

DEPARTMENT OF GEOLOGICAL SCIENCES AND GEOLOGICAL ENGINEERING

## SAFETY MANUAL

(Updated February 17, 2022)

**IN CASE OF EMERGENCY**

FROM WITHIN THE UNIVERSITY 36111  
FROM OUTSIDE THE UNIVERSITY 613 533 6111

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## 1.0 SAFETY IN THE LABORATORIES AND SHOP AREAS

- ALWAYS WEAR PROPER PROTECTION FOR THE TASK YOU ARE CARRYING OUT (e.g. SAFETY GLASSES, PRESCRIPTION GLASSES WITH SIDESHIELDS, LASER GOGGLES)
- ALWAYS WEAR APPROPRIATE PROTECTIVE CLOTHING
- ALWAYS KNOW THE HAZARDOUS PROPERTIES OF MATERIALS BEING USED
- ALWAYS WASH HANDS THOROUGHLY BEFORE LEAVING THE LABORATORY
- NEVER WEAR OPEN TOED SHOES, HIGH HEEL SHOES OR SANDALS
- ALWAYS WEAR LONG PANTS, NO SHORTS, SKIRTS, SHORT DRESSES OR CAPRIS)
- NEVER SMOKE IN THE BUILDING
- NEVER EAT, DRINK OR APPLY COSMETICS IN LABORATORIES
- NEVER PERFORM UNAUTHORIZED EXPERIMENTS
- NEVER ENGAGE IN PRANKS, PRACTICAL JOKE OR OTHER ACTS OF MISCHIEF
- DO NOT BLOCK ACCESS TO EMERGENCY EXITS AND EMERGENCY EQUIPMENT
- ANY WOMAN WHO WORKS IN A LABORATORY WHERE HAZARDOUS SUBSTANCES ARE IN USE AND WHO IS, OR BELIEVES THAT SHE MAY BE, PREGNANT MUST INFORM HER SUPERVISOR

## 2.0 SAFETY OFFICERS

DEPARTMENT

### 3.0 INTRODUCTION

Safety is the responsibility of everyone who works in the Department of Geological Sciences and Geological Engineering. This includes all faculty, staff, graduate students, researchers and visitors to the Department. This manual is intended to cover many of the common or general hazards associated with work in the Department and must be read and adhered to by everyone working in the Department. It cannot be assumed that the warnings or rules laid out in this manual are necessarily complete for dealing with specific chemical hazards; additional information or measures may be required and the appropriate information sources should be consulted.

It is the responsibility of individual supervisors to ensure that the necessary procedures and protocols are both established and followed in their respective work areas.

It is the responsibility of workers to follow prescribed procedures and protocols when dealing with hazards in the laboratory.

Personal safety depends upon a positive attitude towards safety as well as good, informed judgment on the part of each individual working in the Department.

In addition to the health and safety standards set by the Department of Geological Sciences and Geological Engineering, the Department of Environmental Health and Safety, Queen's University, has established a set of policy statements and standard operating procedures for the University. As of June 2006, the documents listed in Appendix I have been implemented.

#### 4.0 QUEEN'S UNIVERSITY DEPARTMENT OF GEOLOGICAL SCIENCES AND GEOLOGICAL ENGINEERING ACKNOWLEDGMENT OF RESPONSIBILITY

Under the Occupational Health and Safety Act, everyone has both rights and responsibilities in providing a safe work environment.

The Department has responsibility and authority for maintaining appropriate standards for health and safety within the Department. To this end the Department sets out the appropriate standards and procedures in the Department Safety Manual, provides basic training in safety and performs inspections of the workplace.

Supervisors are responsible for ensuring that individuals under their supervision have a safe environment in which to work, know and follow the Department's safety rules, are made aware of the specific hazards associated with their work, and have available the appropriate procedures and safety equipment for dealing with these hazards.

Individuals must work safely according to the procedures outlined by the Department and the individual's supervisor, must maintain a safe working environment through good laboratory practice and housekeeping and safe field practices and must notify their supervisor or the Department of any defects in equipment or protective devices, or of the existence of hazards in the workplace.

The rights and responsibilities of supervisors and workers, as defined by the Occupational Health and Safety Act, are described in Appendix I.

