Health and Safety Program Manual

NBK Institute of Mining Engineering

(Revision Date: June 2022, Rev. 005)

Table of Contents

Emergency and Safety Contacts

EMERGENCY:

911

Police | Fire | Ambulance | Hazardous Spill

NON-EMERGENCY	
RCMP	604-224-1322
Vancouver Fire and Rescue	604-665-6010
BC Ambulance Service	604-872-5151
SECURITY & PERSONAL SAFETY RESOURCES	
Campus Security (Vancouver)	604-822-2222
AMS SafeWalk	604-822-5355
FIRST AID RESOURCES	
Closest Defibrillator	www.srs.ubc.ca, UBC Vancouver AED Locations
UBC Faculty, Staff and Student Workers	604-822-4444
UBC Students	911 or Student Health at UBC Hospital 604 822-7011
Visitors	911 or Urgent Care at UBC Hospital 604-822-7222
SAFETY RESOURCES & SAFETY & RISK SERVICES CONTACTS	
Sexual Violence Prevention and Response (SVPRO)	604-822-1588
Report an Accident or Incident	www.cairs.ubc.ca
Asbestos Safety	604-822-8772
Biological and Radiation Safety	604-822-4353
Chemical Safety	604 827-3409
Emergency Management & Business Continuity	604-822-1237
Health and Safety - Faculty of Medicine	604-827-1982
Health and Safety - Student Housing and Hospitality Services	604 827-2671
Health and Safety - Facilities	604 822-1885
Safety & Risk Services	604-822-2029
Safety Programs	604-822-6513
Student Health	604-822-7011
Equity and Inclusion	604-822-6353
Counseling Services	604-822-3811
Ergonomics	604-822-9040
Occupational Hygiene	604-822-6098

Documented Health and Safety Program

Regulatory Compliance

The Occupational Health and Safety Regulation (OHSR) requires that an employer with a workforce of 20 or more workers have an Occupational Health and Safety Program that includes the following:

(a) A statement of the employer's aims and the responsibilities of the employer, supervisors and workers.
(b) Provision for the regular workplace inspection to ensure that prompt action is undertaken to correct any hazardous conditions found.
(c) Appropriate written instructions, available for reference by all workers.
(d) Provision for holding periodic management meetings for the purpose of reviewing health and safety activities and incident trends, and for the determination of necessary courses of action,
(e) Provision for the prompt investigation of incidents to determine the action necessary to prevent their recurrence.
(f) The maintenance of records and statistics, including reports of inspections and incident investigations, with provision for making this information available to the joint committee or worker health and safety representative, as applicable.
(g) Provision by the employer for the instruction and supervision of workers in the safe performance of their work.

Use of this Manual

This document will assist Administrative Heads of Unit in their Health and Safety Program and must be available to all unit personnel. The manual must be reviewed annually to ensure regulatory requirements are up to date.

This document will assist university administrative units achieve the intended outcomes of the University's Occupational Health and Safety (OH&S) management system. Consistent with University Policy SC1- Occupational and Research Health and Safety, the intended outcomes of an OH&S management system include:

(a) continual improvement of OH&S performance;
(b) fulfilment of legal requirements and other requirements;
(c) achievement of OH&S objectives.

Element 1: Health and Safety Policy

The University of British Columbia (UBC) is committed to providing a safe, healthy, secure and environmentally friendly workplace and learning environment for its employees and students. An effective Health and Safety Program that follows the continuous improvement cycle of Plan, Do, Check and Act will foster a positive culture into the working and learning experience at UBC. Through cooperative efforts of workers, supervisors and management within the NBK Institute of Mining Engineering, we will be able to carry out the objectives of Policy SC1: Occupational and Research Health and Safety (Policy #7) and provide a collaborative working environment that will strengthen our commitment to the University's overall safety culture.

POLICY SC1: OCCUPATIONAL AND RESEARCH HEALTH AND SAFETY

General Policy

UBC aims to eliminate unnecessary risks, injuries, and occupational diseases, from UBC's workplace, teaching, and research environments.

UBC accepts Applicable Standards as minimum standards and may establish and enforce more stringent standards, as it deems appropriate for UBC Members.

Each UBC Member who engages in or is responsible for a UBC Activity involving Hazardous Materials and Wastes must:

- Comply with this Policy and the Procedures;
- Understand the Occupational Health and Safety Program, the Biosafety Program, the Radiation Safety Program, and the Chemical Safety Program, prior to carrying out or supervising any UBC Activities; and
- Procure, handle, store, transport, and dispose of Hazardous Materials and Wastes in a manner that harms neither the environment nor living beings.

Each UBC Member engaged in UBC Activities involving, or potentially involving, Hazardous Materials and Wastes should endeavour to:

- Substitute less harmful materials for those that are known to be Hazardous Materials and Wastes prior to the time of acquisition; and
- Acquire or purchase Hazardous Materials and Wastes in sufficiently small quantities to minimize the period of storage at or by UBC.

Sincerely,

Scott Dunbar, Department Head

Element 2: Roles, Responsibilities and Accountability

UBC EXECUTIVE

"UBC Executive" means: UBC's senior leadership team consisting of UBC's President, Deputy Vice Chancellor, Vice-Presidents, Provosts, and University Counsel.

The UBC Board of Governors has delegated to the UBC Executive the following occupational health and safety responsibilities of an employer under the Workers Compensation Act, to:

- ensure the health and safety of UBC Members engaging in UBC Activities in the workplace, research, and teaching environments at or of UBC;
- provide adequate orientation and training to Supervisors and other UBC Members, to ensure that they are made aware of:
    - all known or reasonably foreseeable health or safety hazards related to Hazardous Materials and Wastes;
    - compliance with Applicable Standards; and
    - their individual rights and duties as per Policy SC1
- establish as appropriate the Occupational Health and Safety Program, the Biosafety Program, the Chemical Safety Program, the Radiation Safety Program, and Emergency Procedures, to:
    - support Supervisors in the implementation of effective health and safety programs;
    - provide adequate information, instruction, training, and orientation to Supervisors and other UBC Members;
    - regularly inspect its workplace, teaching, and research environments, and take action, as required, to improve or address unsafe conditions or conduct when reported;
    - initiate an immediate investigation into incidents/accidents/conduct through the procedures established for the area in which the incident/accident/conduct has occurred;
    - communicate with the UBC community or affected groups about events or situations when potentially harmful conditions or conduct arise or are discovered;
    - ensure that workplace teaching, and research health and safety considerations and resources form an integral part of the design, construction , purchase, and maintenance of all buildings, equipment and work processes, including the physical planning for the future research, teaching, and operational needs of UBC, so that design elements are included to address health and safety issues (e.g., ergonomics), handling, storage, transportation, emissions, and disposal of Hazardous Materials and Wastes;
    - ensure that the physical space or facilities being used in UBC's workplace, teaching, and research environments are appropriate for the nature of the UBC Activities being carried out in them;
    - provide access to appropriate first aid and first aid facilities;
    - comply with Applicable Standards; and
    - establish Local Safety Teams to support the Joint Occupational Health and Safety Committees.

Element 2: Roles, Responsibilities and Accountability (cont'd)

ADMINISTRATIVE HEADS OF UNITS

"Administrative Head of Unit" means: a Director of a service unit; a Head of an academic department or unit; a Director of a centre, institute or school; a Principal of a college; a Dean; an Associate Vice President or the equivalent; the Registrar; the University Librarian; a Provost; a Vice Principal, a Vice President or the equivalent, not otherwise identified as a member of the UBC Executive.

Each Administrative Head of Unit, acting under the authority of their respective UBC Executive and through their Supervisors, must:

- share in the accountability for addressing non-compliance with the Policy and the Occupational Health and Safety Program, as applicable, by UBC Members involved in UBC Activities under their Area of Responsibility; and
- cooperate with both Safety & Risk Services and the Office of Research Services, as applicable, with any workplace, teaching, and research health and safety audit, and any inspection or investigation involving their Supervisor(s) conducted in accordance with the Occupational Health and Safety Program.

SAFETY & RISK SERVICES

Safety & Risk Services is the department responsible for monitoring and implementing the requirements of the Workers Compensation Act and its applicable occupational health and safety regulations, the Occupational Health and Safety Program, the Emergency Procedures, and the Applicable Standards by:

- acting as a central resource and auditor of Policy SC1 and Procedures, and Emergency Procedures;
- reporting any substantive Research related issues of non-compliance with Policy SC1 or associated procedures to the Office of Research Services;
- reporting any existing issue or concern identified starting with the Local Safety Team or the Joint Occupational Health and Safety Committees, Administrative Heads of Unit, through to the Responsible Executive(s), and, as necessary and required, ultimately up to the UBC Executive, as part of their duties under the Occupational Health and Safety Program and in accordance with the Workers Compensation Act; and
- attending meetings of and reporting to the Responsible Executive(s), as required by the UBC Executives.

Note: In some areas, Local Safety Experts assist administrative heads of units in meeting their safety obligations.

Element 2: Roles, Responsibilities and Accountability (cont'd)

SUPERVISORS

"Supervisor" means: a person who manages, instructs, directs, or controls other UBC Members in the performance of their duties at UBC (including studying), and may include Biosafety Permit Holders, Radiation Safety Permit Holders, and Principal Investigators.

Each Supervisors is responsible under the Applicable Standards for their Area of Responsibility and must:

- be accountable for the health and safety of UBC Members under their direct supervision and acting in their UBC capacity when engaged in UBC Activities;
- be aware of Applicable Standards and all known or reasonably foreseeable health and safety hazards pertinent to the Areas of Responsibility where such UBC Members conduct UBC Activities;
- formulate and document specific safety rules, guidelines, and procedures for all Areas of Responsibility under their supervision;
- ensure that the Emergency Procedures are in place to mitigate any hazards specific to their Areas of Responsibility, and understand, follow, and communicate to UBC Members under their supervision about Emergency Procedures;
- remove or mitigate unique hazards associated with UBC Activities under their supervision with consultation from the applicable Local Safety Team and/or Joint Occupational Health and Safety Committee;
- provide workplace orientation and training in the safe operation of equipment, handling of Hazardous Materials and Wastes, and performance of day-to-day tasks;
- conduct regular inspections to identify hazardous conditions or conduct and ensure that equipment and materials are properly handled, stored, and maintained;
- promptly mitigate or correct unsafe work practices, conduct, or hazardous conditions;
- ensure all accidents, incidents, or personal security concerns are investigated within two (2) work days;
- promptly report any accidents, incidents, or conduct to the appropriate UBC authority and Safety & Risk Services; and
- consult and cooperate with the appropriate Local Safety Team, Joint Occupational Health and Safety Committee, and/or safety representative(s) for the workplace

Element 2: Roles, Responsibilities and Accountability (cont'd)

FACULTY AND STAFF

"Faculty and Staff" includes: any full-time or part-time staff, faculty, adjunct or clinical faculty, post-doctoral fellow, paid student, visiting academic or researcher, any person holding an appointment at UBC, or any other person having a contractual obligation to adhere to UBC's Board of Governors' policies and procedures.

Roles and responsibilities include:

- comply with Applicable Standards and any rules, restrictions, guidelines, or directives established by their Supervisor, Safety & Risk Services, or the Office of Research Services;
- be safety-conscious in all UBC Activities;
- take all reasonable and necessary precautions to ensure their own safety and the safety of others around them;
- be familiar with the procedure to refuse unsafe work provided for under such Act, if a UBC Member applies as a "worker" under the Workers Compensation Act;
- request training when unfamiliar with a task;
- correct unsafe conduct and conditions;
- report as soon as possible any accident, injury, conduct, unsafe condition, or insecure condition to a Supervisor;
- participate in inspections and investigations at the request of UBC; and
- participate in such committee, if elected or appointed to a Joint Occupational Health and Safety Committee, or a Local Safety Team, or other such health and safety committee.

JOINT OCCUPATIONAL HEALTH AND SAFETY COMMITTEE (JOHSC) MEMBERS

"Joint Occupational Health and Safety Committees" means: the committees established by UBC in accordance with the Workers Compensation Act set out in the Occupational Health and Safety Procedures.

Roles and responsibilities include:

- Attend all monthly Committee meetings, or appoint an eligible alternate to attend.
- Participate in all activities of the Committee, and chair Sub-Committees when requested.
- Review inspections and investigations reported to the Committee, by the LSTs. Participate in inspections and investigations as requested or required.
- Recommend and advise in the development of policies and procedures for improvement of health and safety.
- Attend safety courses or seminars, which are made available to Committee members. Each Committee member is entitled to a total of 8 hours of additional training each year.
- Promote the University Safety Policy, and safety procedures of the University, in carrying out their work.
    - Be familiar with WorkSafeBC Occupational Health and Safety Regulations, the University Safety Policy, and the Committee's Terms of Reference.

Element 2: Roles, Responsibilities and Accountability (cont'd)

LOCAL SAFETY TEAM (LST) MEMBERS

"Local Safety Teams" means: site or department specific occupational health and safety teams, established by UBC, to provide area-specific safety information to the relevant Joint Occupational Health and Safety Committee set out in the Occupational Health and Safety Procedures.

