The Pathobiology Health and Safety Handbook is designed to provide information promoting good laboratory practices and to identify safety concerns for faculty, staff, and students working within Department of Pathobiology, while complying with existing government and University of Guelph policies.

*Reading this handbook is not, however, a substitute for mandatory laboratory safety orientation.*

- [University of Guelph policies](#)
- [U of G Environmental Health & Safety website](#)
- [Guide to the Ontario Health and Safety Act](#)

Under the Occupational Health and Safety Act of Ontario, all supervisors (faculty or their designates) are required to provide new employees (including staff, graduate and undergraduate students, project students and volunteers) with workplace-specific laboratory safety orientation and training prior to commencement of work, including mandatory WHMIS training. WHMIS training sign-up lists are circulated by the Chair's Office each semester. Both the laboratory supervisor and the new personnel member must review and sign the [Department of Pathobiology Safety Orientation form](#), one copy of this form is filed with Joan Hamilton, the Department Secretary, and a copy is retained by the faculty member as part of due diligence. *NOTE that each research laboratory may need additional laboratory-specific safety training* designed to identify specific hazards and procedures associated with individual research projects ([Example of a Lab Biosafety Training Manual](#)).

- [Overview of due diligence under the OHS Act](#)
- [Overview of Faculty responsibilities](#)
- [Information on mandatory safety training](#)
- [Environmental Health & Safety Policy Manual](#)

Laboratories are active work environments. At any time several experiments may be underway in a single room, involving many people using different chemicals and intricate pieces of equipment.

**BE INFORMED!**

We are all responsible for identifying and dealing with workplace hazards, and we share a common interest in preventing accidents and injuries. Access the information in this handbook and associated WEB resources to become familiar with the support systems in place to ensure your workplace is a safe environment.
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Fire and Emergency Procedures

Immediately leave the building should the fire alarm sound

Emergency Telephone Number Extension 52000

Emergency Exit Procedures:

1. Turn off gas outlets at each bench.
2. Close fume hood sashes and biosafety cabinets.
3. Exit the lab, close doors.
4. Exit via the closest stairwell, DO NOT use the elevator.
5. Exit the building and move to a safe distance.
6. REPORT ANY INFORMATION REGARDING THE INCIDENT OR PEOPLE STILL INSIDE THE BUILDING TO A FIRE WARDEN OR THE FIRE MARSHALL.
7. Do not re-enter the building until authorized to do so by a Fire Warden.

PATHOBIOLOGY EMERGENCY CONTACT LIST (link to updated list)

FIRE WARDEN SCHEME

The Fire Warden Scheme operates in most Campus buildings and is designed to facilitate a speedy and safe evacuation of the building in the event of the fire alarm sounding.

Fire Wardens are identified by an orange armband.

On an alarm sounding, wardens will check a specified area to ensure that all people in that area are aware of the alarm sounding and that they are able to evacuate the building. The wardens then exit via designated routes. Once outside of the building, they report to the Chief Fire Warden the status of their designated area and will remain in the vicinity of their designated exit door to inform people approaching the building that they should not enter. Do not re-enter the building until a fire warden has informed you that it is safe to do so. A silenced fire alarm does not mean that it is safe to enter the building.

Fire Wardens are not responsible for enforcing evacuation or for assisting people during evacuation. However, they provide a means of communication to the attending Guelph Fire Department about individuals remaining inside the building or people requiring assistance to evacuate the building. It is vital that the Fire Department know of these incidents as soon as possible and the Fire Warden scheme makes this possible.

Fire wardens are volunteers. Please be respectful to them and follow their advice. The scheme is implemented to ensure your safety.

Fire Safety Plan Bldg 46
Fire Safety Plan Bldg 49
DEFINITIONS & LINKS FOR SAFE WORK PRACTICES IN PATHOBIOLOGY

- **WHIMS training**: Under the Occupational Health and Safety Act of Ontario all new employees, including graduate, undergraduate and summer students, must undergo a safety orientation and WHMIS training. WHMIS training seminars are offered through the Faculty and Staff Development Opportunities Program. Additional courses are offered during peak summer employment times. See Cathy Fletcher, Administrative Assistant, Room 2140, for information.