## 5.0 GENERAL DEPARTMENT SAFETY

- Know and follow safety rules, procedures and protocols
- Be aware of hazards and the procedures for dealing with those hazards before you start your work
- Anyone wishing to use any power tools must have the approval of a qualified technician and must have received appropriate training on that equipment prior to any use.
- Fire doors must be kept closed at all times; automatic (self closing) fire doors must not be blocked
- Familiarize



- There may be some "visitors" who are on campus for a short period of time (e.g. guest lecturers) for whom it would be inappropriate to obtain a waiver/release or other formal documentation.

### 5.3. WORKING ALONE

Undergraduate students must not work alone in a laboratory at any

medical or ambulance personnel.

- If it is necessary to call an ambulance, indicate the location of the injured person and the location of the nearest appropriate entrance to the building. If possible, send someone to that entrance to lead the ambulance personnel to the injured person.
- For all accidents involving critical injury or death:
- Immediately call 3611 for assistance
- As soon as possible, notify your supervisor, the Head of the Department (or Department Manager or Safety Officer), and the Department of Environmental Health and Safety. The latter will notify the appropriate government agencies.
- Do not touch anything associated with the accident, except for the purpose of saving life, relieving suffering or preventing unnecessary damage to equipment or property. The scene of an accident must be examined by the appropriate authorities

## 6.0 UNDERGRADUATE LABORATORIES

The responsibility for safety is shared by all staff and students working in undergraduate laboratories. These laboratories must be operated in a manner that is consistent with the safety procedures of the Department. The following points should be noted:

- safety goggles must be worn in the laboratories while laboratories are in progress
- open toed shoes or sandals must not be worn
- long pants and a lab coat must be worn to protect exposed skin
- long hair must be tied back or contained by a net, cap or other device
- TAs and staff must be familiar with the experiments being carried out, must be aware of the correct procedures and must be aware of the hazards associated with those experiments
- undergraduates must not work alone in a laboratory
- TAs must ensure that all students under their supervision know where emergency equipment is located, and what the procedures are for dealing with medical and fire emergencies
- chemicals from unlabelled containers are not to be used; unlabelled chemicals should be reported to a TA, lab technician or lab coordinator
- all work areas must be kept clean and tidy
- all accidents must be reported promptly

The best safety precautions include advanced preparation for each laboratory and a clean and organized work space.

## 7.0 OFF CAMPUS ACTIVITIES

Queen's University has an Off Campus Activity Safety Policy (OCASP) that is designed to assess risk associated with various off campus activities such as field work, trips associated with courses, international travel and many other situations. A schematic chart for this risk assessment can be found

1. The Campus

## 8.0 SAFE LABORATORY PROCEDURES AND TECHNIQUES

### 8.1. PROCEDURES AND TECHNIQUES

#### 8.1.1. MANUFACTURED EQUIPMENT OR APPARATUS

All equipment should be maintained and operated as per the manufacturer's instructions and recommendations. Operating manuals for equipment should be kept in the vicinity of the equipment.

#### 8.1.2. GLASSWARE

In general glassware used for standard laboratory procedures is made of borosilicate glass. In order to carry out an experiment the following should be done:

- check glassware for cracks, chips and other flaws; these flaws should be repaired before the glassware is used
- select the right glassware for the job: vacuum applications require special glass while operations carried out under pressure require specially designed glassware
- glassware under pressure or vacuum should be shielded
- if it is necessary to apply pressure to glassware wear thick leather gloves
- never heat or apply pressure/vacuum to a chemical in a stock bottle; stock bottles are made of a soft glass which breaks readily

#### Cleaning Laboratory Glassware

For more information see the following link: [https://www.youtube.com/watch?v=...](#)



hazards can be minimized by the following:

- only trained or qualified individuals should repair or modify electrical equipment
- electric wires should never be used as supports
- unplug equipment by pulling on the plug not the cord
- equipment should be regularly inspected and frayed cords or broken plugs should be repaired
- any equipment failure or overheating should be remedied immediately
- use "C" class fire extinguisher for electrical fires