Roles and responsibilities include:

- Hold and /or attend regularly scheduled LST meetings, or appoint an eligible alternate to attend.
- Function within the set Terms of Reference
- Participate in the review of:
    - Reports of current accidents, incidents or illnesses/diseases
    - Remedial action taken or required by the reports of investigations and inspections
    - Other safety and health matters
- Conduct formal workplace inspections
- Assist as required in incident and or accident investigations
- Assist management in the health and safety program development
- Post and distribute meeting minutes
- Make recommendations directly to the Joint Occupational Health and Safety Committee
- Escalate safety related issues to the JOHSC where necessary
- Review and monitor the effectiveness of the unit's Health and Safety Program

RESOURCES

- Find your JOHSC
- JOHSC Resources
- LST Resources
- Unit Organizational Chart: *See below Figures.*
- Our JOHSC is: Applied Science (APSC) JOHSC
- LSTs in our area are: Mining LST and Materials LST.
  Mining LST focuses on activities and safety related items in the Coal and Mineral Processing Lab (CMPL) and Frank Forward (FF) building associated with the Mining Engineering Department.
  Please note: Mining Engineering and Materials Engineering share the Frank Forward (FF) building. The Mining LST and Materials LST are autonomous but cooperative units.

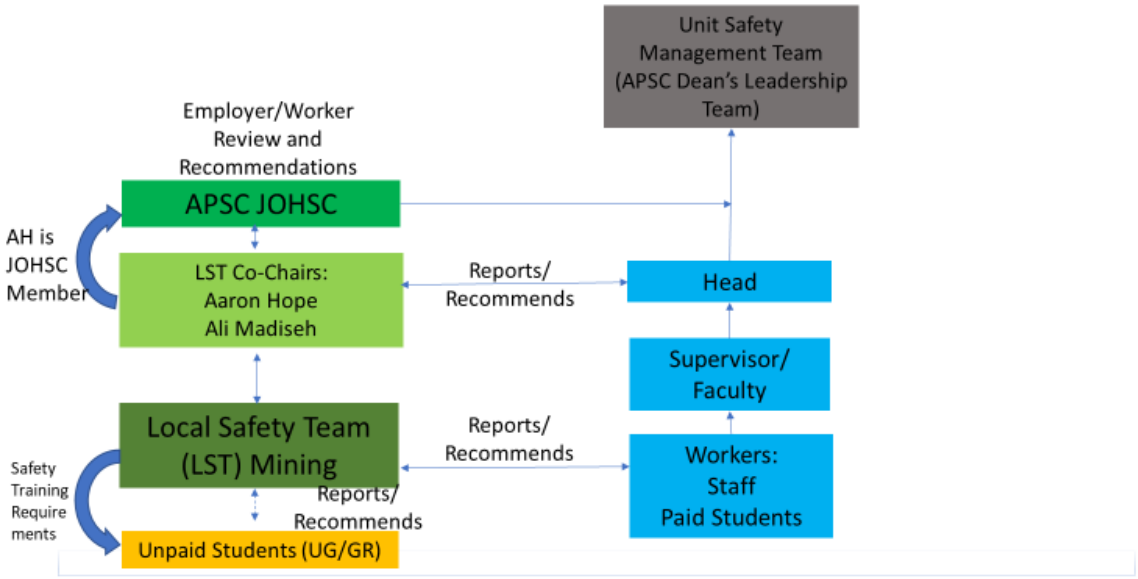

Figure 1. NBK Institute of Mining Engineering

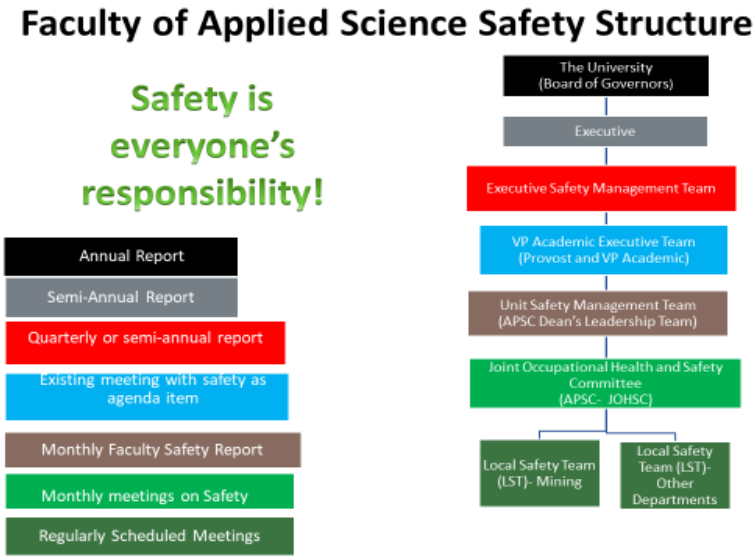

Figure 2. Applied Science (APSC) JOHSC

Element 3: Faculty/Departmental Leadership Meetings

The UBC Executive has delegated an Executive Safety Management Team (ESMT) that meets three times per year. This team consists of delegated Vice-Presidents that are responsible for making decisions on health and safety matters that effect faculties or departments within their portfolio or the University as a whole.

Similarly, Faculty and Departmental Units must strive to take all reasonable measures to provide a safe and healthy workplace. This requires management to be aware of issues and activities that could have an impact on health and safety in their area of responsibility. To meet these obligations, Faculty and Departmental leadership groups must have regularly scheduled meetings that:

- Have Health and Safety as a standing agenda item or are either solely dedicated to health and safety. In the Mining Engineering Department, Health and Safety is a standing agenda item at our monthly Department Meetings. Our monthly department meetings include Faculty and M&P Staff.
- The Mining Engineering Department also holds a monthly Local Safety Team Meeting. The co-chairs of the Local Safety Team also attend the monthly Department Meetings.
- The co-chairs of the Local Safety Team include a Faculty Member and a M&P Staff Member.
- Have a designated person responsible for providing Health and Safety information. (e.g. incident reports, health and safety statistics and trends, etc.)
- Discuss and make decisions on recommendations from the JOHSC and/or LSTs
- Address questions or concerns brought directly to management
- Assign responsibilities for required action on management decisions
- Are clearly documented

Management is responsible for designating key personnel that attend both management and local level meetings to ensure relevant information and decisions are clearly communicated to faculty and staff within their portfolio.

For assistance in developing faculty/departmental leadership meetings, visit or contact Safety Program Advisor at 604-822-6513

RESOURCES

- http://safetycommittees.ubc.ca/
- http://safetycommittees.ubc.ca/roles-responsibilities/
- http://safetycommittees.ubc.ca/johsc/johsc-toolkits/
- Norman B. Keevil Institute of Mining Engineering Faculty Meetings related to safety
- Norman B. Keevil Institute of Mining Engineering LST Meetings Minutes

Element 4: Hazard Identification, Risk Assessment and Safe Work Procedures

All University units shall establish, implement and maintain a process for hazard identification and risk assessment that is ongoing and proactive. The process(es) shall consider, but not be limited to:

- The type of hazard and /or changes in knowledge of hazard
- Number of workers and non-workers (students, volunteers, contractors etc.) participating in or affected by work activity
- Experience level and capability of the workers involved
- Frequency of work activity
- Relevant investigated incidents and/or emergency situations
- Recommendations as a result of an inspection or investigation
- Requirements of the Occupational Health and Safety Regulation

HOW TO DEVELOP SAFE WORK PROCEDURES

Written safe work rules and procedures are formulated to meet WorkSafeBC, UBC and, if applicable, manufacturer's requirements. Safe work procedures should be developed to eliminate or effectively control the hazards. The process for developing a written Safe Work Procedure includes the following steps that are to be completed by the supervisor:

1) Identify all personnel carrying out the task.
2) Identify the hazard(s) associated with each element of the task.
3) Conduct a "Risk Assessment" for the identified hazards.
4) Establish controls to minimize the risk.
5) Determine all required personal protective equipment (PPE) and include when and how it is used.
6) Document the findings.
7) Develop a "Safe Work Procedure (SWP)" to carry out the task(s). This procedure will incorporate findings from the "Risk Assessment" and identified controls.
8) The SWP will undergo review as per Figure 3. Where the SWP applies to work permitted by a UBC institutional compliance committee (e.g. Biosafety, Radiation Safety, Human Ethics or Animal Care), the SWP must also be reviewed and approved as part of the permissions application before implementation.

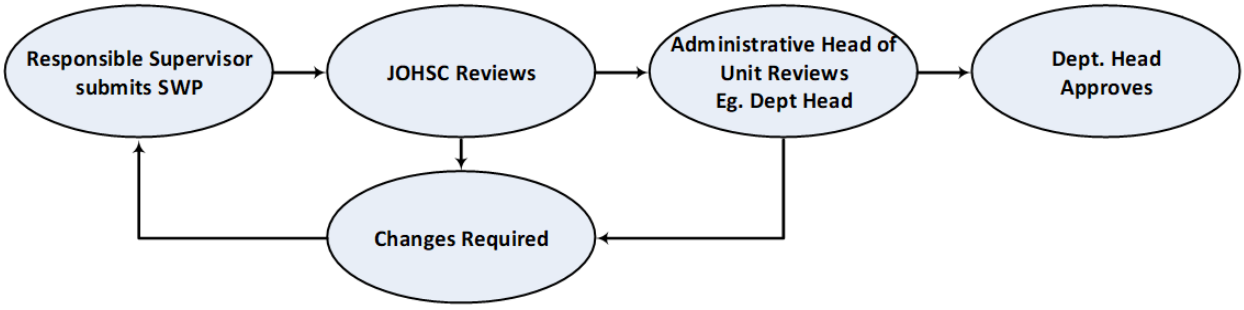

Figure 3: Safe Work Procedure Approval Process

Element 4: Hazard Identification, Risk Assessment and Safe Work Procedures (cont'd)

9) Train all applicable workers on the approved "Safe Work Procedure" and document the training.
10) Ensure documented training records are readily available to indicate that the worker has been trained in the task/procedure that will be carried out.
11) SWP should be regularly reviewed to ensure they are current and effective

It is essential that supervisory staff engage and collaborate with workers when developing Safe Work Procedures to ensure the processes outlined are realistic and meets the demands of the task. Joint Occupational Health and Safety Committees (JOHSC) and Local Safety Teams can provide valuable insight and feedback on the procedures. Safety & Risk Services (SRS) can be contacted at any point to consult on meeting Occupational Health and Safety regulatory requirements.

Be sure to review these procedures whenever a job changes, new equipment is introduced, or workers return after being away for a long period of time. For further information on reviewing procedures, refer to the Safe Work Procedure Guidance Document.

RESOURCES

- General Risk Assessment Template
- Risk Assessment Guidance Document
- General Safe Work Procedure Template
- General Safe Work Procedure Guidance Document
- Field Work Safe Work Procedure Template
- UBC Workplace Violence Risk Assessment Tool
- Chemical Safety Risk Assessment Guide
- Chemical Safety Safe Work Procedures
- SWPs approved by UBC Biosafety Committee
- Ergonomics

Identify the location of your units specific Risk Assessments and Safe Work Procedures:

In Mining, specific SWPs (SOPs) may be needed for the activities being conducted in each lab and may vary for different workers and students depending on the specific focus of their work. To address this, SWPs are kept in each lab in close proximity to the work being conducted when possible.

SWPs (SOPs) were under development for all equipment by lab technicians. For the available SWPs (SOPs), refer to K:\mine-general\CMP Laboratory\ CMPL_FF Lab_Equipment Manuals_Instrument Operating Manuals_SOPs

Note: Access to the shared drive K:\mine-general\ is only available to faculty and staff.

Element 5: Workplace Inspections

A critical component in proactively identifying hazards in the workplace lies in the regular performance of health and safety inspections. Structured examinations of the workplace will not only identify hazards but will help to correct identified safety issues before an injury can occur.

The Occupational Health and Safety Regulation (OHSR) states that "Every employer must ensure that regular inspections are made of all workplaces, including buildings, structures, grounds, excavations, tools, equipment, machinery and work methods and practices, at intervals that will prevent the development of unsafe working conditions."

At UBC, a number of different types of inspections can occur:

1. LOCAL AREA SELF INSPECTIONS

What are they?

Local Area Inspections conducted in areas where the JOHSC, LST or local area supervisors have determined that more than one inspection per year must be done because the tasks or environment may have an increased risk of injury. (E.g. laboratories, shops, kitchens, shipping/receiving areas etc.)

Note that areas covered by a UBC Biosafety or UBC Radiation Safety Permit must be inspected by the Permit Holder or delegated to a study team member named on a valid permit for the space. Anyone not named on valid permit or authorized to perform maintenance for the space should not enter nor inspect a biological or radiological containment zone unless escorted by a permitted study team member.*

*This applies to custodial and trades staff and extends only to the tasks that are part of their regular work.

Who participates?

Local supervisory staff of the workplace are responsible for conducting these inspections.

When are they conducted?

The frequency of local area inspections can vary depending on the risk of the activities being performed in the space. Consult with JOHSC, LST or SRS to assist in making this determination.
Note that documented inspections of permitted spaces must occur monthly.

Element 5: Workplace Inspections (cont'd)

How are they conducted?

