accidents to their supervisor as soon as possible following the incident and by using the universities online “CAIRS” reporting system (www.cairs.ubc.ca)

To meet WorkSafeBC and University requirements, UBC Departments must report and investigate any incident or accident that resulted in:

- a death or critical condition with a serious risk of death
- a work-related injury requiring treatment by a medical practitioner
- a time-loss injury
- an occupational disease or allegations of an occupational disease
- a major structural failure or collapse
- major release of a toxic or hazardous substance; or
- a near miss (did not result in an injury but had the potential for causing serious injury and/or property loss)

5.1 Reporting Procedures

If an accident, incident or near miss occurs in the Department:

- It is reported to a manager/supervisor/student supervisor immediately.
- Manager/supervisor notifies the department head and department safety director by email.
- In the case of a serious injury, the department head and safety director will be notified by telephone.
- The worker’s supervisor/manager will report the incident to SRS by filling an online report on the “CAIRS” system (www.cairs.ubc.ca). The preliminary report must be completed within 48 hours.



INCIDENT/ACCIDENT REPORTING PROCEDURES

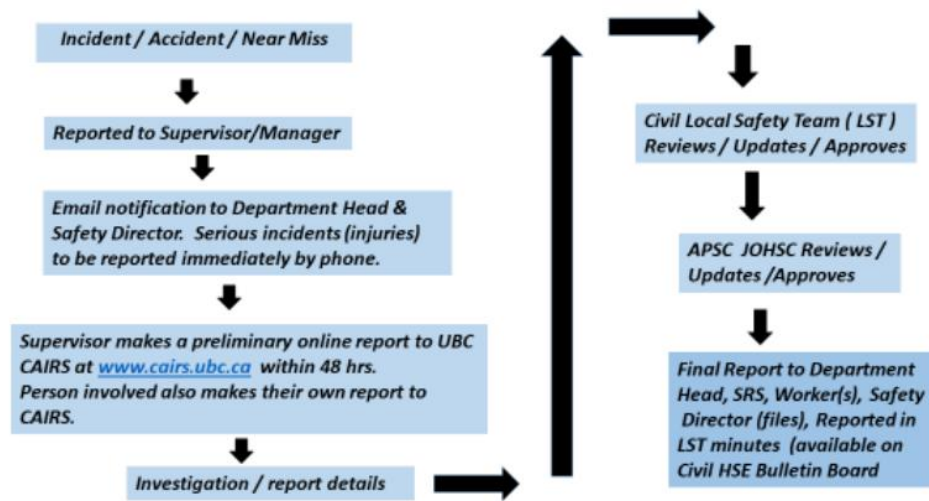


Figure 1: Incident, Accident, and Near Miss Procedures Flow Chart

5.2 Accident Investigation

Incident and accidents are reported and investigated in order to prevent similar situations from recurring. Investigations should never seek to assign blame.

Management will provide all tools and resources necessary for investigations to be effective. These include:

- Accident investigation training for investigators
- Time made available to allow investigators to complete their duties
- Quick action on recommended corrective actions to prevent recurrence of similar situations.

CAIRS Report Process

- An accident investigation report is completed online (see CAIRS at www.srs.ubc.ca) by the supervisor and by the employee (if one is involved). For assistance filing the supervisor reports, contact the department Safety Coordinator.
- The CHBE/CERC/BRIC LST co-chairs, Safety Coordinator and department Head will automatically receive email notifications of the reports.
- The reports are discussed at the monthly LST meetings and the APSC JOHSC meetings with suggested changes and recommendations made.
- The final CAIRS reports are reviewed by the Department Head, the APSC JOHSC, a copy posted on the department's safety drive (UBC server), and a hardcopy kept on file in the Safety Coordinator's office.
- The LST and Safety Coordinator monitor the progress on any actionable items resulting from the investigation and comments on the incident reported in the safety team minutes.



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Note: The initial accident investigation report (online CAIRS report) must be submitted within 48 hours of the incident.

Details on accident investigation procedures can be found at
https://www.cairs.ubc.ca/public_page.php



6. Research Facilities and Laboratories

6.1 Lab Emergency Contacts

In case of **EMERGENCY**: Police/ Fire/ Ambulance call 9-1-1, then call 604.822.2222

See the Emergency Contact List in Section 1

6.2 General Lab Safety Guidelines

Before beginning to work in any area, workers are to complete the Site Specific training for that area. Workers contact the Safety Coordinator and Lab Supervisor to arrange training.