#### 8.1.4. STATIC ELECTRICITY AND SPARK HAZARDS

Protection from static discharge must be addressed in particular when handling flammable solvents; this risk is increased during periods of low humidity. Proper grounding of containers and equipment will significantly reduce this risk. Common potential sources of sparks and static discharge are:

- ungrounded metal tanks and containers
- clothing or containers made of plastic or synthetic materials
- high pressure gas cylinders upon discharge
- control systems on hot plates
- brush motors and forced air dryers

#### 8.1.5. UV LAMPS

Radiation of wavelengths below 250 nm poses a considerable risk to both eyes and exposed skin. Wear UV absorbing safety glasses and avoid direct eye contact with the UV source; wear protective clothing to prevent burns from UV exposure. Work involving UV irradiation should be carried out in an enclosed work area to prevent exposure of workers to the UV source.

Mercury arc lamps should be cleaned thoroughly before use. Handling with bare hands leaves soil deposit on the surface of the outer glass which form residues that will burn into the glass causing buildup of heat during the operation of the lamp. The lamp may overheat and crack, releasing mercury vapour as a consequence.

#### 8.1.6. LASERS

The Department of Environmental Health and Safety runs a "Laser Safety Program". All personnel working in proximity to Class 3B or Class 4 lasers must complete this program before starting work with lasers. The type and intensity of radiation available from a laser varies greatly from one instrument to another. The following general rules should be followed:

- always wear goggles that offer protection against the specific wavelength(s) of the laser in use; no available goggles protect against all laser wavelengths
- never look directly at the beam or pump source
- never view the beam pattern directly; use an image converter or other safe,

### 8.1.7. RADIATION SAFETY AND X RAY GENERATORS

The Principal of Queen's University has appointed the University Radiation Safety Committee to carry the advisory responsibility for the overall operation of the University Radiation Safety Program. The details are included in the Terms of

- use the appropriate regulator for the type of gas
- be aware that special handling procedures are required for certain





## 8.2. GENERAL CHEMICAL

- containers
- only refrigerators/freezers that are approved for flammable storage can be used in laboratories

Alkali and alkaline earth metals, certain other metals such as aluminum, metals in a finely divided form, metal

## Incompatible Chemicals

Accidental contact of incompatible chemicals can lead to fire, explosion and/or the release of highly toxic substances. The magnitude of the problem usually increases with the quantity of chemicals being stored. Prudent practice requires that incompatible chemicals be stored in separate locations to minimize the risk of accidental mixing. Appendix V Classes of Incompatible Chemicals lists some general groups of incompatible chemicals. Further information on specific chemicals may be obtained from references such as

## 8.2.7. DESIGNATED SUBSTANCES

The Occupational Health and Safety Act allows a biological, chemical or physical agent, or combination thereof, to be "designated" and its use in the workplace may be either prohibited or strictly regulated. Regular reporting on inventories of these substances may be required. The following are designated substances:

- ACRYLONITRILE
- ARSENIC
- ASBESTOS
- BENZENE
- CARBON DISULFIDE
- CARBON TETRACHLORIDE
- COKE OVEN EMISSIONS
- ETHYLENE OXIDE
- ISOCYANATES
- LEAD
- MERCURY
- SILICA POWDER
- STYRENE
- VINYL CHLORIDE MONOMER

Acrylonitrile, benzene, carbon disulfide, carbon tetrachloride, isocyanates, styrene, and vinyl chloride monomer are all volatile organic materials and must be used with adequate ventilation (fume hood) to prevent exposure through inhalation and with appropriate protective equipment to prevent exposure through skin absorption. These materials can be disposed of in the normal liquid organic waste stream (halogenated or nonhalogenated as appropriate).

Substances containing arsenic, lead or mercury must be handled in an appropriate manner to prevent exposure through inhalation or absorption. All chemical waste containing arsenic, lead or mercury must be collected and properly labeled for disposal by the Department of Environmental Health and Safety.

Elemental mercury is used in many types of apparatus, in particular mercury filled thermometers. Mercury spills from broken equipment should be cleaned up immediately (mercury spill kits are available from the Department of Environmental Health and Safety). Broken thermometers are collected by lab technicians, who will recover the mercury from the thermometers before disposal.