The personnel completing the inspection are required to document the inspection (checklist) and implement a corrective action plan where the immediate supervisor of the area will be responsible for the correction. All corrective actions taken requires collaboration with supervisory staff and workers to ensure that the identified hazard has been eliminated or properly controlled. There may be site specific conditions (equipment, machinery, environmental conditions etc.) that are not included in the standard checklist, they should be amended to ensure they are regularly checked.

We conduct monthly and yearly inspections.
Following is the list of rooms and the person responsible:

Faculty/ Staff Responsible	Rooms
Davide Elmo	CMP 110, 102, 151 CMP 111 (shared with Bern)
Ali Madiseh	CMP 109, 155, FF 512(suggested)
Libin Tong	CMP 103, 204, 206, 208, 203
Chris McElligott	CMP 101, 100, 108
Marek Pawlik	CMP 216, 207-sink float FF 401, 403
Maria Holuszko	CMP 205, 201A, 358, FF 503
Bern Klein	CMP 201 (HPGR), 207-Cyanide, 310, 304N CMP 111 – Shared with Davide
Ilija Miskovic	CMP 305, 351
Sanja Miskovic	CMP 210,304A, 304S, 201, 200
Joanna Ho	FF 517, 517G, Kitchen
Joanna Ho	FF 506
Anne Brozensky	FF 519A
Carmen Jensen	FF 508
Amin	FF 508E

CMP-Coal and Mineral Processing Lab, FF-Frank Forward Building

Blank copies of the Monthly Safety Inspection Sheets are available to all faculty and staff on workspace: https://files.workspace.ubc.ca . They can sign in with the Group ID: UBC and the CWL details.
There is also a place to upload a photo of the completed inspection in workspace although the monthly inspection sheets are posted in each room and show the month record of inspection.

The Yearly Inspection Checklists are on the G-Drive as follows:
K://mine-general/Safety/Lab Inspections/Blank Lab Inspection Sheets/2020 Blank Inspection Sheets

RESOURCES:

- General Inspection Checklist and Report Template (JOHSC/LST)
- Monthly Self Inspection Checklist for Lab Users
- https://files.workspace.ubc.ca for blank inspection sheets

2. JOHSC OR LST GENERAL INSPECTIONS

What are they?

JOHSC/LST inspections are an examination of specified work areas and practices. Documented workplace inspections are a regulatory requirement under the Workers Compensation Act and the Occupational Health and Safety Regulation.

Who participates?

On behalf of the employer, identified or delegated faculty and staff of Joint Occupational Health and Safety Committees (JOHSC), Local Safety Teams (LST), or faculty/departmental representatives conduct regular Inspections of their workspaces.

When are they conducted?

The frequency of these inspections can vary depending on the location and risks associated with each specific location or area. All workspaces must be inspected at least once per year.

How are they conducted?

Personnel conducting an inspection are required to use the UBC standardized “General Inspection Checklist”. The corrective actions within the checklist are to be reviewed and discussed by the LST and the JOHSC at the next scheduled meeting.

RESOURCES:

- JOHSC and LST General Inspection Checklist and Report

Element 5: Workplace Inspections (cont'd)

3. EQUIPMENT INSPECTIONS

What are they?

Equipment inspections are independent of General Inspections and Local Area Inspections.
Equipment inspections include inspections of tools, vehicles, machinery or equipment.
They can be:

- Pre-use inspections (e.g. inspecting a vehicle or equipment prior to using it)
- Scheduled preventative maintenance inspections as per the manufacturer's manual
- A Special Inspection of equipment, machinery or work process in response to a reported condition or after a malfunction, accident or incident.

Who participates?

They are conducted by workers familiar with the tool, vehicle, machinery or equipment.

When are they conducted?

The frequency depends on the manufacturer's recommendation or industry standards for preventative maintenance. Pre-use inspections are conducted before every use.

How are they conducted?

A pre-use and/or preventative maintenance inspection checklist specific to the tool, vehicle, machine, or equipment is used. Items of deficiency are identified and documented in the corrective action report following the inspection checklist. This type of inspection aids in the development and revision of Safe Work Procedures (SWPs). Specialized equipment may require consultation from trained professionals

RESOURCES:

- Equipment manuals are kept by the technicians for the relevant areas and on the shared drive(K). Copies are also available for download from the manufacturer.

Item	Date of Inspection	Location of Inspection Reports
Crane	July 15, 2021	High-bay RM 200 & 201
Fume hoods (CMPL and FF)	June, 2021	Tag on each fume hood
Forklift	Monthly	Near forklift charging area

Element 5: Workplace Inspections (cont'd)

4. SPECIALIZED COMPLIANCE SAFETY INSPECTIONS/AUDITS

What are they?

These formal inspections are led by SRS staff to meet WorkSafeBC, Public Health Agency of Canada (PHAC), Canadian Food Inspection Agency (CFIA) and/or the Canadian Nuclear Safety Commission (CNSC) regulatory requirements. These inspections augment but do not replace local area self-inspections or JOHSC/LST inspections.

When are they conducted?

SRS may perform specialized audits or inspections in Faculties, departments or areas identified to have an increased risk of injury or require assistance to meet provincial or federal regulatory requirements. Various regulatory requirements are used as criteria for the inspection.

For research spaces that require federally regulated inspections, Safety & Risk Services will collaborate with responsible management:

- Prior to the start of a new project, to assess suitability of the space for the planned work;
- Prior to decommissioning of laboratory space due to a lab move, faculty retirement or impending renovation; and
- As a part of the ongoing monitoring required by regulatory agencies to maintain facility certifications and institution licensing. The frequency of these inspections varies from 1-5 years depending on: the risk rating of the work done, applicable regulatory requirements and compliance history.

How are they conducted?

Specialized audits are a combination of observational inspections and interviews performed by SRS safety specialists.

Identified safety concerns or gaps are presented to management and supervisory staff. Identified personnel are responsible to complete a corrective action plan and return it to SRS with timelines and task assignments completion.

Element 6: Orientation and Training

Employees must be informed about potential hazards and safe work practices in the workplace.

Training and education must begin with orientation. Following orientation, training should continue through the entire period of employment. The objective of training is to raise the skill level of the worker to an acceptable standard of competency, facilitate professional growth and to ease and enable the implementation of health and safety policies into job specific practices.

SAFETY ORIENTATIONS FOR NEW AND YOUNG WORKERS

The BC Occupational Health and Safety Regulation defines a "young worker" as any worker under the age of 25. A "new worker" can be any age and includes those who are new to the workplace or location, or facing new hazards.

According to WorkSafeBC, units need to provide a workplace orientation for workers when they:

- Begin a new job
- Go to a new worksite or department
- Face new hazards, such as working with new equipment
- Perform new tasks

The following topics must be included in the young or new worker's orientation and training:

1) the name and contact information for the young or new worker's supervisor;
2) the employer's and young or new worker's rights and responsibilities including:
    a. the reporting of unsafe conditions, and
    b. the right to refuse to perform unsafe work;
3) workplace health and safety rules;
4) hazards to which the young or new worker may be exposed, including risks from robbery, assault or confrontation;
5) working alone or in isolation;
6) violence in the workplace;
7) personal protective equipment;
8) location of first aid facilities and means of summoning first aid and reporting illnesses and injuries;
9) emergency procedures;
10) instruction and demonstration of the young or new worker's work task or work process
11) the employer's health and safety program
12) WHMIS information requirements as applicable to the young or new worker's workplace
13) Contact information for the joint occupational health and safety committee

Element 6: Orientation and Training (cont'd)

TO ADEQUATELY ORIENT AND TRAIN WORKERS, SUPERVISORS MUST ENSURE

1) Workplace and job-specific orientation and training is provided (by the supervisor or trainer with subject matter expertise)
2) UBC Mandatory Training Courses are completed
3) Program Specific Safety courses are completed
4) All orientation and training is documented

WORKPLACE SAFETY TRAINING AND EDUCATION

In order to help ensure workers can do their jobs safely, Units need to determine and then provide education and/or training necessary.

Generally, education refers to formal classroom instruction that may include lectures, discussions, and videos. Training refers to hands-on, job-specific instruction to individuals or small groups. Typically, training involves demonstrations and active participation by workers so you or a supervisor can confirm that workers fully understand safe work procedures.

UBC MANDATORY TRAINING COURSES

As a new employee, a number of courses are mandatory to meet WorkSafeBC and UBC requirements. At UBC, a worker includes, UBC Executive(s), Management, Faculty, Staff, and Student workers.

Mandatory Training for all workers includes:

- New Worker Safety Orientation – this will assist in meeting the requirements outlined above.
- Preventing and Addressing of Workplace Bullying and Harassment Training
- Workplace Violence Prevention Training
- Privacy & Information Security Fundamentals Training Part 1 & 2
- Safety Supervision at UBC (for supervisors only)

Note: In addition to a general workplace safety orientation, a site- and task-specific safety orientation must also be completed for each new or transferred employee. The site specific safety orientation template can be found here (See Access: New Worker Safety Orientation).

Note: Some employees at UBC do not have access to a computer and as a result, the New Worker Safety Orientation may be carried out in person within your department/building. The mandatory orientation topic list, provided above, can assist in providing a comprehensive in-person orientation.

Element 6: Orientation and Training (cont'd)

JOB SPECIFIC TRAINING

Each role in the workplace has assigned tasks that require training specific to that worksite. Supervisors are responsible for task assignment and assessment of the training needed to complete those tasks safely and effectively.

While this job-specific training may be delivered by the supervisor or a trainer with demonstrated subject matter expertise, the supervisor retains responsibility for oversight of training and confirmation that an adequate level of proficiency has been attained.

Signing off on an employee's training completion testifies to demonstration of trainee competency and is a legally necessary demonstration of supervisory due diligence. If a supervisor finds that an employee has not reached an adequate level of competency, further training must be done prior to sign off of the training record for that assessed requirement.

CONDUCTING JOB SPECIFIC TRAINING

The supervisor or trainer with subject matter expertise must:

1) Instruct the worker to read the relevant protocol/procedure for individual tasks/techniques
2) Ensure safety measures (hierarchy of controls) are integrated into the protocol/procedure
3) Demonstrate how to do the task as per the protocol/procedure and have the worker observe
4) Instruct the worker to perform the task while you observe them and verify that the workers' performance meets expectations for safety
5) Document the training

The supervisor is responsible for making their workers aware of all foreseeable hazards they may be reasonably expected to be exposed to in the course of their work.

Where a hazard is identified:

- A risk assessment may be necessary to assess the risk posed by the hazard
- Determine how to best control that risk using the hierarchy of controls
- Establish a documented procedure for working with or in proximity to the hazard
- Written procedures and training should always be provided together because:
    - Written procedures facilitate consistent training delivery
    - Training is most effective when key messages can be heard and read

Note: Where tasks involve the same hazards, use the same risk mitigation procedures and are performed in the same environment, training may be generalized across the tasks.

Element 6: Orientation and Training (cont'd)

THIRD PARTY TRAINING

The most effective method of training for certain tasks may be through an external, third party that specializes in that field/topic.

ORIENTATION AND TRAINING RECORDS

The supervisor is primarily responsible for maintaining training records. The department can keep training records if there is an established system for maintaining these records.

It's not only good practice to maintain an education and training record for each worker, listing dates and topics covered, federal regulations require it for anyone working with hazardous substances Reviewing the records from time to time helps ensure training requirements have been met. Annual review of these records is a federal requirement for work with regulated biological substances.

Note that the assessment of training needs pertaining to work with biological substances must be documented and available for review by federal and institutional inspectors along with proof of training completion and attainment of competency.

For detailed information about the types of records that must be kept, please refer to Element 8.

RESOURCES

- Unit specific training/orientation requirements: See the below table
- Our online workshop is where our training can be found. The workshop is where all the faculty and department training records and requirements are located.
- All students, faculty, postdocs, visitors and contractors are required to complete the safety training available through our online course, MINE Safety Online Workshop on Canvas. Enroll and access the course here: https://canvas.ubc.ca/enroll/EGWKHH

Safety Requirements

Table. 1

	Undergrad Students including visiting Students	Course-based Grad Students including visiting students	Processing Lab Researchers (Students, Staff, Faculty, Post-Docs, Contractors, Visitors)	Paid Student Workers (TAs, Ras)	Post Docs	Visitors/ Contractors
Enrol in Canvas MINE SAFETY ONLINE WORKSHOP	✓	✓	✓	✓	✓	✓
SRS Introduction to Lab Safety	✓	✓	✓	✓	✓	✓
General Audience WHMIS	✓	✓	✓	✓		
SRS Chemical Safety Course			✓			
SRS Preventing and Addressing Workplace Bullying		✓	✓	✓	✓	✓
SRS Workplace Violence		✓	✓	✓	✓	✓
New Worker Safety Orientation			✓	✓	✓	
Mandatory Privacy and Information Security Fundamentals Training for all Workers (Part 1 and 2)				✓	✓	

Element 7: Reporting and Investigating Incidents/Accidents

The purpose of incident reporting and investigating is to identify factors that contributed to the incident and to implement corrective actions. This will help create a safe working environment and prevent reoccurrence of similar incidents.

