

Introduction to the MTRL Safety Program

INTRODUCTION

This document provides an overview of the MTRL safety program. It covers much of the material given during the Departmental Safety Seminar. This material may be read in the interim as an orientation to the safety program (when the seminar is not available; it is offered 3 times a year). **NOTE:** *You still have to attend the Department Safety Seminar when it next becomes available.*

The MTRL safety program is designed to provide a safe work environment for students, staff, faculty and visiting scholars/scientist in the Forward building. The safety program also seeks to comply with occupational health and safety legislation (federal and provincial) and university policy. The safety program has a structure, requirements and resources for fulfilling its mandate. An effective safety program facilitates a safer work environment, documents the program requirements and maintains records to demonstrate that requirements are being met. (The need for these activities is set out in legislation.) The purpose of this document is to familiarize all personnel with how the safety program works, what the requirements are and how to fulfill them.

The institutional structure of the safety program is outlined here:

- **Department head:** Enacts safety policies and requirements, institutes the safety program.
- **Supervisors (faculty):** Train personnel, enforce safety requirements.
- **Technical staff:** Provide safety guidance in their areas of expertise, assist in implementing some aspects of the safety program. Technical staff run the shops and services facilities, including stores, machine shop, electrical shop and electron microscopy.
- **Forward safety committee:** Advises head on safety policy, provides safety inspections, helps to implement some aspects of the safety program, conducts annual review of safety program. The safety committee meets once per month and does semi-annual safety inspections on all MTRL labs and shops. The current safety committee co-chairs are Bé Wassink (faculty rep) and Glenn Smith (worker rep). Minutes of the safety committee meetings are posted on bulletin boards. Anyone may bring questions and concerns to the safety committee.
- **Individual faculty, staff, students:** Follow safety requirements and rules, report accidents, incidents and unsafe conditions, be safety conscious.

Responsibilities

The responsibilities of the university (acting through the head), supervisors and individual faculty, staff and students are delineated in UBC Policy 7. You will read this in the orientation material you have to work through. These were briefly summarized above. One further responsibility needs to be made clear. In essence, you are responsible to act upon what you know, or ought to know to do. You will receive safety training. If you choose to act contrary to that training and are injured, or injure others, then you will bear a measure of liability for that.

Another aspect of acting upon what you know to do is that you are responsible to correct unsafe conditions to the extent that you have the authority and competency to do so. For example, clean up your messes, maintain equipment in good working order, have it repaired when necessary, make corrective changes to procedures that are unsafe, etc. You are responsible to report accidents, incidents (see below for further explanation) and unsafe conditions that you cannot reasonably be expected to correct yourself. Report to your supervisor, departmental administrative staff or the head. Finally, where you notice others doing something unsafe, or that is contrary to safety requirements you are responsible to tell them so, and what to do about it. Again, if you choose to not communicate about an issue, you bear some responsibility if something goes wrong.

OPERATION OF THE SAFETY PROGRAM

The safety program has four broad operational aspects. These are:

- **Training and orientation:** By law new personnel in the department (employees, students and visitors) must be suitably trained prior to commencing their work, in order to be able to do their work safely.
- **Ongoing requirements:** All personnel need to follow the safety rules and procedures.
- **Emergencies:** Certain types of emergencies require specific procedures and reporting to appropriate authorities.
- **Resources and forms:** Requirements are documented and described, and suitable forms for reporting are provided.

Training and orientation

Safety training and orientation are provided primarily at two levels. The first is the departmental level. This covers aspects that are common to the great majority of people working in the department. The department seeks to provide as much safety training as possible in this setting. Training by the supervisor is the next level. This relates to the particular and specific aspects of the work done, for example, a particular research laboratory. This level of training must be provided by the supervisor or someone designated by the supervisor.

At the departmental level the following training requirements must be fulfilled:

- Review the departmental website safety page: <http://www.mtrl.ubc.ca/safety/index.php>

Note: required forms and helpful information can be found on this site.