Silica powder, including chromatography

## 9.0 SAFETY EQUIPMENT AND EMERGENCY PROCEDURES

A variety of protective measures are available

### 9.3. PERSONAL PROTECTIVE EQUIPMENT

#### 9.3.1. EYE AND FACE PROTECTION

The minimum requirement for eye protection is that safety glasses or prescription glasses fitted with side shields must be worn in laboratories when hazardous chemicals are in use and when operating rock saws, crushers or polishers. Safety glasses do not provide complete protection to the eyes from spills, splashes or rock chips.

## 9.4. EMERGENCY EQUIPMENT

### 9.4.1. EYEWASH FOUNTAINS AND SHOWERS

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of waste chemicals is outlined below in Disposal Procedures for Hazardous Chemicals.

Flammable liquids such as common organic solvents must be placed in solvent disposal cans (red with wide mouths and flame arrestor) which are identified as to point of origin. This waste should be collected in separate containers for Halogenated and Non halogenated waste (<3% halogen content).

Containers which have

**APPENDIX I – LIST OF DEPARTMENT OF ENVIRONMENTAL HEALTH AND SAFETY POLICIES**

# Queen's University Environmental Health & Safety

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September 2017

**Page No.:**  
1

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EHS-Admin-02A

**Revision:**  
1.0

**Subject:**



<b>Date Issued:</b> September 2017	<b>Page No.:</b> 2	<b>Document No.:</b> EHS-Admin-02A
<b>Revision:</b> 1.0	<b>Subject:</b> Table of Contents (Technical Departments)	

**Tab 5**

**Lab Safety Procedures**

- (SOP-Lab-01) - Fume Hoods Procedures for Installation, Maintenance and Use
- (SOP-Lab-02) - Autoclaves-Procedures for Operation, Maintenance, Repair and Services
- (SOP-Lab-03) - Emergency Eyewash Stations and Safety Showers
- (SOP-Lab-04) - Laboratory Decommissioning
- (SOP-Lab-05) - Lab Coats

**Tab 6**

**Fire Safety Procedures**

- (SOP-Fire-01) - Storage in Building Corridors and Egress Routes
- (SOP-Fire-02) - Monthly Fire Extinguisher Inspection
- (SOP-Fire-03) - Aboriginal Use of Traditional Medicine
- (SOP-Fire-04) - Fire Watch
- (SOP-Fire-05) - Guidelines for the use of Tents

**Tab 7**

**General Safety Procedures**

- (SOP-Safety-01) - Guidelines for Working in the Heat
- (SOP-Safety-02) - JHSC Workplace Inspections
- (SOP-Safety-03) - Health and Safety Roles and Responsibilities
- (SOP-Safety-04) - Hoists and Cranes
- (SOP-Safety-05) - Respirator Protection
- (SOP-Safety-6) - New Orientation Health & Safety Orientation
- (SOP-Safety-07) - Departmental Safety Bulletin Boards
- (SOP-Safety-08) - Electrical Equipment Certification
- (SOP-Safety-09) - Foot Protection
- (SOP- Safety-12) - Sharps Disposal
- (SOP-Safety-13) - Asbestos
- (SOP-Safety-14) - Refusal to Work
- (SOP-Safety-15) - Ladder Safety
- (SOP Safety 18) - Roof Access Safety
- (SOP-Incidents/WSIB-01) - Unpaid Student Placements

**Tab 8**

**Information Bulletins**

- Amendments to the Criminal Code
- Laser Pointer Safety Fact Sheet
- Health Concerns: Roofing Projects
- MOL Announces Ticketing for Industrial Safety Violations
- West Nile Virus
- Work Refusal Process



WORKERS AND THEIR

Right to Refuse or to Stop Work Where Health or Safety are in Danger:

(1) worker may refuse to work or do particular work where he or she has reason to believe that,

(a) any equipment, machine, device, or thing the worker is to use or operate is likely to endanger himself, herself or another worker;

(b) the physical condition of the workplace or the part thereof in which he or she works or is to work is likely to endanger himself, or herself; or

(c) any equipment, machine, device or thing he or she is to use or operate or the physical condition of the workplace or the part thereof in which he or she works or is to work is in contravention of this Act or the regulations and such contravention is likely to endanger himself, herself or another worker.