An incident investigation is an analysis of an incident based on the factual information gathered of all the factors involved to determine the preventative root causes.

WORKSAFEBC REQUIRES THE FOLLOWING TYPES OF INCIDENTS TO BE INVESTIGATED

Element 7: Reporting and Investigating Incidents/Accidents (cont'd)

AFTER CONTACTING THE APPROPRIATE EMERGENCY SERVICES, THE FOLLOWING INCIDENTS ARE REQUIRED TO BE IMMEDIATELY REPORTED TO SAFETY & RISK SERVICES (SRS)

- A serious injury to or the death of a worker
- A major structural failure
- A major release of a hazardous substance
- A fire or explosion that had potential for serious injury
- A blasting incident causing personal injury
- A dangerous or unusual incident involving explosives
- A diving incident that causes death, injury or decompression sickness requiring treatment
- A major exposure to a pathogenic or radioactive substance

During work hours, 8:00am – 4:30pm Monday- Friday at 604-822-2029. After work hours, contact Campus Security at 604-822-2222 and the call will be forwarded to SRS' 24/7 on-call personnel.

Note: Upon notification, SRS will immediately notify WorkSafeBC of the incident

WHEN AN INCIDENT OCCURS THAT REQUIRES INVESTIGATION, THERE ARE TWO TYPES OF INVESTIGATIONS

Preliminary Investigation (within 48 hours)	Full Investigation (within 30 days)
• Upon notification of the incident, ensure that the area is secured or restricted, and anyone injured has received first aid • Within 48 hours (2 days) of the incident occurring, go to the area where the incident happened and ensure the area is safe • Gather information by speaking with your worker. The UBC Incident Site Investigation Guide details the type of information you need to gather • Submit information into CAIRS within 48 hours of the incident occurrence • Document immediate corrective actions that make the area safe or restrict access, and address the direct (obvious) causes of the incident	• SRS stipulates that a full investigation needs to be completed in CAIRS within 25 days of the incident occurring to meet the 30 day legal requirement Full Investigations require the following: • All details have been added to the report • Error Producing Conditions, Root causes and corrective actions with assigned timelines and personnel have been documented. Preliminary Investigation = Full Investigation if: • Details in the incident report provide a sufficient amount of information to allow corrective actions to be determined • Root causes and corrective actions with assigned timelines and personnel have been documented.

Element 7: Reporting and Investigating Incidents/Accidents (cont'd)

CONDUCTING AN INVESTIGATION

The Accident/Incident Investigation Training Course provides more detail information on how to conduct an investigation. The steps below provide a general overview

1) Manage the Accident Scene
    - Contact First Aid, Control the remaining hazards, Preserve the accident scene
2) Gather Information
    - Physical Data, Interview Witnesses, Document Review
3) Evaluate and Analyze Findings
    - Build a sequence of events that occurred before, during and after the incident
4) Determine Causes
    - Direct Causes (obvious, can be seen and sensed), Root Causes (obtained by asking "Why?")
5) Corrective Actions
    - Corrective actions should be SMART (Specific, Measureable, Actionable, Realistic, Timely)
6) Complete Documentation
    - File a CAIRS report with all the information obtained from the previous steps
7) Follow up
    - Ensure corrective actions are complete and are not creating new hazards

SUPERVISOR RESPONSIBILITY:

It is the responsibility of the supervisor to investigate an incident that has occur in their area. Subject matter experts and workers familiar with the associated work are available to assist as required.

1) Educate all workers under their supervision to report all incidents that have occurred in the workplace
2) In the event of an injury, all workers are aware of how to access first aid by contacting 2-4444 (Point Grey Campus only)
3) Completing an incident report in CAIRS
4) Informing injured workers to initiate a WorkSafeBC claim by calling 1-888-967-5377 if they have seen a doctor or missed any time from work beyond the date of the incident
5) Ensuring corrective actions are implemented and effective

IMPORTANT: The Worker and Supervisor are able to submit an incident report in CAIRS

NOTE: Incidents involving exposure to or theft of biological or radiological substances must also be reported immediately and directly to the appropriate UBC Compliance Committee by calling 604.822. 4353 or 604.827.5111.

Element 7: Reporting and Investigating Incidents/Accidents (cont'd)

CENTRALIZED ACCIDENT/INCIDENT REPORTING SYSTEM

The Centralized Accident/Incident Reporting System (CAIRS) is used to:

- Report incidents
- Obtain required information to initiate a WorkSafeBC claim for work-related injuries/illnesses
- Document incident investigations

RESOURCES

- Accident/Incident Reporting Program
- UBC Incident Site Investigation Guide

Element 8: Documentation, Records and Statistics

It is the Administrative Head of Unit's responsibility to ensure proper record keeping and statistics are kept for the prevention of injuries and illnesses in their area of responsibility. This will assist employers, managers, supervisors, and JOHSC members:

- Identify the nature, extent, and cause of health and safety hazards
- Set prevention activities
- Determine if control measures are working

Good record keeping is essential. In order for occupational health and safety information to be useful, it must be reliable and accurate.

UNIT REQUIREMENTS

Units are required to keep the following safety records:

A) Safety Orientation and Training Records, including:

- Mandatory and Program-Specific Training
    - Maintain SRS Course certificates for mandatory and program specific courses
    - Maintain completed safety orientation documents – such as online New Worker Orientation
    - Note: Training certificates do not always have to be printed out but they should be readily accessible when needed

- Site Specific Orientation Records – ideally, Part 2 of the New Worker Orientation

- Job Specific Training when hazards are present
    - Training delivery and verification of competency must always be documented where there is a potential for worker exposure. Job Specific training records provide a legal record that workers have been trained to competently recognize and deal with hazards as outlined in the procedures.
    - Note: A Job Specific Training Documentation Template is available to guide you in the documentation of staff training assessments and completion.

- Third Party Training
    - Some procedural training is best provided by a specialist (3rd party) for that topic. If the training is provided by a 3rd party:
        - The training must be adequately specific for the job tasks performed
        - Attendance must be documented and a course syllabus kept as proof of training
        - Create a log indicating the name of the trainer, trainee, date of training, and name of third-party course/training session.

Element 8: Documentation, Records and Statistics (cont'd)

B) Additional Safety-Related Records, including:

- Risk Assessments
- Meeting minutes and crew talks where health and safety issues were discussed and noted
- Local Safety Team and JOHSC meeting minutes
- Inspection reports and records of actions taken to solve problems or for continual improvement
- Equipment log books and maintenance records
- Incident Investigations - automatically stored in CAIRS
- Statistics on the frequency, severity of accidents, type of injuries, etc.
- Supervisors' notes and logs of health and safety contacts with workers
- Records showing the use of progressive discipline to enforce health and safety rules
- Building Emergency Response Plan (should be updated annually or as necessary)
- Sampling and monitoring records of exposures to harmful substances
- Inventory records and federal permissions pertaining to hazardous materials
- Noise exposure measurement records and hearing tests
- Other documents applicable to the type of work (e.g. confined space permits)

Units should strive to generate statistics in order to develop and implement safety initiatives in their workplace.

Incident/Accident records are a good source for identifying trends in the workplace. The UBC Centralized Accident/Incident Reporting System (CAIRS) database allows administrators access to retrieve relevant statistics. To learn how to obtain access, click here.

Element 9: Joint Occupational Health and Safety Committee (JOHSC) and Local Safety Team (LST)

A JOHSC is made up of worker and employer representatives working together to identify and resolve health and safety problems in the workplace. They are mandated to advise, assist, and make recommendations to improve occupational health, safety, and personal security within UBC's workplace environments. To be successful, the committee must meet at least once per month, operate in an atmosphere of cooperation and be effective in promoting and monitoring a sound occupational health and safety program.

The committee's role (through various activities) in the workplace includes:

a) Promoting safe work practices
b) Assisting in creating a safe and healthy workplace
c) Recommending actions which will improve the effectiveness of the occupational health and safety program, and
d) Promoting compliance with the WCA and the Occupational Health and Safety Regulation (OHSR).
e) Participating in inspections and incident investigations

For more information about the JOHSC, refer to the JOHSC Reference Manual

Our JOHSC is: Applied Science (APSC) JOHSC
Their minutes can be found here: Safety Committees Website
http://safetycommittees.ubc.ca/johsc/find-your-johsc/joint-occupational-health-safety-committees/provost-vp-academic-a-to-l/applied-sciences/#Minutes
LSTs in our area are: Mining LST and Materials LST

RESOURCES

The following Resources can be found on the Safety Committees Website

- Information pertaining to each JOHSC
- JOHSC Terms of Reference Template
- JOHSC Meeting Agenda Template
- JOHSC Minutes Template

Element 9: Joint Occupational Health and Safety Committee and Local Safety Team (cont'd)

LOCAL SAFETY TEAM

A Local Safety Team (LST) is a dedicated safety advisory group for a building department or area that assists the JOHSC in assisting occupational health and safety initiatives in workplaces across the University. The LST has a mandate to advise, assist and make recommendations to Heads of Units and the correlated JOHSC to improve health, safety and the personal security for all faculty and staff.

Each Faculty/Department has a variety of work groups and workplaces within its portfolio which have a diverse set of functions and related hazard potential. It is felt that one JOHSC within the Department would be overwhelmed in this diverse workplace, so the decision has been taken to organize and implement LSTs to provide site specific safety information to JOHSCs.

The role of the LST is to:

- Assist local supervisory staff Identify hazards in the workplace
- Participate in, discuss, and review investigations within their work area.
- Conduct, discuss and review workplace inspections.
- Collaborate with JOHSC in the development of health and safety initiatives
- Recommend actions that will improve the effectiveness of the Health and Safety Program
- Educate and promote WorkSafeBC regulatory requirements to faculty and staff in their area
- Identify and escalate items beyond their local scope of control to the JOHSC

WHY SHOULD AN LST BE ASSEMBLED?

- The JOHSC membership is unable to perform inspections for all their areas of responsibility
- The members of the JOHSC are unable to participate in incident investigations for all areas in their area of responsibility
- There are geographical constraints that would limit the effectiveness of the JOHSC (e.g. Off-campus facilities)
- There is an increased safety risk in the day-to-day work activities in a given area that requires local expertise and oversight. (e.g. Theatres, gardens, farms etc.)

RESOURCES

- The following Resources can be found on the Safety Committees Website
    - LST Terms of Reference
    - LST Meeting Agenda Template
    - LST Meeting Minutes Template
    - LST General Inspection and Report Template

Element 10: Emergency Procedures and First Aid

The purpose of 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

UNIT REQUIREMENTS FOR EMERGENCIES

1) Units must understand how to provide employees with a quick and effective response in the event of injuries or emergencies.

2) Supervisors are required to communicate emergency numbers and procedures to workers during orientation and to regularly review this information during staff meetings. Annual emergency and evacuation drills shall be practiced to ensure awareness and effectiveness of emergency routes and procedures. The success of the First Aid and Emergency Service Programs depends on employees knowing what to do in emergency situations, both major and minor.

3) The risks associated with the Unit's work process and related control measures must be communicated with employees and understood.

4) All training, meetings and drills shall be documented to meet due diligence requirements.

5) Management will provide all tools and resources required for these programs to be effective. These include:
    - Appropriate emergency response plans and equipment
    - Education and training of Unit
    - Time made available to allow key personnel to complete their duties
    - Established chain of command for emergency situations.

BUILDING EMERGENCY RESPONSE PLANS AND PROCEDURES

The Unit has a current completed Building Emergency Response Plan that details plans and procedures for situations where emergencies could arise. These plans and procedures deal with fire prevention, emergency evacuation, personal security, earthquake and bomb threats.

Depending on the nature of the emergency, response will be provided by Vancouver Fire and Rescue Services, the local detachment of the RCMP, Campus Security and/or SRS.

The UBC Building Emergency Response Plan must be completed for each UBC Building. For the Frank Forward and Coal & Mineral Process Labs, the plans can be found at Safety - NBK Mining Institute (ubc.ca)

Element 10: Emergency Procedures and First Aid (cont'd)

UNIT REQUIREMENTS FOR FIRST AID

University "2-4444" Central First Aid System

The UBC Occupational First Aid program will provide first aid coverage for all Faculty, Staff, and Students for the UBC Point Grey Campus, 24 hours a day.

Faculty, Staff and Paid/Practicum Students can call 604-822-4444 (or 2-4444 on a campus phone) which will summon trained first aid attendants, to the location of the injured person.
Students and visitors can call 604-822-2222, which is the Campus Security number. All campus security personnel have first aid training.

The First Aid attendants will:

- Promptly provide first aid at a level of care within the scope of their first aid training.
- Objectively record observed or reported signs and symptoms of injuries and illnesses in the first aid record
- Refer workers with injuries and illnesses beyond the scope of their training to medical attention
- Arrange for transport of a worker to medical aid, as required (Attendants can decide whether an injury requires rapid transport, or to transport to UBC Hospital or clinics on campus via first aid vehicle)

In the event of a medical emergency all Faculty, Staff and Paid/Practicum Students should first call 911 and then first aid at 604-822-4444.This will ensure the quickest response for assistance. For visitors, 911 and then 604-822-2222.