This will involve learning the location of the following key items:

- Locations of Fire extinguishers, Phones, Exits, First Aid Supplies
- Eye wash stations and/or safety showers
- Emergency procedures and emergency contacts

When working in the research facilities of the Chemical and Biological Engineering Department, specific safety rules must be followed. These include:

- Access to most CHBE research facilities is restricted and the rooms have keyed access or card access. To obtain access, complete the online CHBE Access Request Form. The access request must be approved by the lab supervisor before being processed.
- Safety glasses, lab coat, long pant and closed-toed, water resistant shoes are the minimum PPE to be worn in labs at all times.
- No food or drink is allowed in any of the labs
- Equipment is to be operated only by trained personnel.
- There is no access to labs without permission from the Principal Investigator.
- Work alone must be in accordance with UBC procedures and to be approved by the supervisor and Safety Coordinator
- Before starting any task within a lab, check with the supervisor to determine the necessary for the work planned.
- Procurement of chemicals is only through the CHBE Department ordering system
- Use, handling, storage and disposal of chemicals must be done in accordance with UBC procedures, the MSDS and in consultation with the Safety Coordinator
- Samples are to be disposed of in an appropriate manner and the working areas are to be cleaned up.
- Glass disposal is in accordance with UBC procedures

6.3 Personal Protective Equipment

The PI provides personal protective equipment (PPE) for workers in their labs and work areas.



6.3.1 Gloves

Gloves are to be worn when handling chemicals.

- Choose the glove that is appropriate to the type of chemical or hazardous materials handled.
- Gloves are only to be worn in the laboratory.
- Follow the one glove policy if handling chemicals outside the lab

Consult with the Safety Coordinator to assess specific needs if required.

6.3.2 Eye Protection

Safety glasses are to be worn in all labs at all times.

Contact lenses should not be worn:

- If not recommended on the chemical MDS
- In dusty situations or where/when there is the potential for splashes or debris

Additional eye protection is to be worn whenever there is a potential for splashing of chemicals or biological substances, or for impact from projectiles or dusts. Selection of eye protection should be made after careful hazard analysis. Safety Goggles or Face Shields are available in many of the laboratories.

6.3.3 Goggles or Goggles with a Face Shield

Goggles or goggles with a face shield are recommended for the following situations:

- The substance being handled is a serious eye hazard and/or the operation involves a high risk that an eyehazardous material will splash,
- The substance being handled is a liquid hotter than 60 °C. Hot materials are much more injurious than the same materials at room temperature and they are more likely to splash or spatter.
- If there is need for protection of the entire face, such as where there is the potential for flying particles and/or acids.
- When the eye hazard is unknown

The wearing of safety glasses does not excuse personnel from the requirement of wearing safety goggles if deemed more suitable.

6.3.4 Footwear

Protective footwear is designed to protect the foot from physical hazards such as falling objects, stepping on sharp objects or exposure to corrosive chemicals.

Chemical Laboratories Footwear (All labs including Undergraduate Learning Labs)

All faculty, staff and students working in laboratories shall wear closed-toed, water resistant footwear to protect against the hazards commonly encountered in laboratories including but not limited to chemical and biological as well as physical hazards associated with sharps, broken glassware, material handling and electricity.



Closed-toed footwear is made of a solid material which completely encloses the foot (for example, an oxford or athletic style leather shoe). Open toe or open heel sandals or shoes with a ventilated construction are not acceptable.

Machine Shop, Stores Footwear

Faculty and staff working in these areas shall wear closed-toed footwear equipped with steel toes. Boots or shoes must be CSA rated.

6.3.5 Respiratory Protection

Workers should use respirators for protection from contaminants in the air only if other hazard control methods are not practical or possible. Respirators should only be used:

- When engineering or administrative controls are not technically feasible
- While engineering controls are being installed or repaired
- When emergencies or other temporary situations arise (e.g., maintenance operations).

Respiratory hazards can include airborne contaminants such as dusts, mists, fumes, and gases or oxygen-deficient atmospheres. Well designed and maintained engineering controls are the preferred methods of controlling worker exposure to hazardous contaminants in the air. These control methods include:

- Mechanical ventilation
- Enclosure or isolation of the process or work equipment
- Proper control and use of process equipment, and
- Process modifications including substitution of less hazardous materials where possible.

Respirator users must have the respirator fit tested before use in the lab. UBC Safety & Risk Services provide [Respirator Fit Testing](#) online course:

<https://wpl.ubc.ca/browse/srs/operational-safety/courses/wpl-srs-rft>

6.4 Electrical Safety

Almost every workplace has a source of electrical power. If this electrical energy is used improperly, electrical shock and injury may result. The following basic guidelines will help reduce electrical hazards. Always check with an experienced technician if you have any concerns about electrical elements.