(2) Upon refusing to work or do particular work, the worker shall promptly report the circumstances of the refusal to the worker's employer or supervisor who shall forthwith investigate the report in the presence of the worker and, if there is such, in the presence of one of:

(a) committee member who represents workers, if any;

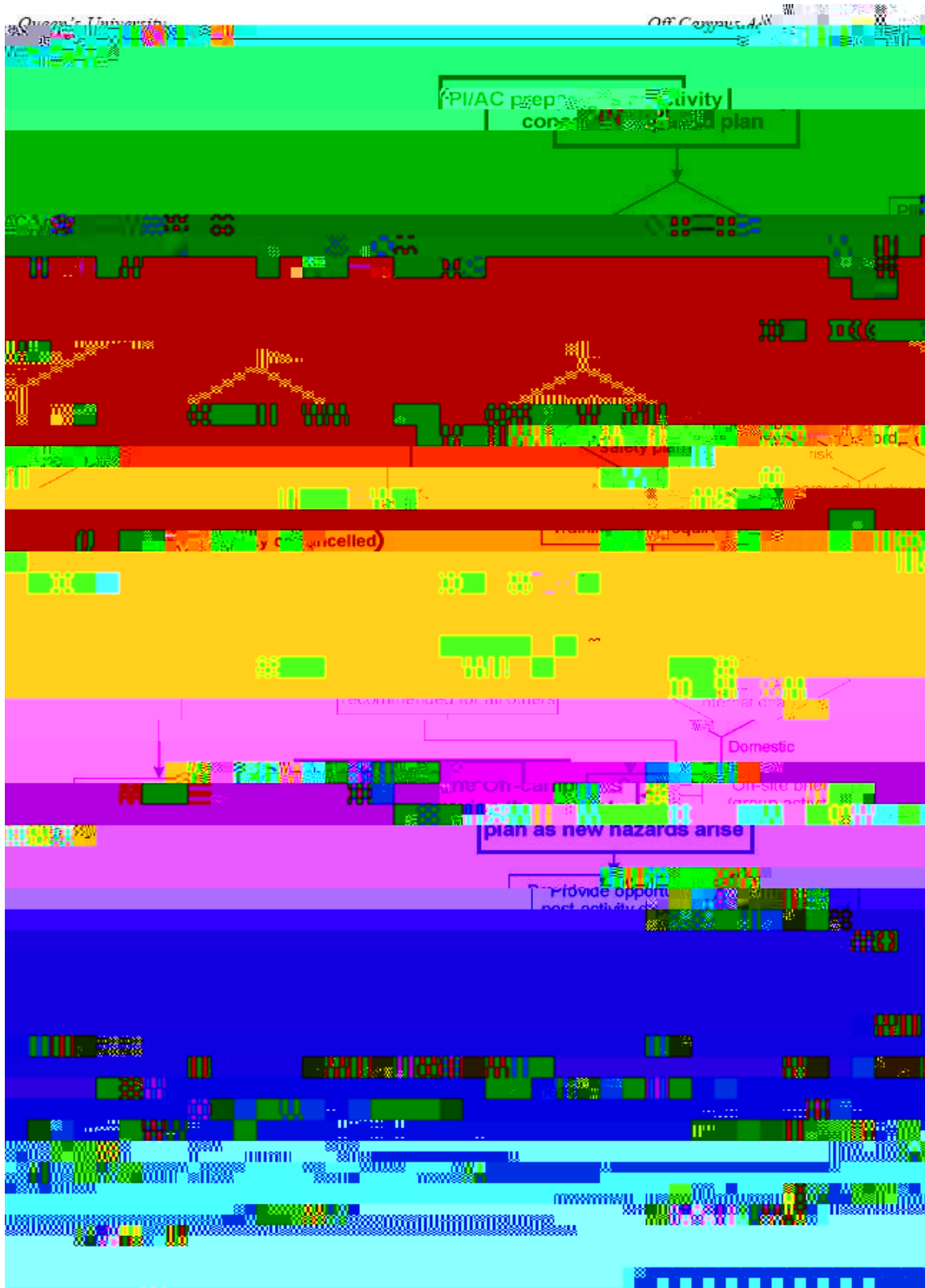
(b) health and safety representative if any; or

(c) a worker who because of knowledge, experience and training is selected by a trade union that represents the worker, or if there is no trade union, is selected by the worker to represent them, who shall be made available and who shall attend without delay.