Supervisors must ensure that signs clearly indicating the location of, and how to call for, first aid are posted conspicuously throughout the workplace, and communicated to the workers in the Unit.

FIRST AID AT OFF CAMPUS LOCATIONS

Supervisory staff are required to educate Faculty, Staff and Paid/Practicum Students under their responsibility when and how to summon first aid at their location.

Element 10: Emergency Procedures, First Aid and AEDs (cont'd)

AUTOMATED EXTERNAL DEFIBRILLATORS (AEDS)

AEDs have been installed in a variety of UBC buildings to provide quick response in the event of a cardiac arrest. The defibrillator provides quick access to help and can increase the chance of saving someone's life. You can download a list of UBC Vancouver Buildings with AEDs .

Using a defibrillator is safe and straightforward, and its light weight means it can be carried to where it is needed. Once activated, the device provides easy-to-follow voice instructions and automatically determines if someone requires a life-saving shock. Defibrillators cannot do harm, and will only deliver a live-saving shock if it is required in the case of cardiac arrest. It will not shock someone accidentally. When an AED is used, a CAIRS report must be completed and you must contact Campus Security who will retrieve the used AED and replace it with a temporary unit.

RESOURCES

- First Aid Poster (UBC Vancouver Occupational First Aid Poster)
- AED Locations at UBC Vancouver (General AED Information)
- AED Locations in Frank Forward building: (1) First floor, hallway, north of Room 119 north entrance; (2) 5th floor by room 503 near elevators.
- AED Locations in CMPL: 2nd Floor (Main) outside Rooms 254 & 256 (near elevator)
- Building Emergency Response Plans (BERP):
    - Coal and Mineral Processing Lab (CMPL) BERP https://mining.ubc.ca/safety/#resources
    - Frank Forward (FF) BERP https://mining.ubc.ca/safety/#resources

Element 11: Hazardous Materials Management

BIOLOGICAL SAFETY

Biosafety is the containment principles, technologies and practices that are implemented to prevent unintentional exposure to biological material and toxins, or their accidental release. The primary objective of the UBC Biological Safety Program is to facilitate and ensure the safe and knowledgeable use of biological materials in research, teaching and the environment. Additionally, the Biosafety Program supports the containment practices for genetically modified organisms, environmental pests/insects, and invasive species

Approval for research projects using biological substances must be sought, in the form of a biosafety permit application, from the University Biosafety Committee for review prior to release of funding. Once approved, a UBC Biosafety Permit is issued by the UBC Biosafety Committee through the UBC Research Information System (RISe). The Permit, which states the allowable biological substances, methods and spaces where they may be used and stored, must be posted in each room listed on the permit. Only study team members listed in the permit application are authorized to do the work described in the permit.

The Biosafety Office acts as a resource on issues of biosafety, including pathogen & toxin acquisition, training, laboratory design and equipment selection. Specialized, mandatory training is offered for permit holders, study team members and people shipping or receiving infectious materials.
Specialized inspections of permitted spaces are done as necessary to maintain facility certifications, obtain importation permissions and keep permits in good standing.

At this time of writing there are no research projects in the CMP Laboratory involving biohazardous agents. If a project involving a biohazardous agent is to be undertaken the persons involved must take the UBC Biosafety course.

CHEMICAL SAFETY

The Chemical Safety Program promotes the recognition, evaluation and control of chemical hazards that may cause illness, impaired health or significant discomfort to UBC faculty, staff and students.

The Chemical Safety Program incorporates the entire lifecycle of the chemical beginning with purchasing and ending with disposal. The aim is to ensure faculty and staff are properly informed on the use and handling of chemicals that are capable of causing injury, illness, disease, fire, explosions or property damage.

Element 11: Hazardous Materials Management (cont'd)

RADIATION SAFETY

Radiation Safety is the protection of people and the environment from the harmful effects of ionizing radiation. The primary objective of the UBC Radiation Safety Program is facilitate and ensure the safe, knowledgeable and legal use of radiation sources and devices in research and teaching.

All research projects using radioactive substances and/or radiation devices must be submitted to the University Radiation Safety Committee for review prior to release of funding to verify that the work planned is compliant with the terms of UBC's CNSC licensing. Once approved, a UBC Radiation Permit is issued by the Committee through RISe. The Permit, which will state the types and amounts of radiolabeled compounds and radiation devices as well as the spaces where they may be used and stored, must be posted in each room listed on the permit. Only study team members listed on an approved permit are authorized to work with radiation as described in the permit.

The Radiation Safety Office acts as a resource on issues of radiation protection, including radiation acquisition, handling and disposal, training, laboratory design and equipment selection. Specialized training is offered for authorized users of open source and sealed substances. The Radiation Safety Training course provides an introduction to the safe handling of radioactive sources and is mandatory for all faculty, staff and students prior to commencing work with radioactive materials.

Specialized inspections are done of permitted spaces as necessary to maintain institutional licensing, obtain importation permissions and keep permits in good standing.

RESOURCES

- SRS Website (Biological Safety)
- Biological Safety Manual
- Procedures for Working with Biological Materials Policy
- SRS Website (Chemical Safety)
- WHMIS Information and Training
- Chemical Safety Manual
- Spill Clean Up Procedure
- SDS Database
- SRS Website (Radiation Safety)
- Radiation Safety Manual
- Radiation Safety Policy
- The location of chemical inventory in FF and CMPL:
    - Chemical Inventory can be found in the following rooms: CMPL 103, CMPL 200, CMPL 207, CMPL 216, CMPL 304, FF 401, FF403, and FF503.
    - Digital copy of the inventory lists is available from the shared drive: K> mine-general > CMP Laboratory

    - Physical copy of the inventory lists can be found on the white board at CMPL 250 area (outside staff offices)
- Lab specific rules can be found on the Mining website, in Canvas Mine Safety, in the UBC Chemical Safety Manual and posted in many labs.
- The location of the Safety Data Sheets (SDS):
    - Physical copies of SDS are available at CMPL 252 and FF401.
    - Digital copies of SDS are available from the shared drive: K>mine-general > CMP Laboratory
    - Additional resources for SDS: CCOHS Web Information Service, SDS databases are subscribed by UBC library.

Element 12: Occupational Hygiene

DEFINITION AND PURPOSE

Occupational Hygiene promotes a safe a healthy environment by providing information and advice on prevention of ill health from work activities.

OCCUPATIONAL HAZARDS

A hazard is anything in the workplace that poses a risk to buildings, machinery/equipment, or individuals. The following items are occupational hazards that can be found in many workplaces.

Hygiene Hazards

A hygiene hazard is anything that could cause adverse health effects. Most hygiene hazards can be categorized as physical, biological, or chemical hazards.

Hazard Type	Source
Physical	noise, light, temperature, and radiation
Biological	micro organisms, toxins and animal allergens
Chemical	acidic, basic, and organic vapors in the interior air; in MINING this also includes: corrosive, toxic, flammable, combustible.

To determine if a hygiene hazard can result in adverse health effects, monitoring needs to be carried out through either personal sampling or area sampling using specialized equipment. The results from all monitoring are compared to WorkSafeBC regulations or other applicable standards to ensure compliance. If compliance is not achieved then the necessary controls need to be implemented. See the SRS website for further information.

Noise Hazards

Noise levels greater than 85 decibels, averaged over eight hours, can damage hearing. If anyone is exposed to this level of noise, controls must be implemented to mitigate the risk of hearing damage.

Nuisance noise is noise that does not cause hearing loss, but may have a psychological effect and impact employee performance. Due to its effect on employees, it should be minimized where possible and should be managed at a local level.

As with any exposure, the hierarchy of controls should be used when controlling for noise exposure. See Noise Hazards for further information.

If you are concerned that noise in your workplace exceeds 85 dBA, contact the Occupational Hygienist to arrange an on-site noise assessment. This assessment will determine if a hearing test is required and if other controls need to be used in that area.

Element 12: Occupational Hygiene (cont'd)

Indoor Air Quality (IAQ) Hazards

IAQ deals with the content of interior air that could affect the health and comfort of building occupants. The IAQ may be compromised by microbial contaminants (mold, bacteria), chemicals (such as carbon monoxide, radon), allergens, or any particulate or environmental stressor that can induce health effects.

If you are concerned about poor Indoor Air Quality at your workstation please see the SRS Website for more details on how to proceed.

Scents in the Workplace

Exposure to scented products can adversely affect a person's health. In high concentrations, scented products may trigger a negative responses for those with allergies or chemical sensitivities. Dealing with a scent situation can be a sensitive undertaking. There is a delicate balance between expressing your concern to the individual and appearing to be confrontational.
Scent situations can be brought to the attention of your supervisor, Joint Occupational Health and Safety Committee (JOHSC) representative and/or Local Safety Team (if available). See the SRS Website for more information.

Respirators

Respirators must be fitted to the individual, which ensures the respirator fits properly on the face. Respirator fit is affected by scarring, dental work, surgery, weight loss, facial hair. A respirator fit testing session will ensure individuals are competent at putting on their respirator.

Respirator fit testing is required prior to the first use of your respirator and annually thereafter, as required by WorkSafeBC regulations. For more information on respirators and fit testing, see the SRS Website.

Element 13: Contractor Safety

It is the intent of UBC to provide a safe, healthy and secure environment for all members of its faculty, staff, students and visitors. As a contractor, it is your responsibility to ensure that project work is performed in a safe manner, and that it is in compliance with WorkSafeBC Occupational Health and Safety Regulations, any other applicable provincial and/or federal laws and/or regulations, and any UBC policies, procedures and other requirements that may apply.

The University expectations are that contractors will train, supervise, and direct their employees to be mindful of the safety of UBC‟s students, faculty, employees, neighbors and property, when performing work on UBC‟s premises. The manual below does not address, and is not intended to abrogate or assume responsibility for the contractor's duty to its employees. Nor does the manual provide an exhaustive outline of laws, ordinances or regulations governing environmental, health and safety compliance. Rather it is provided to identify specific responsibilities, communicate the availability of hazard information for university properties and to outline UBC Safety and Environmental procedure.

RESOURCES

- Contractor Safety Information can be found on the SRS website: Contractor Safety Manual

For the NBK Institute of Mining Engineering, more specific information is found under the Canvas Mine Safety courses. A general link is at Safety - NBK Mining Institute (ubc.ca) and information can be found using the information:

> "Safety training can be accessed through our MINE Safety Online Workshop on Canvas. You can enroll and access the course here: https://canvas.ubc.ca/enroll/EGWKHH
> Once you are enrolled there are different requirements depending on your role at UBC."

Element 14: Program Review

To ensure the overall success of a Health and Safety Program (HSP) a system for evaluation must be in place. The purpose of a reviewing and evaluating an HSP is to determine and implement changes needed to continually improve all elements health and safety in the workplace.

These evaluations/reviews are to be designed to:

1) Identify the strengths of the Unit's HSP
2) Identify areas of non-compliance (with WorkSafeBC and UBC Policy requirements)
3) Identify where the HSP could be further improved so as to achieve higher levels of health, safety and compliance
4) Assist the Unit in reducing workplace injuries and the resulting operational disruption.

Once the evaluation has been completed, identified improvements must be implemented using a standardized Plan-Do-Check-Act continual improvement cycle:

1) Plan: Developing an action plan based on risks and opportunities to improve the health and safety program in your area of responsibility
2) Do: Prioritize recommendations and assign accountability for implementation of plan
3) Check: Monitor and measure activities and processes with regard to health and safety objectives. Document a report of the results
4) Act: Take actions to continually improve health and safety performance to achieve the intended outcomes

Appendix

1. UBC Safe App

The health and safety of the campus community is UBC's top priority. UBC Safe is a free mobile safety app for the UBC Vancouver campus. This multi-function app puts direct access to campus safety resources and security tools in your hand, while on the go.

Find important safety information, contacts, maps and procedures — all in one place!

- UBC Alerts — Turn on your push notifications to receive UBC Alerts in active and urgent situations that require your immediate attention.
- Campus resources — Access important safety and support resources in one convenient place.
- Critical services — Connect with Campus Security staff for help or first aid when needed, and access SafeWalk.
- COVID-19 health assessment — Complete and confirm your daily health assessment using the COVID-19 feature.

Download the new UBC Safe Vancouver app and make use of its many features and resources. The free mobile safety app is available for iPhone and Android devices.

2. Asbestos

The Occupational Health and Safety Regulation defines asbestos – containing material as containing 0.5% or more asbestos as determined by polarized light microscopy, electron microscopy, and/or gravimetric analysis. Review the following resources before working on an ore sample with more than 0.5% asbestos

Top tips:

- Refer to Safe Work Practice for Handling Asbestos handbook
- UBC workers must contact UBC Asbestos Safety Coordinator for guidance before working on an ore sample with more than 0.5% asbestos
- PPE, including respirators and protective clothing, is essential in controlling worker exposure to asbestos

Respirators

- Each worker will be fit tested if a respirator is required
- If a worker is required to wear a respirator that requires an effective seal with the face for proper functioning, the worker must be clean-shaven where the respirator seals with the face
- When the worker notices a resistance to breathing, the respirator filters must be replaced
- Respirators will be used, cleaned, and stored in accordance with the respirator program

Other PPE and hygiene

- Workers will wear disposable coveralls (for example, Tyvek) when working with asbestos-containing materials or entering a work area contaminated with asbestos
- Other PPE, such as protective eyewear or hearing protection, will be worn as required
- Hard hats or high-visibility vests will be worn in work or sampling areas.