- All electrical equipment shall be properly grounded. Contact a department technician if unsure.
- Learn where the disconnect switches or circuit breakers are for the electrical equipment and receptacles in your area.
- All circuit breakers and switches shall be labelled to clearly indicate the "on" and "off" position, and what equipment they serve.



- The design, construction and modifications of all research electrical apparatus shall be either done or approved by a department electronic technician. All research apparatus must be inspected by a department technician before being put into service.
- Any equipment purchased to be used in the department must be inspected prior to use by the Safety Coordinator and must have an electrical certification recognized by the BC Safety Authority.
- All equipment, appliance and extension cords shall be inspected regularly and be kept in good working condition. Problems should be reported to a department technician immediately.
- Exercise caution when it is necessary to work on electrical equipment in damp conditions. Use a ground fault circuit interrupter (GFCI) in all areas (inside and out) that may pose a potential water hazard. A GFCI protection device or outlet must be used for all portable equipment being operated outdoors.
- Power bars (multi-outlet plugs) shall not be used unless they have a built-in circuit breaker and are CSA approved. Surge protected power bars are recommended. The following conditions shall be met when using power bars:
 - Users must verify that the total amperage of all equipment plugged into the power bar does not exceed the rated current for the power bars (typically 15 A). The amperage of electrical equipment is usually stamped on the manufacturer's plate - if in doubt, consult a department electronic technician.
 - Power bars must be plugged directly into mounted electrical receptacles. They must not be daisy chained.
- • Extension cords shall be CSA approved with three separate insulated wires and three pronged connectors all in good condition. In addition, the following apply to their use:
 - Extension cords can only be used for temporary work and should not be used through walls, ceilings, doorways, floors, etc.
 - Extension cords should only service a single piece of electrical apparatus which does not exceed the current rating of the cord (see manufacturer's rating on equipment).
 - All cords must be placed such that they do not present a tripping hazard. If such placement cannot rule out a hazard completely, appropriate warning signs must be displayed.
 - Do not route cords over metal objects such as emergency showers, overhead pipes or frames, metal racks, etc.
 - Do not place under carpet, rugs, or heavy objects.
 - Do not place cords on pathways or other areas where repeated abuse can cause deterioration of insulation.
- Never override fuses, circuit breakers or interlock switches. Blown fuses should be replaced by qualified personnel and only with the properly rated substitute.
- All building electrical repairs, splices, and wiring shall be performed by the Physical Plant Electrical Department.



7. Hazard Assessment and Worksite Inspections

7.1 Unit Requirements

WorkSafeBC requires that Units ensure that hazards to the health and safety of workers are identified and brought to management's attention. It is management's responsibility to ensure that the identified hazards are eliminated or, where this is not practical, controlled, and that workers are protected from the hazards.

Worksite hazard assessments and inspections are key activities in the prevention of accidents. Their purposes are to:

- Identify existing and potential hazards.
- Increase awareness leading to the prevention of workplace accidents and illnesses.
- Ensure compliance with standards and regulations.

To meet this requirement, CHBE:

- Conducts a Safety Audit prior to operation of new or modified projects and experimental set-ups
- Conducts regular Worksite Inspections.
- Provides all necessary resources to ensure that hazard assessments and workplace inspections are effective. These include:
 - Hazard recognition and inspection training for those conducting inspections.
 - Quick action on recommended corrections.
 - Documents all assessments and inspections and reporting to the LST

7.2 Safety Audits

For all new and modified experimental equipment in the labs in CHBE labs, a safety audit must be conducted prior to start or operations.

The department requires all graduate students, staff and researchers conducting experiments to have their equipment inspected by the CHBE/CERC/BRIC LST before the experiment may be run. Digital copies of the following documents are submitted to the Safety Coordinator for distribution to the LST for review prior to the safety inspection.

- Preliminary Hazard Analysis Checklist
- Simplified HAZOP Worksheet
- Emergency Contact Information & Shutdown Procedure
- Laboratory Equipment Safety Inspection Checklist
- Flowchart of setup (process flow diagram – PFD)
- Standard Operating Procedures (SOP)
- List of people trained to operate the equipment



Once these documents have been received and be reviewed by the LST, the Safety Coordinator will coordinate a time for a safety audit.

During the safety audit, the documents and experimental set-up are reviewed. Modifications to equipment, PPE, controls, procedures, documents, etc. may be required. If necessary, a follow-up safety audit may be conducted. The Safety Coordinator documents the meetings and follow-up actions.