- Complete the “Personal safety orientation worksheet.” This is available on the MTRL website, safety page. Submit it to your supervisor or someone he/she has designated for your safety training for review and correction. This worksheet requires you to learn about safety resources and procedures in the department and in your lab or area. It should be completed in consultation with your supervisor or someone he/she designates.
- Complete the chemical safety course (offered by Risk Management). Risk Management courses are available through rms.ubc.ca. There is more than one lab safety course. *Be sure to take the chemical safety course for faculty/staff/students working independently.* The course has an on-line instruction component and currently also has a practical session. As long as the practical session is available, it too must be taken. Submit a copy of the certificate of completion to the secretary at the main office, room 309. *Note: certification expires after five years and then the course must be retaken.*
- *If a practical session is not available soon enough before you are to start your lab work, indicate when you intend to take it on your MTRL student and employee training checklist. Since this part of the course covers using a fire extinguisher and cleaning up chemical spills, these procedures may not be carried out until the course has been completed.*
- View the departmental safety training and orientation video (available from the safety page of mtrl.ubc.ca). This covers:
 - MTRL departmental safety orientation
 - Compressed gas cylinders safety
 - WHMIS orientation
 - Project planning sheets (hazard analysis and minimization)
 - Undergrad lab safety (for teaching assistants and lab instructors)
- A form that documents these requirements (MTRL Student and Employee Training Checklist) is provided on the MTRL website safety page. This must be completed by the student/employee/visitor in consultation with the faculty supervisor or someone he/she designates instead.

Lab- or workplace-specific training includes the following two points, common to all personnel:

- At the level of individual labs and work areas the supervisor needs to determine what training is required and how it will be documented. Once introductory training and orientation has been provided the MTRL Student and Employee Training Checklist mentioned above may be completed and submitted to the main office.

Note: the introductory training and orientation by the supervisor is intended to provide a sufficient level of training that you can begin your work in his/her lab or area. Laboratory research is varied and complex. The supervisor's responsibility is to provide sufficient safety

training for you to get started. As you proceed and the work evolves, new equipment, materials and processes may be required. Then additional training will be required. Necessary safety training for new work is ultimately determined by the supervisor. The individual student etc. may, of course, ask for suitable training. B.C. legislation requires that suitable training be provided prior to work commencing.

Right and duty to refuse unsafe work

Students, staff, etc. have both the right and the duty to refuse work they consider to be unsafe. If you are instructed to do work you believe is unsafe, you are putting yourself at risk. You have a significant responsibility for your own safety. There is a well established process for refusal of unsafe work. Consult a safety committee co-chair for assistance and clarification.

Other lab-specific training

In addition there may be other specific training required for certain types of research. These are listed below. Only the people who employ these materials or procedures need to be trained in their use.

- Work involving radioactive sources requires the Risk Management Radiation Safety Course. *No one is permitted to work with radioactive materials prior to taking the radiation safety course.* This course expires after five years and then must be retaken.
- Work with biohazardous agents requires the Risk Management Biosafety Course. This currently has no expiry date.
- Work with lasers in research requires the Risk Management Laser Safety Course. This has no expiry date either.
- For Risk Management safety courses registration see: <http://www.rms.ubc.ca> Search the website for the appropriate course.
- Persons working with picric acid (e.g. as an etchant, must receive training from this department prior to use. This is provided either by the EM technician or the stores keeper. *(Picric acid may explode on contact when its water content drops below a threshold value.)*
- Concentrated perchloric acid (~70%) is not permitted in the Forward building. There are not adequate facilities for its safe use in the building. The AMPEL building does have suitable facilities. Any person working with perchloric acid solutions must be adequately trained. Your supervisor is responsible to see that this is provided. **(Note: Perchloric acid may react violently with reducing substances, such as organic matter. The hotter the temperature and the more concentrated the acid, the greater the danger of explosion. Fatal explosions have occurred with perchloric acid use. No perchloric acid solution may be evaporated in any fumehood in the Forward building.)**

- Persons using liquid nitrogen need training from the EM technician. Liquid nitrogen is a cryogenic liquid and can cause severe frostbite burns, as well as asphyxiation.