RESOURCES

- Asbestos Management https://srs.ubc.ca/health-safety/safety-programs/safe-work-processes/asbestos-management/
- Asbestos Containing Materials in UBC Buildings http://riskmanagement.sites.olt.ubc.ca/files/2015/09/Labels-and-Identification-Memo.pdf
- WorkSafeBC. Asbestos. https://www.worksafebc.com/en/health-safety/hazards-exposures/asbestos
- WorkSafeBC. Resources/Safe Work Practices for Handling Asbestos. https://www.worksafebc.com/en/resources/health-safety/books-guides/safe-work-practices-for-handling-asbestos?lang=en

3. Fall protection

Fall protection is the use of controls designed to protect workers from falling or in the event they do fall, to stop them without causing severe injury. Falls from heights, even relatively low elevations can result in serious injury or death.

The Occupational Health and Safety Regulation requires workers to use fall protection systems when they could fall from a height of 3 m (10 ft) or more, or where a fall from a lesser height could result in serious injury.

RESOURCES

- UBC SRS – Fall Protection https://srs.ubc.ca/health-safety/safety-programs/safe-work-processes/fall-protection/
- WorkSafeBC. An Introduction to Personal Fall Protection Equipment
- https://www.worksafebc.com/en/resources/health-safety/books-guides/an-introduction-to-personal-fall-protection-equipment
- Ladder Safety. https://www.worksafebc.com/en/resources/health-safety/toolbox-meeting-guides/setting-up-a-ladder
- UBC Fall Protection Plan (WORD) https://riskmanagement.sites.olt.ubc.ca/files/2020/06/UBC-Fall-Protection-Plan.docx

4. Ergonomics

Ergonomic injuries (overexertion and repetitive strain injuries) account for over 40% of the days lost from WSBC accepted time loss claims.
Musculoskeletal injury (MSI) risk factors are regulated under sections (4.46 to 4.53) of the BC Worker's Compensation Act.

RESOURCES

- Ergonomics Regulations, Inspections& Investigations
  http://www.hr.ubc.ca/wellbeing-benefits/workplace-health/ergonomics/regulations-risks-investigations/
- Ergonomics MSI Hazard Identification Checklist (PDF)
  http://www.hr.ubc.ca/wellbeing-benefits/files/Ergonomics-MSI-Hazard-Identification-Checklist.pdf
- Incident Investigations: Lifting Tool (PDF)
  http://www.hr.ubc.ca/wellbeing-benefits/files/CAIRS-Incident-Investigations.-Lifting.-Additional-Information.pdf
- Overview of WSBC Ergo MSI Risk Factors to investigate (PDF)
  http://www.hr.ubc.ca/wellbeing-benefits/files/Ergo-MSI-Incident-Investigation-Factors-to-Consider-Overview.pdf
- Ergo MSI Investigation Tip Sheet (PDF)
  http://www.hr.ubc.ca/wellbeing-benefits/files/Ergo-MSI-Incident-Investigation-Tip-Sheet.pdf
- Lifting Guidelines (PDF)
  http://www.hr.ubc.ca/wellbeing-benefits/files/Lifting-Guidelines.pdf
- Safe Lifting Resource Sheet (PDF)
  http://www.hr.ubc.ca/wellbeing-benefits/files/Safe-Lifting-1-page-resource-sheet.pdf
- Lab Ergonomics: setting up your workstation, poster resources
  http://www.hr.ubc.ca/wellbeing-benefits/workplace-health/ergonomics/lab-ergonomics/
    - Microscope Ergonomics
    - Pipetting & Sitting
    - Pipetting & Standing
    - Pipette Fillers
    - Laboratory Ergonomics Guide (PDF)
      http://www.hr.ubc.ca/wellbeing-benefits/files/LabErgoGuide21.pdf
    - Fume Hood (PDF)
      http://www.hr.ubc.ca/wellbeing-benefits/files/Ergonomics-in-the-Lab-fumehood.pdf

5. Safe Work Procedures

Safe Work Procedures are required for work that is deemed by supervisors to be sufficiently hazardous. See Element 4 for further information.

In general, whenever chemicals are to be used review the SDS for safety information.

Basic safety training is provided at the department/university level. This does not suffice for task-specific training, such as operating potentially hazardous equipment or conducting potentially hazardous procedures. A safe work procedure is part of the required safety training for task specific work.

List of safe work procedures

Name	Location
Safe use of glassware Peroxidizable chemicals Use of compressed gasses Use of liquid nitrogen	K:/mine-general/CMP Laboratory/ CMPL_FF Lab_Equipment Manuals_Instrument Operating Manuals_SOPs
Chemical Spill Clean-up Procedure	https://riskmanagement.sites.olt.ubc.ca/files/2017/11/Chemical-Spill-Cleanup-SWP.pdf
Mercury Spill Clean-up Procedure	https://riskmanagement.sites.olt.ubc.ca/files/2017/12/Mercury_Spill_Cleanup.pdf

RESOURCES

- UBC SRS Risk Assessment & Safe Work Procedure https://srs.ubc.ca/health-safety/safety-programs/risk-assessment-safe-work-procedure/
- Risk Assessment Template (WORD) https://riskmanagement.sites.olt.ubc.ca/files/2020/05/General-Risk-Assessment-Template.docx
- Risk Assessment Guidance https://riskmanagement.sites.olt.ubc.ca/files/2020/05/General-Risk-Assessment-Guidance-Document.docx
- General Safe Work Procedure – Template (WORD) https://riskmanagement.sites.olt.ubc.ca/files/2019/05/General-SWP-Template.docx
- General Safe Work Procedure – Guidance Document (WORD) https://riskmanagement.sites.olt.ubc.ca/files/2019/05/General-SWP-Guidance-Document.docx
- UBC SRS Chemical Safety https://srs.ubc.ca/health-safety/research-safety/research-safety-resources-documents/chemical-safety-resources/

6. Fume Hoods Safety

The purpose of using laboratory fume hoods is to protect the user from inhalation hazards. Fume hoods should be correctly used and regularly maintained. The fume hoods at CMPL are: 200-1, 207-1, 207-2, 304-1, 304-3, and 304-4. Fume hoods in FF Building for NBK Mining are in Rooms 503, 403 and 401.

Top tips:

- Keep fume hood exhaust fans on at all times when hazardous materials are present

- Preform all work six inches inside the hood to minimize turbulence at entrance to hood
- Keep the hood sash at the level indicated on the maintenance sticker
- Keep lab doors closed to ensure negative room pressure
- Avoid rapid movements in front of the hood

RESOURCES

- WorkSafeBC 30.8 standards. https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-30-laboratories#SectionNumber:30.8
- American Conference of Governmental Industrial Hygienists. Industrial Ventilation – A Manual of Recommended Practice. The manual is used by WorkSafeBC 30.8 standards.
- UBC SRS. (2017 version). Chemical Safety Manual. Retrieved from https://riskmanagement.sites.olt.ubc.ca/files/2017/12/Chemical-Safety-Manual_2017.pdf

7. PPE Requirements

Please refer to chemical safety manual for PPEs including basic PPE, lab coats and aprons, eye and face protection, laboratory gloves, footwear, respiratory protection, and hearing protection.
Minimum PPE requirements in NBK Institute Laboratories includes: safety glasses/goggles and lab coat/coveralls. For further requirements see Appendix 17: NBK Lab Access Protocols.

RESOURCES

- UBC SRS. (November 27, 2017). Glove Selection Guide. https://riskmanagement.sites.olt.ubc.ca/files/2017/11/Glove-Selection-Guide-GDL-1.pdf
- UBC SRS. (2017 version). Chemical Safety Manual. Retrieved from https://riskmanagement.sites.olt.ubc.ca/files/2017/12/Chemical-Safety-Manual_2017.pdf
- WorkSafeBC – OHS Regulation Part 8: Personal Protective Clothing and Equipment https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-08-personal-protective-clothing-and-equipment

8. Electrical Safety

Hazardous energy is any energy source that could cause injury or death to workers. Electrical energy belongs to hazardous energy.
Only trained personnel are permitted to access electrical panels or equipment electrical enclosures. Workers conducting repair and maintenance on equipment and machinery are exposed to possible serious injury should the equipment or machinery unexpectedly start-up or stored energy is released from the equipment or machinery.
De-energization is the removal of hazardous energy from machinery or equipment before lockout is applied. De-energization may include shutting off a machine and unplugging it, or disconnecting a switch before a lock is applied to prevent the machine from being started up accidentally.
Lockout is the use of lock(s) to render machinery or equipment inoperable or to isolate an energy source. Once de-energization is complete, lockout can be applied. The purpose of lockout is to prevent an energy-isolating device (e.g. circuit breaker, line valve) from accidentally or inadvertently being operated

while workers are performing maintenance on machinery or equipment. Lockout makes sure machinery or equipment won't start and injure a worker.

RESOURCES

- De-energization & Lockout
  https://srs.ubc.ca/health-safety/safety-programs/safe-work-processes/de-energization-lockout/ /
- High-voltage electricity
  https://energy.ubc.ca/ubcs-utility-infrastructure/high-voltage-electricity/

- WorkSafeBC – OHS Regulation Part 19: Electrical Safety
  https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-19-electrical-safety

9. Crane Training / Safety

Two 5 ton overhead cranes are used by technicians and researchers at CMP Laboratory: UBC-025 and UBC-026. The overhead cranes are inspected and repaired annually. Inspection records can be found on the east wall of CMP 200 &201. Training is to be provided by trained technical staff and documented by the supervisor.

RESOURCES

- OHS Regulation Part 14: Cranes and Hoists – WorkSafeBC
  https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-regulation/part-14-cranes-and-hoists
- BC Crane Safety.
  https://bccranesafety.ca/

10. Forklift Training / Safety

The Mining Department operates a Jungheinrich EFG 220 electric counterbalance forklift. Only trained and certified operators can use the forklift. Technical staff obtained certification/training from Pivot Industrial Training Services (https://www.pivotservices.ca). Recertification is required and takes place every 3 years.

The forklift is inspected by the operator prior to each use. A monthly inspection report is located next to the charging station. Trained operator documents and forklift manual are stored on the Mine shared drive (K)/Mine-general/CMP Laboratory/Forklift

RESOURCES

- WorkSafeBC – Forklift operator training
  https://www.worksafebc.com/en/health-safety/education-training-certification/forklift-operator
- WorkSafeBC – Forklifts & materials – handling equipment
  https://www.worksafebc.com/en/health-safety/tools-machinery-equipment/forklifts

- WorkSafeBC – OHS Guidelines Part 16: Mobile Equipment https://www.worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation/ohs-guidelines/guidelines-part-16

11. Waste Disposal

Refer to Hazardous Waste Disposal Guide website. Technicians use Hazardous Waste Inventory System (HWIS) for disposal of hazardous waste.

List of resources for waste disposal

File name	Link	Comments
Metro Vancouver Sewer Use Bylaw	http://www.metrovancouver.org/boards/Bylaws1/GVSDD_Bylaw_299-Unofficial_Consolidation.pdf	Oct. 26, 2018 (Organic, inorganic etc.) Refer to Table C – Inorganic Contaminants for leaching solution disposal
Pollution Prevention: Sanitary and Storm Severs	https://riskmanagement.sites.olt.ubc.ca/files/2019/04/Sanitary-SW-Procedure-UPDATE_2019.pdf	Feb. 1, 2019.
A List of Hazardous Waste Disposal Procedures	https://srs.ubc.ca/environment/hazardous-waste-management/hazardous-waste-procedures/	UBC SRS. Please refer to the following resources for detailed procedures.
Hazardous Waste Inventory System (Point Grey Campus)	https://cwis.rms.ubc.ca/wis/login.aspx	All chemicals for disposal must be -pre-approved for disposal by an ESF Technician.

Please refer to the following procedures for waste disposal. If the type of waste you are disposing of is not listed below please contact the relevant lab technician for the area you are working in.

RESOURCES – Waste Disposal Procedures

- Non-Hazardous Chemicals Safe to Throw Out with Your Garbage https://riskmanagement.sites.olt.ubc.ca/files/2016/03/Safe-for-garbage-disposal.pdf
- Non-Hazardous Chemicals Safe to Dispose Down the Drain https://riskmanagement.sites.olt.ubc.ca/files/2016/03/Safe-to-dispose-down-drain.pdf
- UBC Hazardous Waste Disposal Information Sheet https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Hazardous-Waste-Information-Sheet-2019.pdf
- Aqueous waste disposal https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Aqueous-Waste-Disposal.pdf
- Chemical waste disposal (refer to HWIS) https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Chemical-Waste-Disposal.pdf
- Mercury waste disposal (such as mercury thermometers)

https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Mercury-Disposal.pdf

- Sharps disposal
  https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Sharps-Disposal.pdf
- Organic solvent waste disposal
  https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Organic-Solvent-Disposal.pdf
- Unknown Laboratory Chemicals Disposal
  https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Unknown-Lab-Chemicals.pdf

  Comments:
  Unknown chemicals, explosives & potentially explosive materials, compressed gas cylinders & lecture bottles of hazardous gases are not acceptable by the Environmental Services Facility. The cost of waste removal and disposal by external contractor is the generators' and/or their department's responsibility. For more detailed information on Unknown Laboratory Chemicals Disposal Procedures, please contact the relevant lab technician.