- **Material Safety Data Sheets** are kept in every lab detailing hard copy information about physical, chemical and toxicological properties and hazards, as well as recommended handling and emergency procedures for each particular chemical used in that area. On- line information may also be accessed through Fisher Scientific Inc. under ‘Services’ or at U of G MSDS.

- **Environmental Health and Safety** offer First Aid and Safety Courses in seminar and video-for-loan format.

- **Radioisotope License** is required for projects using these chemicals. The Principle Investigator is responsible for users listed on their project license. All users must be certified by EH&S for Radiation Safety Training.

- **Personal Protective Equipment**: EHS Lab Safety Manual ‘General Lab Safety’, pages 20-24 (draft, web site not yet available)

- **Pathobiology Lab Coat Policy** here

- **Waste Disposal** Pathobiology has set up several procedures to facilitate safe and simplified methods of biohazardous waste disposal and chemical disposal.

- **Animal Care Facilities**, operated under the Office of Research, are available for live animal research projects. Animal Utilization Protocols and guidelines.

- **Post Mortem Room** is a joint AHL/Pathobiology facility. Access is limited to those immunized for Rabies. This area is administrated by AHL. Students new to Pathobiology are trained by their Supervisory Pathologists and may be directed to the Standard Operating Procedures (SOP’s) documented and maintained by AHL.
- **Biohazards Containment Certification** is required prior to initiating any laboratory work detailing safety procedures associated with the use of biohazards.

- **Biohazard Sign** is posted at the entry door of laboratories for all projects ranked ‘Level 2’ notifying building occupants, housekeeping and maintenance personnel that biohazardous agents are used at this location.

- **Biosafety Training Checklist** must be filled out insuring that persons handling biohazardous materials have received specialized training.

- **Biohazardous agents** are covered by WHMIS; Material Data Safety Sheets are required for workers for all biohazards that affect humans.

- Biohazardous waste is decontaminated as documented in the Certification protocol.

- Pathobiology provides autoclave service:
  - [Autoclaving Procedure](#)
  - [CSU Overview ORIENTATION](#)

**Biosafety resources:**

- [American Biological Safety Association](#)

- [Health Canada](#), Health Protection Branch, Laboratory Centre for Disease Control

- [NIH Guidelines for Research Involving Recombinant DNA Molecules](#)

- [Bureau of Microbiology](#)

- [Canadian Food Inspection Agency](#)
REFERENCES & RESOURCES FOR PATHO BIOLOGY

- Online Safety Course by the Howard Hughes Medical Institute
- Health Canada, Laboratory Biosafety Guidelines 2004, copies in various laboratories
- CSLT Guidelines for Laboratory Safety, 1986, copies in various labs
- Biosafety in Microbiological and Biomedical Laboratories (BMBL) 4th Edition
- Merck Index

Environmental Health and Safety ‘provides additional information and assistance through health and safety training sessions, a computerized inventory system for hazardous materials, and a resource library of books, compact disks, videos, and MSD sheets for chemicals and infectious agents. EHS has information about the Occupational Health and Safety Act and Regulations, the allowable exposure limits for chemicals, and can research hazardous chemicals, and physical or biological agents.’ (website quote)

ACKNOWLEDGEMENTS

This manual is devised from various public domain sources listed above. The Department of Pathobiology Joint Health and Safety Committee acknowledges the Department of Integrative Biology Occupational Health and Safety Committee, Department of Molecular and Cellular Biology, and the Environmental Health and Safety Manual, University of Guelph for their major contributions to the compilation of this booklet, with thanks.
The following notes are intended to give you an overview (or review!) of basic safety issues that pertain to your work in this Department. Some of the remarks concern the Safety Committee, issues of training, and general safe practices and procedures.

Reading this manual is a starting point; it does not mean that you are fully trained to work safely. You must receive specific training for operating equipment and performing particular procedures. This manual is not designed to replace the Material Safety Data Sheets, instrument operating instructions, biohazard, or radiation regulations or the individual supervision you receive in the lab. It is the responsibility of your supervisor to ensure that adequate training is available to you. Do not proceed with something if you are unsure how to do it.

**YOUR RESPONSIBILITY:**

Safety is very much the responsibility of everyone in the department. While the department provides resources and training to identify hazards, you are the one performing experiments and you are ultimately responsible for your own safety.