Ongoing requirements

There are four basic ongoing requirements for individual workers and students, etc.:

The safety passport system

The safety passport system is designed to ensure compliance with safety program training requirements. Your safety passport is your completed safety training checklist form (with expiry date and signature of a safety committee co-chair). Technical staff in stores, the electronics shop, the machine shop and the electron microscopy lab check if you have met your requirements. If so, you will be able to access these services. If not, you will not be able to access these services, until you have met your requirements. The requirements for the safety passport have been described above and are summarized on the MTRL student and employee training checklist form. All research personnel must complete these requirements. Upon completion of the requirements, bring the documentation to one of the safety committee co-chairs (Bé Wassink in general) for review.

Project planning sheets

Every new research project requires a completed project planning sheets document. This is a basic hazard analysis and minimization exercise. The purpose of this is for the researcher to think through the hazards involved with the project (e.g. equipment, hazardous materials and conditions, hazardous waste handling/storage, and environmental considerations) and to take steps to minimize those hazards. The project planning sheet forms can be found at on the MTRL website safety page under safety forms and resources for downloading, forms. The "risk level" is a qualitative assessment (high, medium, low) of how dangerous a particular hazard is. Risk level is a product of probability of an event occurring \times the severity of the occurrence. *The project planning sheets should be completed with assistance from your supervisor or someone he/she designates.* A Risk Management document that can assist with this is found on the same website, Resources and Guides, Hazard Analysis Guidelines. Ignore the first page; the last two pages are most useful. Common hazards are listed along with typical possible control measures.

Note that one per new project is required.

Note: research projects may evolve and change. Thus it may not be possible to anticipate every possible hazard. However, to the extent possible the researcher should consider the anticipated hazards based on what he/she is likely to do, and make plans accordingly to minimize the hazards. As a project evolves and new previously unanticipated work becomes necessary, the researcher should again consider the hazards and take steps to minimize the dangers.

There are four types of methods for minimization of hazards. The effectiveness of hazard minimization decreases from 1 to 4.

1. Elimination/substitution. Where possible this should be done. For instance, damaged equipment must be repaired before use. Makeshift electrical wiring should be replaced by professionally wired equipment. If feasible, especially toxic chemicals may be replaced by less toxic ones (e.g. toluene instead of benzene; digital or alcohol thermometers instead of mercury thermometers, etc.)
2. Engineering controls. Here a hazard is contained or removed by suitable equipment and processes. Once activated, these controls do not require ongoing effort or attention by the operator. For example: toxic dusts and fumes can be removed by good ventilation or extraction equipment; guards over moving parts; interlocks.
3. Personal protective equipment. These are items worn by the operator. They include safety glasses, lab coats, respirators, gloves, steel-toed shoes, etc. This is essential in any laboratory involving hazardous materials and processes. It is also a less effective means of minimizing hazards than the two previous methods. All personal protective equipment has limitations in its effectiveness. Dust masks remove less than 100% of dusts and aerosols. Lab coats are permeable. Safety glasses can be breached. Nevertheless, it is the last line of defense. Adequate personal protective equipment must be worn by all personnel at all times in all laboratories and shops areas that have been marked off as potentially hazardous areas.
4. Administrative controls. These include steps such as student/worker training, written safe work procedures, adequate supervision, regular safety inspections, etc. These too are essential, but are the least effective. They require ongoing administrative effort. It is not possible to provide constant administrative oversight for all persons working in all situations.

Use of personal protective equipment

Personal protective equipment (PPE) must be worn in all labs and shops areas. All labs and shops have been marked off with yellow and black hatched tape on the floors. This marks off boundaries that define the hazardous areas. Once someone crosses into the hazardous area they must put on the required PPE. First of all, there is a basic level of PPE that all persons must wear in the area at all times, whether they are working or not. This will generally be at least a pair of safety glasses. Other PPE will have been determined by the supervisor in consultation with the safety committee. This is the basic PPE that everyone is required to use at all times in a given hazardous area.

In addition, people working in the lab or area may need other specific PPE for the work they are doing. For example, labcoats, gloves, steel-toed shoes, etc.