The experimental set-up may be inspected again at any time.

7.3 Workplace Inspections

In compliance with the UBC HSE program and in keeping with best practices implementation, regular inspections of the research facilities and office areas are carried out to identify safety and housekeeping issues. These are compiled into reports that are reviewed by the CHBE/CERC/BRIC LST and APSC JOHSC to determine appropriate actions.

Following are the four types of workplace inspections to be conducted:

Informal Workplace Inspections

- This is accomplished by supervisors conducting regular walk-throughs of their areas of responsibility and by workers checking their work areas prior to commencing work.
- All employees are expected to maintain continual awareness of hazards in their work areas.
- No formal inspection report is required; however, any detected hazards must be corrected immediately if the task is within the employee's capabilities. If not, the hazard should be reported to the area supervisor or management for correction.

Regular Workplace Inspections

- Work areas will be inspected on a regular basis by the PI or designate. For most labs, these inspections are to be conducted monthly. In high risk environments, these inspections will be conducted more frequently.
- The inspection checklists will be completed for each inspection and each PI must regularly review and update his/her checklist as required.
- The completed reports shall be forwarded to the department Safety Coordinator for review and response.
- The CHBE/CERC/BRIC LST is responsible for ensuring inspections are completed regularly, reviewing inspection reports and providing recommendations.
- The PI must ensure that corrective action is taken so that the hazard is eliminated or controlled.

CHBE/CERC/BRIC LST Inspections



- General Inspections are formal workplace inspections that are conducted by Local Safety Team members and/or other employees at least annually.
- A General Inspection Report is completed and copies sent to the APSC JOHSC, and the Local Safety Team for review.
- The Lab PI must ensure that corrective action is taken to eliminate or control identified hazards.

Special Inspections

- Special inspections take place immediately after a malfunction/accident, when new machinery or processes are introduced, or as required by manufacture instructions
- The area supervisor and a worker representative conduct this type of inspection, along with a specialist when necessary.
- The area supervisor must report all findings to the local safety team for review.
- The area supervisor must ensure that any existing unsafe conditions are effectively controlled before commencing an inspection or investigation.

7.4 Unattended Operation

If an experiment must run overnight, a risk assessment is to be conducted and provided to the Safety Coordinator as per UBC WorkAlone Policy (see 9.2). Emergency contact information and/or procedures must be documented. For further workplace inspection information, see UBC Safety & Risk Services website.

7.5 Hazardous Materials - Chemicals

To order chemicals or for information and advice, contact the CHBE Safety Coordinator. Labs must have plans on how to store and dispose of any leftover chemical (or by-products of reaction) and must have a copy of the SDS available when working with the chemical. All PPE, special safety and handling equipment are to be secured prior to use of the chemical.

Ordering chemicals is through the [CHBE Ordering System](#). The Stores Coordinator will contact the chemical supplier/vendor to place the orders. Chemical users are to read the SDS and be familiar with all protocols required to safely handle, use, store and dispose of the chemical.

All those working with chemicals must have completed the UBC SRS Chemical safety Training.

7.6 Workplace Hazardous Materials Information System (WHMIS)

WHMIS² (Workplace Hazardous Material Information System) uses classifications to group chemicals with similar properties or hazards. The Controlled Products Regulations specifies the

² WHMIS <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/occupational-health-safety/workplace-hazardous-materials-information-system.html> and [Workplace Hazardous Materials Information System \(WHMIS\) | Safety & Risk Services \(ubc.ca\)](#)



criteria used to place materials within each classification. There are six (6) classes although several classes have divisions or subdivisions. Each class has a specific symbol to help people identify the hazard quickly. The classes are listed below. Click on each link for more information from Health Canada

- [Class A – Compressed Gases](#)
- [Class B – Flammable and Combustible Materials](#)
- [Class C – Oxidizing Materials](#)
- [Class D – Poisonous and Infectious Materials](#)
- [Class E – Corrosive Materials](#)
- [Class F – Dangerously Reactive Materials](#)



8. Environmental Protection

8.1 Unit Requirements

The University is committed to protecting the environment through ensuring compliance with legislation, demonstrating due diligence, and establishing a process of continuous improvement resulting in environmental stewardship.

8.2 UBC Policy SC63 (Environmental Protection Compliance)

UBC Policy SC6 indicates:

“UBC will act responsibly and demonstrate accountable management of the property and affairs of UBC in protecting the environment. All individuals in the University community share the responsibility for protecting the environment. Administrative heads of unit are responsible for ensuring compliance with legislation and UBC procedures both on and off campus.”