The Occupational Health and Safety Act can be found at the following Web address:

[http://www.e-laws.gov.on.ca/html/statutes/english/elaws\\_statutes\\_90o01\\_e.htm](http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o01_e.htm)

# APPENDIX III – OFF CAMPUS ACTIVITY FLOWCHART





## APPENDIX IV – POTENTIAL HAZARDS FOR OFF CAMPUS ACTIVITY FORM

### Potential Hazards and Risks one might encounter while participating in off campus activities that should be identified during the OCASP process:

#### Remote locations (i.e. Northern Ontario, Arctic)

- x Wild animals (bears, wolves, dog etc.)
- x Cold and wet conditions, hypothermia
- x Thin ice
- x Intense sun and heat
- x Getting lost or disoriented in unfamiliar locations
- x Arduous hikes and long working days
- x Rugged terrain
- x Vehicular accidents while travelling to and from the activity location as well as while participating in the activity – all terrain vehicles, vans etc.
- x Watercraft accidents – Canoes, kayaks or motorized boats. Risk management plans should note who will be operating watercraft and whether they have the appropriate certification.
- x Swimming, scuba diving or snorkeling – If participants will be participating in any of these activities it should be noted on their OCASP record as well as a risk management plan (i.e. travel in pairs, no water activities during bad weather). It should also be noted that the students will confirm with their travel insurance provider that they will be covered under their insurance if they are injured while participating in these activities.
- x Insects – stings, bites, various diseases/illnesses (i.e. malaria, Lyme disease, tick borne encephalitis)
- x Infectious disease – hepatitis, tuberculosis, meningitis, influenza etc.
- x Poisonous plants and flowers – poison ivy, wild parsnip, water hemlock, giant hogweed etc.
- x Crime
- x Firearms used for hunting or protection from wild animals. The activity may not require any of the faculty, staff or students to carry firearms; however, firearms may be much more prevalent in the activity location than what the students are used to.
- x Natural disasters – heavy rain/snow, lightning storms, flash floods, forest fires, earthquakes, tornadoes etc.
- x Nutritional concerns – Fresh food may be expensive or not readily available, vegetation may be toxic

x A numberof the potential

health circumstances. Emergency air evacuation can be extremely expensive so each participant should ensure this is covered under their policy.

**Communication strategy** – It is a very good idea to address how the group will be communicating with each other while they are participating in off campus activities as well as any steps that should be followed in the event of an emergency situation (i.e. will the Group Leader be carrying a cell phone that participants should be contacting and is there a central rendezvous location in an emergency). This is particularly important when travelling outside of Canada.

**Other Documents that might be relevant to the activity or location** – Are there any additional documents such as a third party waiver or site specific rules and regulations that all of the participants are expected to abide by? If the group leaders (usually faculty or staff) and/or the participants are required to review a waiver or terms of condition etc. that is specific to the site, it should be noted on the OCAS record. At QUBS all participants are required to sign a document that details acceptable behaviour and rules around boating, fires etc. when they arrive at QUBS. This should be noted.

**Some common industry specific hazards and risks** – Below are some examples of industry specific hazards that may or may