- Battery waste disposal
  https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Battery-Disposal.pdf
- Laboratory glass waste disposal
  https://riskmanagement.sites.olt.ubc.ca/files/2019/11/Laboratory-Glass-Disposal.pdf
- Oil waste disposal
  https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Oil-Waste-Disposal.pdf
- FAQ about waste disposal
  https://riskmanagement.sites.olt.ubc.ca/files/2019/08/Frequently-Asked-Questions-HW.pdf
- Hazardous Waste Accumulation Area Inspection Checklist
  https://riskmanagement.sites.olt.ubc.ca/files/2020/02/Hazardous-Waste-Area-Inspection-Checklist.pdf

RESOURCES – Laboratory Pollution Prevention Guide

- Introduction to lab pollution prevention and waste minimization
  https://riskmanagement.sites.olt.ubc.ca/files/2019/07/Intro-Lab-Pollution-Prevention.pdf
- Source Reduction of Laboratory Waste
  https://riskmanagement.sites.olt.ubc.ca/files/2019/07/Source-Reduction-Lab-Waste.pdf
- Sanitary and storm sewer pollution prevention
  https://riskmanagement.sites.olt.ubc.ca/files/2019/07/Sanitary-Storm-Sewer-PP.pdf
- In-laboratory treatment of chemical waste
  https://riskmanagement.sites.olt.ubc.ca/files/2019/07/In-Lab-Treatment-Chem-Waste.pdf
- Planning and running experiments
  https://riskmanagement.sites.olt.ubc.ca/files/2019/07/Planning-Experiments.pdf
- Minimize other environmental impacts
  https://riskmanagement.sites.olt.ubc.ca/files/2019/07/Other-Environmental-Impacts.pdf

12. Spill Safety/Kits

Laboratory technicians may be able to respond to a small, controlled lab spill. If there is any doubt about the safety of the individual in the lab, immediately call 911, or 2-4444. The response to a spill depends on the amount of chemical spilled, the chemical properties of the chemical, and the potential for impact outside the lab. For general spill kit check list, refer to Chemical Safety Manual.

UBC's Emergency Spill Response providers

Company Name	Emergency Response Phone – 24/7	Lead Rep Phone (non-emergency)
Nucor Environmental Solutions	1-844-5-HAZMAT (429628)	604-575-4721 (direct) 604-910-6796 (cell)
Tervita	1-800-32-SPILL (77455)	Use spill response line to be redirected

Top tips

- If appropriate equipment and trained personnel are not available on site, the clean-up should not proceed.
- Refer to UBC Building Operations Spill Preparedness & Response Procedure http://riskmanagement.sites.olt.ubc.ca/files/2015/11/UBC-Spill-Response-Procedure_Bldg-Ops_Finalsigned.pdf

RESOURCES

- UBC SRS. (2017 version). Chemical Safety Manual. Retrieved from https://riskmanagement.sites.olt.ubc.ca/files/2017/12/Chemical-Safety-Manual_2017.pdf
- UBC Building Operations Spill Preparedness & Response Procedure. https://srs.ubc.ca/environment/pollution-prevention/spills-and-contaminated-sites-2/
- Spill Response Chemical Safety General Information | Safety & Risk Services (ubc.ca)

13. X-Ray Safety

An Innov-X-Ray Fluorescence analyzer is available at CMP Lab for sorting projects and sometimes for chemical analysis. Three students and one technician obtained XRF Level 1 Certificate (Effective date: 2018/05/28, Expiry date: 2023/05/28).

Top tips

- Do not allow anyone other than a certified XRF operator to operate the analyzer
- Allow no one closer than 1 meter during operation of the analyzer
- Wear appropriate dosimetry as might be required by the regulatory authorities or in operational procedures
- The XRF operator is responsible for the security of the analyzer
    - Never leave the analyzer unattended when in use
    - When in use, the analyzer should be in the operator's possession at all times (i.e. either in direct sight or a secure area).
    - Always store the instrument in a secure location when not in use

XRT sorting machine is located at CMP Room 201A, which is operated by students supervised by Prof. Maria Holuszko
All training is to be documented by the supervisor for this specific area.

RESOURCES

- UBC SRS. (May 4, 2020). Radiation, X-Ray and Laser Safety. Retrieved from https://srs.ubc.ca/health-safety/research-safety/radiation-safety/
- Natural Resources Canada (NRCan). (2017). Operator of Portable X-Ray Fluorescence Analyzers (XRF) Certification Information and Examination Preparation Booklet.
- Innov-X Systems, Inc. (2005). Instruction manual – Innov-X system alpha series X-Ray Fluorescence Spectrometers.

14. Laser Safety: General Information and Registration

Malvern Mastersizer 2000 is located at CMP Room 304. The Mastersizer 2000 optical bench is a Class 1 laser product. There is no exposure to laser radiation in its normal operation. Autosampler, Class 2 equipment is not used with the equipment.

Top tips

- The use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure
- The LASER Safety training is mandatory for all faculty, staff, visiting scientists and students prior to setting up or using a Class 3B or 4 laser. All training is to be documented.

RESOURCES

- Malvern Instruments Ltd. (2007). Mastersizer 2000 user manual. MAN0393-1.0

15. COVID-19 Resources

RESOURCES

- Coronavirus (COVID-19) and UBC's response
  https://covid19.ubc.ca/
- COVID-19 INFORMATION FOR APSC
  https://apsc.ubc.ca/covid-19
- APSC RETURN TO RESEARCH
  https://apsc.ubc.ca/return-to-research
- COVID-19 HEALTH & SAFETY
  https://srs.ubc.ca/covid-19/health-safety-covid-19/

16. Gas cylinders and regulators

Compressed gases include compressed gas (O_2, helium, argon), compressed liquid (chlorine, CO_2), dissolved gas in liquid (acetylene in acetone) and Cryogenic liquids (N_2, O_2) (P26, Chemical Safety Manual). They may present physical and chemical dangers to people, eg. asphyxiation due to displacement of oxygen by inert gases, fire and explosion caused by flammable gases, frostbite by exposure to cryogenic liquid etc. For the safe handling of compressed gases and cylinders, read information contained in the Safety Data Sheets, and refer to Laboratory Health and Safety Handbook on WorkSafeBC web site, UBC Chemical Safety Manual (2017) and Specialty Gas and Equipment Solutions before using any gases.

Note procedure needed to move a cylinder, below – DO NOT MOVE CYLINDERS WITH REGULATORS ATTACHED AND WITHOUT A CAP!

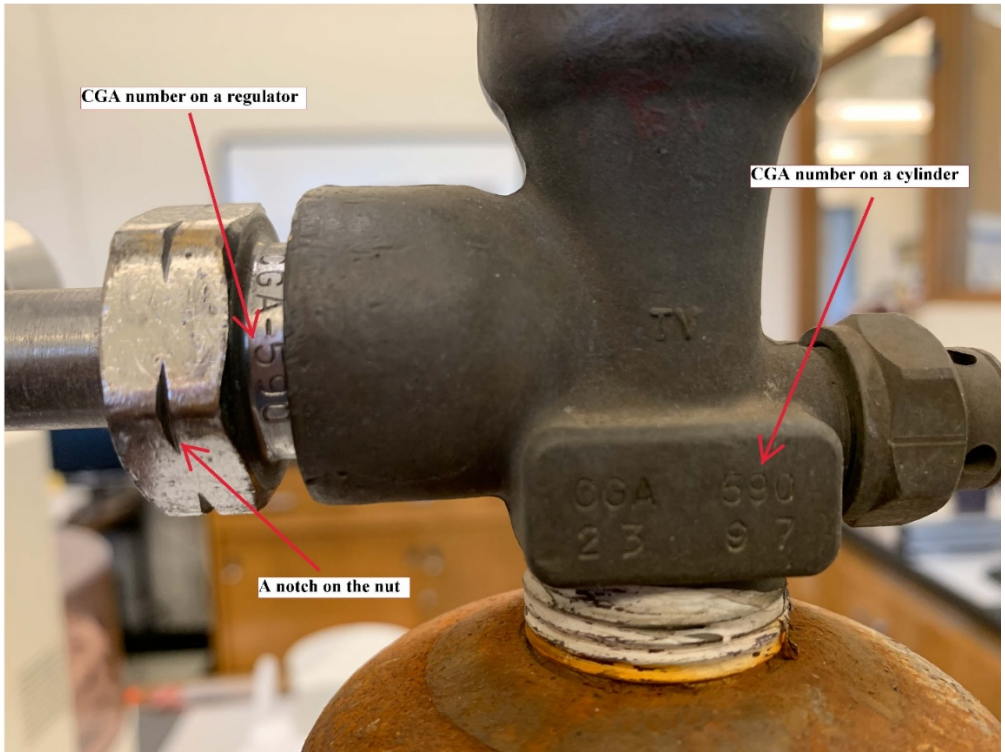

Figure 1: CGA number on a regulator and a gas cylinder

Gas regulators are specifically disigned for special applications. Undesirable connections in compressed gas installation could lead to a serious accident. For example, some gases may react with the metal material of the regulator. To avoid the accidental mixing of potentially reactive gases and minimize wrong connections, the Compressed Gas Association (CGA) has developed a standardized system for the attachment of a compressed gas cylinder to the required regulator. CGA number is typically shown on the cylinder valve outlet. The table below lists some CGA number of common gases used in our labs. For more CGA connection numbers for compressed gases cylinder regulators, refer to section G of Specialty Gas and Equipment Solutions.

Name	Chemical	CGA Connection
Acetylene	C_2H_2	510,300
Air	N/A	346, 590
Carbon Dioxide	CO_2	320
Helium	He	580
Hydrogen	H_2	350
Methane	CH_4	350
Nitrogen	N_2	580

Table 1: CGA connection number

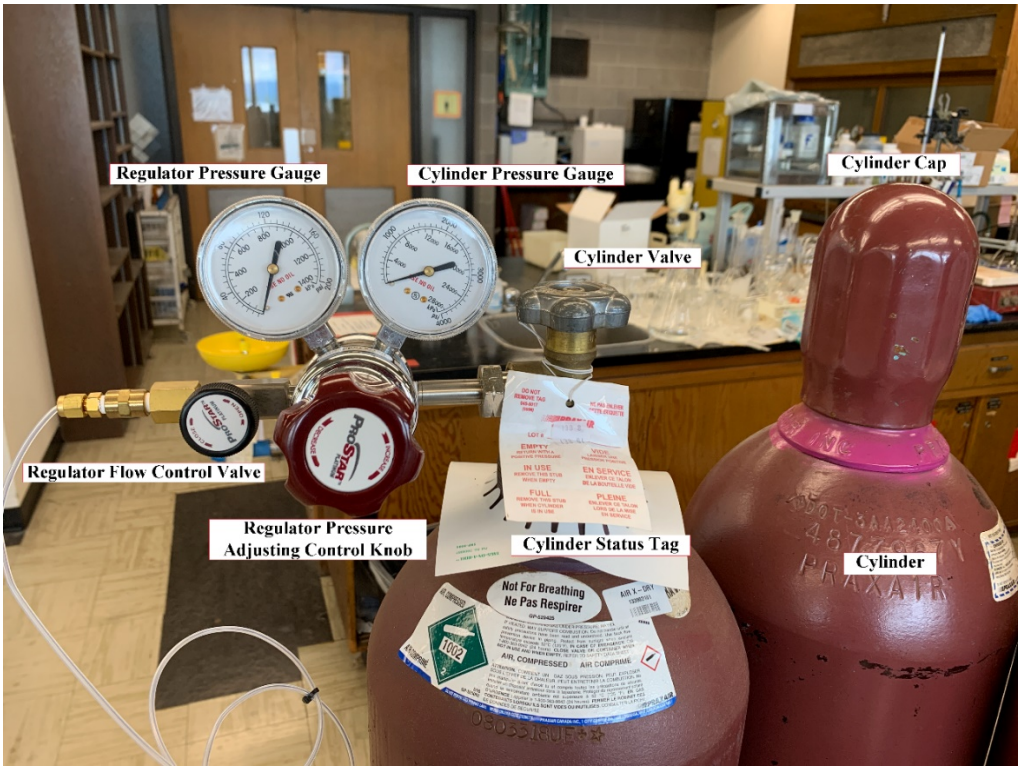

Figure 2: Compressed gas regulator and cylinder assembly

Connecting the regulator to gas cylinder and using the regulator

- Remove the cylinder cap
- Make sure the regulator and gas cylinder are all closed
- Check the CGA numbers on the gas regulator and cylinder valve are compatible (Figure 1)
- Check the regulator, cylinder valve and their threads for evdience of damage and contamination
- Attach the regulator to the cylinder and tighten the connection using a wrench. If there is a notch on the nut (Figure 1) that it means an opposite thread direction to the normal direction, so that incorrect gases can't be connected. Do not overtighten. Be certain the conncetion of a cylinder and a regulator without being too loose and too tight. Don't use grease/oil, Teflon tape / pipe dope as an aid to connect a regulator and a cylinder.
- Slowly open the gas cylinder valve and check leaking by comparing the reading on cylinder pressure gauge with the expected pressure inside the gas cylinder and lisening for gas seepage.
- Raise the delivery pressure to the desired value by rotating the regulator pressure adjusting knob
- Open the regulator flow valve and adjust it to the desired value
- If the delivery pressure decreases after the gas flow is established, slightly adjust the regulator knob again
- Tear off the "FULL" stub of the cylinder status tag

Removing the regulator

- Shut off the gas cylinder valve
- Keep the regulator knob open until the pressure reading on the regulator pressure gauge is zero
- Rotate the regulator knob to close the regulator
- Disconnect the regulator from the cylinder by loosening the connection with a wrench
- Tear off the "In USE" stub of the cylinder status tag
- Replace the cylinder cap on the cylinder

Moving a gas cylinder

Compressed gas cylinders are dangerous goods. Only a person with a TDG certificate may receive compressed gas cylinders. To prevent incidents when moving cylinders,the following tips should be followed.