All individuals in the Department are made aware of UBC Policy SC4 - Environmental Protection Compliance and other relevant policies (e.g. UBC Policy UP7 – Pest Control Policy).

8.3 Activities

The principle investigator assesses the environmental impact of all new projects or activities. Where possible, efforts are taken to minimize any adverse impacts.

- project proposals are required to address the disposal of materials.

All individuals are trained prior to conducting activities that could impact the environment.

Examples include:

- all employees working in the environmental lab are trained regarding hazardous waste disposal
- acid and caustic wastes are neutralized before disposal
- the workshop follows UBC procedures for disposing of waste oils, etc.
- liquid waste from the Materials lab is treated before discharge to the sewer

Disposal of hazardous wastes is conducted in accordance with all applicable legislation and UBC procedures. For hazardous waste disposal procedures, contact the UBC Environmental Services Manager. All individuals handling hazardous materials shall refer to the UBC Spill Reporting Procedures located in the Laboratory Chemical Safety Reference Manual.

The Department participates in the following programs:

- Solvent recovery (contact 822-1285)
- Chemical Exchange (contact 822-6306)
- Waste Reduction (contact 822-9280), including:

³ [Environmental Protection Policy \(SC4\)](#)



- battery recycling
- e-waste pickup
- paper recycling
- plastic recycling
- concrete recycling
- oil recycling

8.4 Management Review and Reporting

Environmental issues are reviewed at the Lab Management Meetings with the department head. Serious issues are reported immediately to the UBC Environmental Services Manager



9. Personal Security and Public Safety

All members of the University Community including Unit, staff and students shall be provided with an environment safe from violence or the threat of violence.

9.1 Bullying and Harassment

The Department strives to provide a safe, respectful and productive work environment for our faculty, staff and student employees. All employees in the Chemical and Biological Engineering Department are trained in recognizing and preventing bullying and harassment. This training is online at <http://bullyingandharassment.ubc.ca/trainingevents/>.

9.2 Working Alone

Working on your own in the research facilities is only permitted if a proper plan is developed. Work alone requires a risk assessment and templates are available on the [UBC SRS website \(https://srs.ubc.ca/health-safety/safety-programs/personal-safety/workingalone/\)](https://srs.ubc.ca/health-safety/safety-programs/personal-safety/workingalone/). When the procedure and form have been completed, it is to be approved by the PI and then the Department Safety Coordinator before work alone can begin. The completed working alone forms are housed on the SharePoint site under Safety Plans.

9.3 Field Work

Course work, research and work requirements may result in faculty, staff and students leaving the Department and working off campus or farther afield. It is the responsibility of the faculty supervisor to assess the level of risk involved. The researcher must prepare a Field Safety Plan.

The Field Safety Plan is assessed by the faculty supervisor, and forwarded for approval to the department Safety Coordinator. The Safety Coordinator will evaluate and discuss plan with the researchers and the CHBE/CERC/BRIC LST. After integrating amendments, the completed plan is approved and stored on the department drives (UBC server) site and a hardcopy in the safety Coordinator's office.

9.4 Ergonomics

Ergonomics is the study of the interaction between people, equipment, and systems in their (work) environment. It includes the physical, psychological and environmental aspects of the interaction. The goal of ergonomics is to find a balance between the capabilities of the human and the demands required by the work environment to prevent musculoskeletal injuries (MSI).

The UBC HR website offers resources on [Ergonomics | UBC Human Resources](#) including:

- [Working-From-Home.-Temporary-Set-up.-March-2020.pdf \(ubc.ca\)](#)
- online and live workshops on Ergonomics: [Ergonomic Training & Workshops \(ubc.ca\)](#)
- [Ergonomics Assessments.](#)



Employees are encouraged to review their own work practices to see if there are any of these risk factors present in their work environment and to take steps to eliminate them.

9.5 Student Safety Abroad

UBC's Student Safety Abroad Program is based on the requirements outlined in [UBC SC12 Students Abroad Policy](#)⁴. The policy applies to students traveling outside of Canada for university activity – this includes conferences, field work related to research, volunteering, service learning, varsity sports, and studying abroad. Students travelling outside Canada for a university activity are required to register with the [Student Safety Abroad Registry](#) (<https://registry.safetyabroad.ubc.ca/>)

⁴ [Students Abroad Policy \(SC12\) | Office of the University Counsel \(ubc.ca\)](#)
<https://universitycounsel.ubc.ca/policies/students-abroad-policy/>