**BE INFORMED!**

Research creates potential hazards that can only be appreciated by highly trained individuals. If there is a procedure you do not understand, or if you are using hazardous materials that you are unfamiliar with, consult your supervisor before proceeding. The key to working safely is to avoid becoming complacent.

Get into good work habits now and safety becomes second nature.

It is also important to foster a safety-minded ethos in the department. You can work with the utmost care and diligence but it means little if your lab colleague is exposing you to carcinogens or pathogens. Do not hesitate to point out to someone if they are working in a hazardous manner. Bring the matter to the attention of your supervisor, or the department Safety Committee or Department Chair.

**SAFETY COMMITTEE:**

The Departmental Safety Committee is not an optional committee; it is required under the Ontario Occupational Health and Safety Act (OHSA)

Mandatory Regulations
There is also a **University Central Joint Health and Safety Committee** and an office of **Environmental Health and Safety (EHS)**.

The local Departmental Committee is assigned a number of specific tasks including workplace inspections, reporting unsafe conditions and practices, training and departmental orientation, incident investigations, accompaniment of government inspectors, maintaining safety files, emergency planning and first aid, and posting information. The **AHL/Pathobiology Joint Health and Safety Committee** is comprised of faculty, staff, and graduate students from both departments. This joint committee works well as we share the same geographical building and have common concerns. Notices and information posted by this committee are located between Rooms 2124 and 2121 at the top of the stairwell in Building 49.

"Safety" tends to expand into many other areas - including housekeeping, maintenance, and good manners. The Safety Committee works with you in promoting safety in the department. You should consider yourself a "member-at-large" of the Departmental Safety Committee - You have an important role in ensuring your workplace is safe! Please talk to us, ask us questions, and we'll try to help!

**DUE DILIGENCE AND TRAINING:**

The phrase "due diligence" is used to indicate that employers and supervisors will do their utmost to ensure that the workplace is safe and that people will be trained so that they can work in a safe and knowledgeable manner. It also means that you, as an individual, will do your very best to be informed, to learn correct procedures, and practice them. Under the provisions of "due diligence", the University can - and has been - fined when a person who didn't know how to operate a piece of equipment was severely injured. In addition, non-compliance with safe practice guidelines can mean loss of working privileges (e.g. radioisotope licenses, biohazard permits) or damage to equipment.

So, it is in everyone's interest, including your own, for you to take safety seriously!

**Supervisor due diligence**

There are many opportunities for you to get both basic and specialized training in safe working procedures. The **EHS** office sponsors a variety of short training sessions on various topics and you are welcome to participate. Other training may be more specialized, relating to your research work. You should document the training you have received from your supervisor or advisor (e.g. biohazard materials, equipment training, specialized procedures taught to you).

**Pathobiology laboratory guidelines**

**Laboratory training**
SAFETY INSPECTIONS:

Workplace inspections are one of the primary methods of identifying and eliminating actual and potential hazards. These hazards can include problems with equipment, the workplace environment, the building, as well as with work practices. There are many different kinds of workplace inspections, including daily "walkabout" inspections when you enter your laboratory or office, "pre-use" inspections of equipment you are going to run, and "spot-checks" by your work supervisor or advisors. Other inspections are more formal, and involve documenting the fact that inspections have been done on a regular basis as part of "due diligence".

The Occupational Health and Safety Act requires that the workplace be inspected monthly. It would not be practical for the members of the departmental safety committee to perform comprehensive inspections of all areas of this building each month. In addition, the people who are most knowledgeable about what goes on in a room or laboratory - and the people most directly concerned with safety in that location - are the people who work in that space. As a result, the workers and supervisors of a lab routinely perform informal safety inspections as part of their daily work routine. Care and maintenance of equipment, stocking of adequate supplies, and providing personal protective equipment relevant to the tasks performed insures the laboratory work can proceed safely.

Once a year: One or more members of the Departmental Safety Committee* inspect each laboratory and facility in the building. Written documentation of these inspections is made in the form of the Workplace Inspection Recording Form, submitted to the Departmental Safety Committee, Supervisor of the work area, Department Chair, EH&S for review. Included in the inspections report is the Lab Inspection Action Report ranking potential hazards and safety inspections and designating corrective actions to either the supervisors of the work area or the administrative assistant responsible for building maintenance

Please participate in these reviews of your working areas and talk to your laboratory colleagues about safety issues. The most important safety inspection is your own daily, weekly, monthly review of your workplace - be aware of experiments in progress, what's going on and potential hazards.