- Always wear always personal protective equipment: heavy-duty work gloves, safety glasses and steel-toed safety shoes
- Always keep the cylinder cap in place on the gas cylinder while moving the cylinder or it is in storage
- Gas cylinders from suppliers are chained on a wall cylinder clamp beside loading dock of Frank Forward Building before they are moved to the lab storage area
- Before moving a gas cylinder, inspect a cylinder for any obvious damage or leakage, and its labels

- Always use a cylinder cart to move a cylinder while it is securely fasten by a chain or strap on a cart, never drop, drag or roll cylinders into place,
- Secure a cylinder in a upright position by the safety strap of a cylinder clamp to prevernt tipping, falling or rolling
- When a cylinder is empty or in storage, close the cylinder's valve, remove the gas regulator, tighten the cylinder cap

RESOURCES

- Laboratory Health and Safety Handbook https://www.worksafebc.com/en/resources/health-safety/books-guides/laboratory-health-and-safety-handbook?lang=en
- Compressed gas cylinders https://www.worksafebc.com/en/resources/health-safety/toolbox-meeting-guides/compressed-gas-cylinders?lang=en
- UBC Chemical Safety Manual (2017) http://riskmanagement.sites.olt.ubc.ca/files/2017/12/Chemical-Safety-Manual_2017.pdf
- Specialty Gas and Equipment Solutions http://leafdigitalpublishing.com/praxair/Reference_Guide/mobile/index.html#p=1

17. NBK Lab Access Protocols

NBK Institute Laboratory Access Protocols

To be reviewed annually
May 2022

The Norman B. Keevil Institute of Mining Engineering (NBK) strives to provide a safe and efficient workplace within all of our laboratory facilities. Safety is our number one priority above ***ALL*** other commitments.

All users of NBK laboratory facilities – regardless of position or status in the department *(including those from outside of the department)* will be informed of and follow all laboratory safety protocols set out in this document.

General NBK Laboratory Access Protocols

The Manager, Safety and Research Facilities (the Manager) is responsible for safety and activities in all NBK laboratory facilities. Use of equipment for research projects, equipment installation, modification, or repairs must be scheduled in consultation with the Manager.

At the direction of the Manager, laboratory technicians in the Coal and Mineral Processing Lab (CMP) and Frank Forward (FF) buildings are responsible for safety and activities in those buildings.

The laboratory technicians are responsible for overseeing, implementing and enforcing safety protocols associated with laboratory activities.

All users of our lab facilities must follow the items below:

1. Register and complete all safety training requirements from the Canvas MINE SAFETY ONLINE WORKSHOP: https://canvas.ubc.ca/enroll/EGWKHH

2. Attend a general safety orientation or view the recording on Canvas (offered at start of each term).

3. Complete a Site Specific Orientation for each lab or area which they will be working in with one of the laboratory technicians, the Manager or the Faculty Supervisor of the specific lab area.

4. Be familiar with the location and/or operation of laboratory safety equipment and procedures, including, but not limited to: automated external defibrillators (AEDs), fire alarms, safety showers, eye wash stations, fire extinguishers, emergency exits and muster points. (See: Building Emergency Response Plans - BERP)

5. Receive training on equipment **before** starting to use it.

6. Wear appropriate clothing. (long pants, shirts with sleeves, shoes with closed toes that cover the entire foot).

7. Secure long hair, loose clothing and jewelry.

8. Wear appropriate Personal Protective Equipment (PPE). The minimum requirement includes safety glasses/goggles and lab coat/coveralls. For laboratory work using dust generating equipment or toxic chemicals, appropriate dust masks and respiratory devices must be used. Respiratory masks must be properly fitted and fit-tested annually or documentation must be provided. When required, lab workers must wear CSA approved steel toe footwear.

9. Do not wear disposable gloves or work gloves in common spaces of the NBK facilities (hallways, corridors, offices, kitchens, etc.). Gloves must be removed before exiting the labs or entering common spaces.

10. Do not wear devices that completely obscure hearing.

11. Wear hearing protection while working around loud machinery or processes. Earbuds and noise cancelling headphones are not approved hearing protection.

12. Avoid bringing and/or storing food and drink in the lab.

13. Work only during normal working hours (Monday to Friday - except holidays- from 8 AM to 6 PM) and do not work alone in the lab facility without the permission of your supervisor and a documented check in plan. (see: Working Alone Permission form and procedure on Canvas).

14. Maintain good housekeeping practices by keeping the work area and walkways clear of clutter and obstructions, promptly cleaning up spills and cleaning up the area at the end of the operation day; for areas with ongoing experimental work, a New Hazard Assessment Form should be completed and posted in the area. Experimental work in multi-user areas needs to be cleaned up/ removed every day.

15. Report all accidents, incidents and near-misses to your supervisor, the designated supervisor or the Manager. (See: CAIRS reporting at srs.ubc.ca)

16. Label all chemicals decanted into new containers accurately with the date, contents and your name on an NBK/WHMIS approved workplace label. Contact lab technicians for assistance if required.

17. Label all samples in the NBK facilities with NBK approved sample labels. Contact lab technicians for assistance if required. (All samples including, but not limited to, samples in buckets, barrels or bags)

18. Segregate and dispose of hazardous wastes according to regulations. Contact lab technicians for assistance if required.

19. Refuse unsafe work.

20. No smoking is allowed inside or within 6 meters from any NBK buildings; this includes the Coal and Mineral Processing Building and the Frank Forward building.

Responsibilities of Faculty, Instructors and Research Supervisors

1. Faculty, Instructors and/or research supervisors are responsible for ensuring research students, teaching assistants and other paid students under their supervision complete the department Safety Training Requirements on the Canvas MINE SAFETY ONLINE WORKSHOP.

2. Faculty, Instructors and/or research supervisors must inform research students, teaching assistants, and other paid students under their supervision to attend the Departmental Safety Orientation offered at the start of each term or review the recording of the presentation.

3. Faculty and/or Instructors are responsible for ensuring that teaching assistants under their supervision, are provided with a safety orientation to the lab area they will be teaching in.

4. Faculty and research supervisors who wish to have students under their supervision use equipment in a laboratory must inform the laboratory technician and, if requested, provide Standard Operating Procedures (SOP) for the equipment and experimental procedures they intend to use. Graduate students are required to be trained on the safe use of the equipment and procedures before using the equipment. The faculty or research supervisor is required to make a training request from one of the laboratory technicians. Any training should be documented.

5. Faculty, research supervisors, and lab technicians are responsible for ensuring their students and other researchers are aware of the NBK Laboratory Access Protocols, as well as ensuring that all appropriate procedures noted in the Lab Protocols are followed.

6. Faculty and/or Instructors are responsible for ensuring Teaching Assistants (TA) conduct a safety orientation at the start of each laboratory session (5-10 min presentation on safety hazards relevant to each lab), as well as communicating to their Teaching Assistants that written lab instructions are to be provided to the relevant lab technicians at least 24 hours before the start of the lab.

7. Faculty and research supervisors who are doing research with materials or chemicals that may be brought/ delivered to the lab must ensure the Material (Ore) Assessment Form is filled in **before** materials or chemical supplies are delivered to the laboratory. They have a duty to ensure any hazardous materials shipped to the department have the appropriate safety controls in place to protect all workers. They are responsible for any costs related to storing or disposing of the materials.

Policy for Undergraduate Students

1. Undergraduate students are not allowed, under any circumstances, to work unsupervised during their lab classes. Teaching Assistants are to be present at all scheduled lab times; special arrangements are to be made if the work is performed outside of regular/ scheduled lab hours. This special arrangement has to be communicated with the Manager and either an appropriate lab technician or a Local Safety Team member.

2. Undergraduate students are required to follow all general lab protocols.

Responsibilities of Graduate Students

1. All graduate students working in the lab area are required to complete safety training on the Canvas MINE SAFETY ONLINE WORKSHOP and attend or view a recording of the departmental Safety Orientation session (compulsory).

2. All graduate students working in the lab area are required to complete a Site Specific Orientation for each area they will be working in with the laboratory technician, the Manager or the Faculty Supervisor of the specific area before starting work.

3. Graduate students are required to be trained on the safe use of the equipment and procedures before using the equipment. The Supervisor is required to make a training request from one of the laboratory technicians. Any training should be documented.

4. In the case of continuous work carried out by the graduate student there is no requirement for retraining*, however if the work has been discontinued for more than 6 months, the returning student needs to be retrained or their records need to be updated after the return to work. The updating is also required if there are any changes to the project in terms of using different chemicals or machinery.
   * Note: SRS Chemical Safety Training certificate is only valid for 5 years and must be renewed before expiration date.

5. All graduate students who are doing research with materials or chemicals that may be brought/delivered to the lab must ensure the Material (Ore) Assessment Form is filled in completely **before** materials or chemical supplies are delivered to the laboratory.

6. All graduate students working in the laboratory are required to complete a New Hazard Assessment Form. The form includes a list of equipment, safety plan, waste handling safety plan and environmental plan. The graduate student/ researcher is required to fill in the form and upload it to Canvas. A copy must be submitted to the laboratory technician in charge of the lab in which the research activities will be carried out and another copy should be kept with the researcher's supervisor.

7. Random inspections will be carried out once a month to ensure and enforce compliance with the policies.

Responsibilities of Teaching Assistants

1. Teaching Assistants are required to complete safety training on the Canvas MINE SAFETY ONLINE WORKSHOP and attend or view a recording of the departmental Safety Orientation session (compulsory).

2. Teaching Assistants are required to provide a Safety Orientation for their students. It is expected that this orientation be held during the first scheduled laboratory session/ class.

3. Teaching Assistants are required to communicate general and specific safety hazards before the start of each lab class. This orientation session should not be longer than 5-10 minutes and should identify specific hazards and assessment of relevant risks (SDS, hazards related to the material handled during the particular laboratory session as well as material disposal after the class ends).

4. Teaching Assistants are responsible for leaving the lab area clean. It is recommended that this responsibility should be enforced through an appropriate grading system.

5. Teaching Assistants are responsible for providing written laboratory instructions to the relevant laboratory technicians at least 24 hours before the start of the laboratory session.

6. Laboratory inspections will be carried out routinely to ensure compliance to the policies for undergraduate laboratory classes.

Policy for Outside Clients and External to UBC Projects

1. Outside (non-UBC) clients need to complete the departmental safety training (with yearly renewal). Including:
    a. Register and complete safety training from the Canvas MINE SAFETY ONLINE WORKSHOP: **https://canvas.ubc.ca/enroll/EGWKHH**
    b. Attend a general safety orientation or view the recording on Canvas.
    c. Complete a Site Specific Orientation for each lab area which they will be working in with one of the laboratory technicians, the Manager or the Faculty Supervisor of the specific lab area.
    d. If Safety Training has not been received, please arrange with your supervisor or contact the Local Safety Team Co-Chairs at safety@mining.ubc.ca.

2. Outside (non-UBC) clients need to present their liability insurance to the Local Safety Team Co-Chairs (safety@mining.ubc.ca) and the Department Administrator (Joanna.ho@ubc.ca).

3. Outside (non-UBC) clients are required to communicate the scope of the work and schedule with the technical staff, the Manager or the Faculty Supervisor of the specific area before they arrive to perform the work on the NBK-UBC premises.

4. Visitors who are invited by the Faculty or Staff are required to comply with the NBK-UBC Safety regulations as outlined in: https://mining.ubc.ca/safety/.

5. Faculty or Staff hosting visitors to NBK lab facilities need to notify the Manager and relevant lab technician or Faculty Supervisor of the specific area. Graduate students or postdocs must notify their Supervisor and the Manager if they would like to invite visitors to NBK lab facilities.

6. Faculty or Staff hosting visitors need to communicate in advance the clothing and footwear requirements for visiting the NBK lab facilities. They also need to ensure visitors wear appropriate PPE during the visit. Lab coats/coveralls, hearing protection, hard hats and eye protection should be arranged in advance. Visitors can also bring their own PPE.