Supervisors are responsible to inform their personnel of this requirement, and to enforce it. *If you notice someone not wearing the required PPE tell them they need to put it on.*

Working alone or in isolation

Legislation in British Columbia limits the circumstances under which working alone or in isolation is permitted. Supervisors have determined what kinds of work may not be done while working alone in your lab or area. This is contained in a working alone policy for each lab or area. Part of your required safety training is to be made aware of this working alone policy. You are required to abide by it. Normal weekday hours are 8:30-5:00, Mon.-Fri., except holidays.

WHMIS (Workplace Hazardous Materials Information System)

This is a federally legislated program that governs all WHMIS-controlled products (a great many hazardous materials). It specifies requirements for labeling of commercial chemicals/materials and labeling of materials we generate, either for in-house use or to be sent out for analysis or testing. It also has rules for the availability of information on how to safely handle each product and how to respond to emergencies. This information is contained in MSDS sheets (Material Safety Data Sheets). Finally, the employer is required to ensure that all personnel are suitably trained as to WHMIS requirements. All personnel working with hazardous materials must be aware of WHMIS requirements and abide by them. The Risk Management Laboratory Chemical Safety Course has a section on WHMIS.

All materials generated in the department must be properly labeled, including wastes. Information on labeling is available on the department website safety page, Safety forms and resources for downloading, Resources and guides, Labeling requirements. The safety committee looks carefully for unlabeled or improperly labeled chemicals and materials during its semi-annual safety inspections.

Transportation of dangerous goods

(a) Shipping or receiving

Research personnel need to be aware of limitations on transportation of dangerous goods (the TDG act). Hazardous goods that are designated as dangerous goods must be packaged and shipped according to strict requirements under TDG. *Failure to comply with TDG rules may result in very large fines.* Classification as dangerous goods depends in part upon the nature of the hazard and the total amount of material. The storeskeeper has TDG certification. Only TDG-trained personnel may receive/ship dangerous goods. See the storeskeeper for advice on shipping potentially hazardous materials. The Risk Management website will also have information on TDG. The following general points apply:

- No person without TDG certification may receive a dangerous goods shipment into the building.

- No person without TDG certification may ship dangerous goods. (This includes even shipment locally by ground couriers)
- All potentially hazardous goods that need to be shipped from the department must be checked with the stores keeper (who has TDG certification). The stores keeper will advise you on what to do.
- An MSDS will have to be prepared for each dangerous goods shipment. A template form is available on the department's website safety page under safety forms and resources for downloading, forms, MSDS template.
- Personal transport of hazardous materials by public means of transportation is not permitted.

(b) Transport in the building or between buildings

Hazardous materials may be transported within the building using suitable containers, such as rubber bottle carriers or sealed containers, preferably shatterproof. *Hazardous materials may NOT be carried between rooms in open containers!*

Leakproof and shatterproof containers are required for transport of hazardous materials between buildings on campus.

Dust masks and respirators

Disposable dust masks are now considered to be respirators under BC legislation. No one is permitted to use a dust mask or a respirator without first being fit-tested. Fit testing can be arranged through Risk Management and takes only about 15-20 minutes. Respirators and dust masks can be obtained through stores. Fit testing is required annually.

Emergencies

By law the following emergencies require specific procedures, forms and reporting:

Accidents or incidents

(1) An accident results in work-related injury, illness or property damage. An incident is an event that could have caused injury, illness or property damage, but which did not. It can also be termed a near miss. It is required by law that accidents and incidents be reported. Report as soon as possible to your supervisor, or if he/she is not available, to the head or administrative staff. You will not be penalized for reporting. (Since you are responsible to report these events, you could rather be penalized for not reporting them.) Accidents and incidents will be investigated. The purpose will be to ascertain the cause(s) and then to recommend measures to prevent recurrence. *Accident/incident investigations do not assign blame!* The appropriate reporting and investigation form will be filled out by the supervisor and a member of the safety committee.

(2) If you seek medical attention (e.g. from a doctor or hospital) for a work-related illness or injury, you must report this to your supervisor (or administrative staff, if need be) within 24 hours, if at all possible. Failure to do so may result in serious fines to the department.