## APPENDIX V – CLASSES OF INCOMPATIBLE CHEMICALS

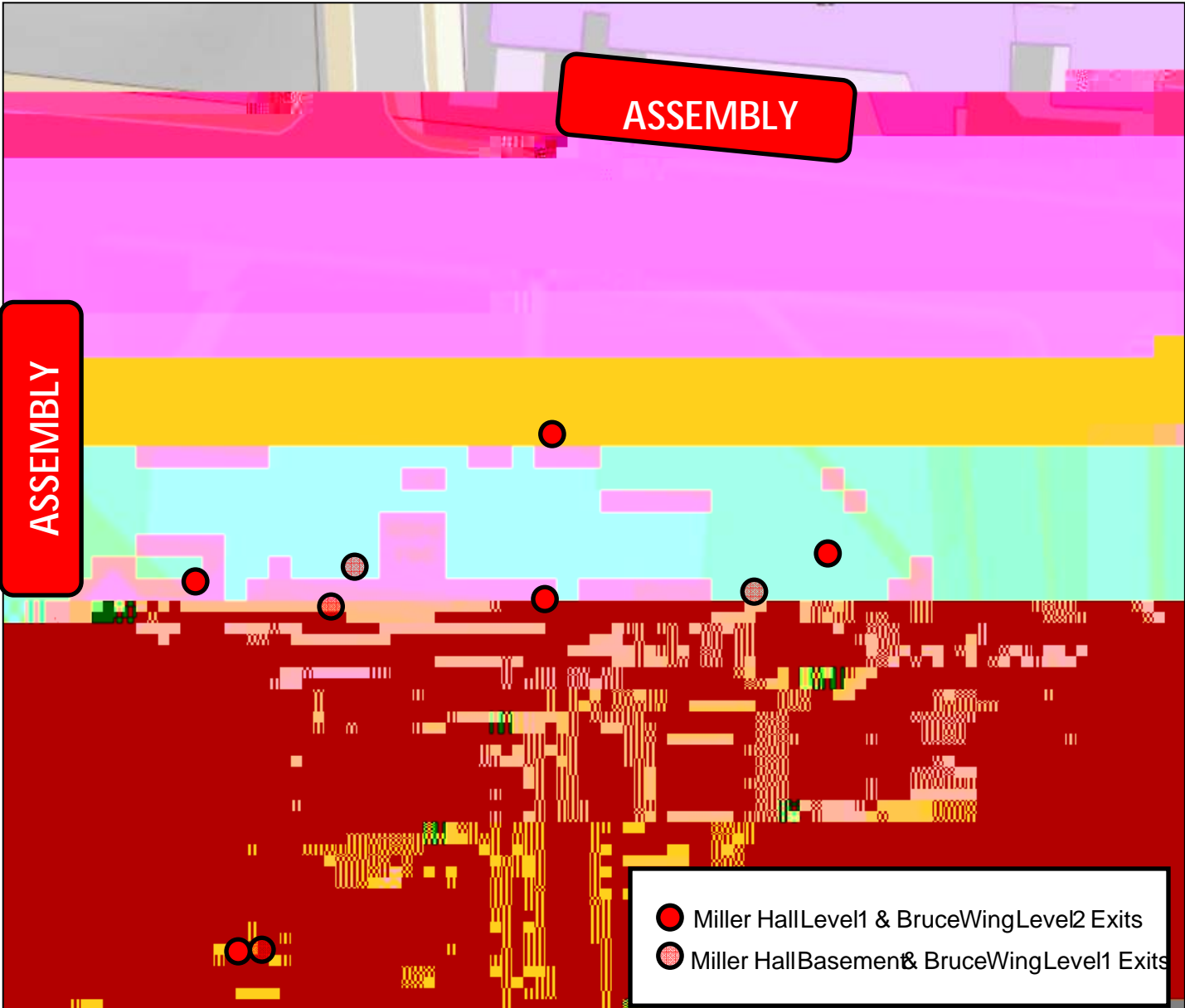
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Class of Chemicals	Incompatible with
Alkali and alkaline earth carbides, hydrides, hydroxides, metals, oxides and	

APPENDIX VI – MILLER HALL & BRUCE WING EVACUATION PLAN

When the Fire Alarm Sounds:

- 1) Notify others in the immediate area that there is a "Fire"
- 2) Activate nearest wall mounted fire alarm pull station
- 3) Leave the building promptly via the nearest exit. DO NOT USE THE ELEVATOR
- 4) Assemble across Union Street in front of Beamish Munro Hall/Goodwin Hall
- 5) Phone the Emergency Report Centre at 36111 or 911
- 6) Do not re enter the building until authorized by the Fire Department



**FORM I – EMPLOYEE & STUDENT SAFETY ORIENTATION CHECKLIST**




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<b>BB</b>			
<i>Lone Worker</i> ¶			




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FORM II – RELEASE OF LIABILITY



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