*As the voluntary Graduate Student and Research Technician members of the Departmental Safety Committee are not always at liberty to spend substantial amounts of time on inspections, the Departmental Safety Committee members may ask for assistance from departmental members in conducting inspections of particular facilities. The Department thanks you for your anticipated willing and enthusiastic participation!
REPORTING ACCIDENTS AND INCIDENTS:

In the event you should have a workplace accident or injury, you have two responsibilities:

1. Seek first aid and/or treatment.
   Please don't shrug off a problem as a "little" accident or minor chronic problem. Seek help, whether it's a cut that needs disinfecting or a situation that needs an independent assessment. Every laboratory exit door in Pathobiology lists trained personnel in First Aid and CPR. Also listed is the location of the nearest first aid kit, shower, eye wash station. Familiarize yourself with this information.

2. Report the incident or problem
   Tell your supervisor/advisor or a member of the Safety Committee about the problem as soon as possible. For personal injuries or hazardous situations, a formal incident report form must be completed and sent to EHS from the Chair's Office within 24 hours.

Such reports document problems that have been encountered and are required by the Ontario Health and Safety Association. "Hazardous situation reports" (The "near misses" category) also allow safety committees to recognize and remedy problem situations before something serious happens.

Floods

Floods are usually caused by inadequate tubing connections to water-cooled apparatus, leaving sinks unattended while being filled with water, or shearing off water valves. Water may actually be coming from a higher floor in the building.

During regular working hours:
Turn off the source of the water if known and you can do so safely. Be aware of any electrical sources that may be an electrocution hazard. If you cannot turn off the source and/or you know it is due to a plumbing problem, contact Cathy Fletcher, 54750, who will send the appropriate trades persons.

Outside regular working hours:
Notify campus police at Extension 52000. Explain the nature of the problem. The police will contact Housekeeping and the appropriate response persons.
LOSS OF POWER

Occasionally, there may be a loss of electrical power for an extended period of time. There are emergency circuits that are powered by an on-campus diesel-fired generator. Emergency lighting is connected to these circuits as well as 'essential' items such as some freezers. Emergency power should be in operation 15 seconds after the loss of power. When operating in Emergency power, airflow in the building is reduced. There is sufficient airflow to ventilate fume hood and Type B safety cabinets with the windows closed but not to provide operator protection with the window open. Type A Biosafety Cabinets should not be used when operating in Emergency Power.

In the event of a power outage all fume hoods and biosafety cabinets must be closed.

If the interruption to exhaust has resulted in a hazardous leak of chemicals, vapours or biohazards then treat this situation as an emergency and pull the fire alarm to ensure a prompt evacuation of the building and that the emergency services are summoned.

Out of hours- as above but contact University police (extension 52245) to inform them of the loss of power in non-emergency situations.

LABORATORY TRAINING REQUIREMENTS

The Department of Pathobiology has designated staff responsible for the training and maintenance of support labs containing common use equipment and highly specialized instruments. Mandatory training sessions insure consistent and proper use of these facilities.

- CSU Overview ORIENTATION
- Pathobiology training for common use labs
- Pathobiology Central Research Lab

In addition, supervisors are responsible for providing specific training and documentation related to the laboratory techniques and instruments used for their research purposes.

- Example of a Lab Biosafety Training Manual
MATERIAL SAFETY DATA SHEETS (MSDS):

Material Safety Data Sheets must be in hard copy, and alphabetically filed in a binder. The binder must be easily accessible, preferably located near room exits, so that it can be located in an emergency by persons not familiar with the laboratory.

MSDS are also required for items in storage areas and for all hazardous materials including compressed and liquefied gases.

SAFETY SIGNS:

Rooms or experiments with special hazards or requirements, e.g. intermediate level radioisotope rooms, rooms containing laser equipment, dark rooms, glass vacuum racks, must have appropriate signs on the entrance doors.