(3) Self-treatment using first aid kits. Each lab has its own first aid kit. If you use something in the kit (e.g. a bandaid for a cut) you must complete the treatment record sheet that is also in the kit. (If this is missing, ask a building first aid attendant for a new one!) This is required by law, and it is crucial for your own benefit; if there are subsequent complications from the minor injury, the treatment record sheet may be your only proof that you sustained the injury at work. This can affect whether you may be eligible for any kind of compensation.

(4) Personal security concerns. If you have concerns about your personal security, violence or threats report these to your supervisor or other administrative staff.

First aid

If you or someone nearby are injured or feel ill and need assistance there are three levels of help available.

(1) Departmental first aid (Occupational First Aid, Level 1). A few people in the department are trained in this. First aid attendants are listed on the department safety page, mtrl.ubc.ca. They are available during normal working hours (approximately 8:00-4:00), Mon.-Fri., except holidays.

(2) UBC first aid. Call 822-4444. Available 24 hours/day, 7 days/week, 365 days/year. Call if department first aid is not available.

(3) 911. For major emergencies, or if in doubt, all 911. You **MUST** know the building's civic address:

6350 Stores Road, Vancouver, V6T 1Z4

and you **must** be prepared to have someone meet the paramedics/firefighters at the main entrance (north entrance). If you call 911, call UBC first aid next. They may get here first and can help.

Large chemical spills

There are two types of spills. One is internal. This is a spill of a hazardous material within the building, but without release to the external environment. The second is external. In this case there is a release to the external environment (land, water or air). A spill into a sink, or a large enough gas emission up a fumehood would be classified as external spills.

In the case of external spills, there are guidelines as to what constitutes a “large” chemical spill. If you have a large external spill, or you are the first on the scene of a large external spill, you are required to take suitable action. All such spills require you to contact

Hazardous Materials Response (call 911). Further, you may have to contact certain government agencies as well. "Large" is a relative term. A small mass or volume of a highly toxic material may constitute a large spill, whereas a large mass of a very slightly toxic material might be classified as a small spill. It all depends on what is reportable under federal and provincial legislation. Information on spill reporting is available from the Risk Management website, A-Z forms and publications, Spill reporting procedure. In addition, Risk Management must be contacted in the event of a large spill. Failure to report a large chemical spill can result in severe criminal penalties.

In the case of an internal spill, you may clean it up yourself using the spillcart (outside of stores, room 006), or if it is too large, then call 911 for assistance. Notify your supervisor or administrative staff immediately. For example, a spill of 1 L or more of a highly flammable liquid will require emergency help. If you call 911 for assistance, you must also pull a fire alarm to evacuate the building. If you are unsure about what to do, get help from administrative staff or faculty immediately. An accident/incident report and investigation will be required. Notify your supervisor, the head or other administrative staff to get this started.

Resources and forms

The department's website safety page contains a number of forms and resources. You should review this website to become familiar with this information. If you need a form or information this is a good place to check first. If you need assistance contact Bé Wassink. Departmental technicians also have a wealth of experience and knowledge and can provide expert safety guidance for many situations.

Other resources

For further advice and assistance, contact the following people and organizations:

Organization or role	Name	Forward room no.	Telephone
MTRL department head		313	822-3669
MTRL departmental administrator	Fiona Webster	311	822-3671
MTRL safety committee co-chairs:	Bé Wassink	406A	822-2662
	Jacob Kabel	419	822-2716
Stores keeper	Marlon Blom	006	822-2716
Electronics technician	Wonsang Kim	017B	822-6181
Machine shop technician	Ross MacLeod	017A	822-2605
Machine shop technician	Carl Ng	017	
Machine shop technician	Dave Torok	017	
EM technician	Jacob Kabel	419	822-5648
Building emergency director	Bé Wassink		
Deputy building emergency director	(Mining)		
UBC Risk Management Services		n/a	822-2029
UBC Chemical Safety Office		n/a	822-5909
Environmental Services Facility	Valeriy Kichenko	n/a	822-6306

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