Conversely, inappropriate signs are to be removed (e.g. "radioactive" label tape used for packaging tape).

Unattended experiments must be identified with the name of the experimenter, telephone number, and any special hazards that may be present (e.g. high voltage, hot surfaces, experiment under vacuum, toxic materials, pyrophoric situations).

**TAKE NOTE OF THESE SIGNS; THEY ALERT YOU TO HAZARDS THAT YOU MAY ENCOUNTER IN DIFFERENT AREAS.**

WHAT ELSE CAN YOU DO FOR SAFETY?

- **DRESS APPROPRIATELY.** Wear shoes that enclose your feet completely - they should be leather or a similar material that will not allow chemical spills or hot water to penetrate easily. Wear a laboratory coat. Use appropriate gloves and other personal protective devices such as goggles, hearing protection as needed.

- **KNOW AND OBEY THE BASIC LABORATORY RULES**

- **OBTAIN PROPER KNOWLEDGE ABOUT EQUIPMENT USE**

- **KNOW WHAT YOU’RE WORKING WITH.**

- **LET OTHERS KNOW TOO:** Label things clearly, whether it's reagents, incubated or stored materials, cultures or materials on benches. Use clear and informative "Experiment in progress" signs if you are running something overnight or unattended during the day.

- **ASK QUESTIONS, KEEP LEARNING**
LOCATION OF EMERGENCY EQUIPMENT

An up to date list of equipment is available [here](#) and on the department resources website.

MEDICAL INCIDENTS AND EMERGENCIES

TAKE CONTROL:

Assess the scene and determine the level of aid required. Enlist the help of identified trained Department First Aiders.

Pathobiology Qualified First Aid Personnel

MINOR INJURIES:

Render first aid assistance if permission is granted.

Employee- If the injury requires further medical attention, the employee may either contact Occupational Health Services in the yellow portable buildings on Christie Lane during regular working hours, extension 52133, or may follow up with the physician of his/her choice. If a hazardous material is involved, send a copy of the Material Safety Data Sheet with the casualty. Prior to receiving medical aid off-campus, notify Occupational Health Services, extension 52133, during regular working hours.

After hours, phone extension 52000 for transportation and assistance. There is no charge to the employee for transportation to medical aid for a work-related injury if warranted.

Student- If the injury requires further medical attention, the student may go for assessment during regular working hours to Student Health Services. After hours, the student may call Student Health Services, extension 52131, to contact the on-call physician. If the student wishes to seek medical aid off-campus, the student is responsible for his/her own transportation. If the student lives in Residence on campus, transportation assistance may be available; the student can contact his/her Residence Manager for information. If a hazardous material is involved, send a copy of the Material Safety Data Sheet with the casualty. If a student needs to leave the class, send an escort with the student if the injury warrants or if the student requests one.

After hours, SafeWalk can accompany the student during the SafeWalk hours of operation. Phone extension 53200 to contact SafeWalk.
There are several "after-hours" clinics in Guelph (Yarmouth Street 519 837-2550, and Surrey Street 519 763-6201). These walk-in clinics are preferable to the Guelph General Hospital Emergency Room for minor injuries that occur outside regular working hours. The clinics are open until 10:00 p.m. weeknights and have limited hours on Saturdays, Sundays, and holidays; call for exact hours of operation. St. Joseph's Hospital does not maintain an emergency room.

Reporting: Please report all incidents, including ‘near misses’. Complete an "Injury/Incident Report Form" for all incidents no matter how minor and fax within 24 hours to Environmental Health and Safety, 519 824-0364. Forward the top copy to the chair/department head, the brown copy to Environmental Health and Safety, the blue copy to your local joint health and safety committee within 24 hours.

SERIOUS ("CRITICAL") INJURIES:

A critical injury is defined under the Occupational Health and Safety Act and Regulations as an injury of a serious nature that,

- Places life in jeopardy;
- Produces unconsciousness;
- Results in substantial loss of blood;
- Involves the fracture of a leg or arm but not a finger or toe;
- Involves the amputation of a leg, arm, hand or foot but not a finger or toe;
- Consists of burns to a major portion of the body; or
- Causes the loss of sight in an eye.

CALL: Extension 52000 for assistance 24-hours per day. The dispatcher will arrange for a taxi or an ambulance as appropriate. The dispatcher will have campus police meet the ambulance or taxi to guide it to the scene of the accident. Do not call 911 directly. Ambulance and taxi drivers are not familiar with campus and valuable time can be lost while they try to find you.

RENDER FIRST AID: if permission is granted. Keep the casualty comfortable. Make sure their personal belongings are secure.

MSDS: If a hazardous material is involved, send a copy of the Material Safety Data Sheet with the casualty.

SECURITY: Maintain security at the scene of the accident. Do not allow anyone to interfere with, disturb, destroy, alter, or carry away any wreckage, article or thing at the scene or connected with the occurrence until permission to do so has been given by a Ministry of Labour inspector except for the purposes of saving life or relieving human suffering, maintaining an essential public utility service or public transportation system, or preventing unnecessary damage to equipment or other property.

REPORTING: Report the incident by telephone to Environmental Health and Safety, extension 53132, during regular working hours as soon as the casualty has been stabilized. If outside regular working hours, campus police will contact the appropriate agencies. Complete an "Injury/Incident Report Form" and fax immediately to Environmental Health and Safety, 519 824-0364. Send the top copy to the chair/head, the brown copy to Environmental Health and Safety, and the blue copy to your local joint health and safety committee.
WORKING WITH HAZARDOUS MATERIALS

All personnel must complete a WHMIS training course as soon as possible after starting work in the department. This course will introduce you to the requirements of working with hazardous materials.

All hazardous materials containers require WHMIS labels. Check compressed gas cylinders, dewar flasks, safety solvent dispensing cans and reused reagent bottles for labels. Chromic acid cleaning baths, electrophoresis chambers, dry ice buckets, and pesticide spray tanks, for example, all require workplace WHMIS labels. These are available from the Physical Resources Stockroom on Trent Lane.

Regulators must be appropriate for the compressed gas; homemade adapters are not acceptable. Transfilling of cylinders is prohibited, as it is a very dangerous practice. Glass dewar flasks must be protected by outer covers or by applying self-adhesive tape to the outside to protect against flying glass if the dewar is broken.

An up-to-date inventory of all hazardous materials including radioactive and biohazardous materials must be easily accessible to emergency personnel unfamiliar with the laboratory. It must be located near the exit of the laboratory. In addition, a chemicals inventory for each lab should be maintained on the HazChem site, Environmental Health and Safety.

Chemical stock should be appropriate for work currently being carried out in the laboratory. Flammables are to be limited to one day’s supply. Any amount in excess of this must be in approved safety cans, or storage cabinets. Flammables are not to be placed in ordinary domestic refrigerators, or freezers, or incubators. Signage is to be posted on refrigerators and freezers indicating this. (available from Pathobiology Safety Committee and Environmental Health and Safety)

Persons using biohazard materials in the laboratory must be knowledgeable of procedures. Decontamination procedures are to be documented and easily accessible to persons not familiar with the laboratory. “Biohazard” signage and bags are to be used appropriately. Projects must be posted as BioHazardous in a prominent area, usually on the entrance door to the lab.

The inventory and wipe-test records for radioactive materials are to be easily accessible to persons not familiar with the laboratory. Signage must be appropriate and waste stored in proper containers in a secure area. Projects must be posted in a prominent area.
LABORATORY SAFETY

- **Emergency showers and eyewash stations** must be free of dirt and clutter and tested regularly. They are to be identified with prominent signage. Eyewash bottles are not recommended because of contamination problems.

- **Fire extinguishers** are tested regularly by the Fire Prevention Officers. Access to them must be kept clear of obstructions. Air and water-reactive materials require special extinguishers.

- **Laboratory benches** should be well organized with surfaces intact. The colored plastic buttons should be on all gas jets, air lines, and water faucets.

- Services on the **fume hood** should be checked. The pilot light should be working and the door should move easily. Velocity of airflow through fume hood should read at least 100 feet per minute. The Departmental Safety Committee tests this annually.

- **Floors and aisles** are not to be used for general storage. Hallways that lead to exit doors must not be cluttered with items that reduce their width. Bicycles are not to be stored in stairwells. Ontario Fire Code 2.7.17 (1)

- **Sinks and drains** are to be kept free of clutter. All drains, including floor drains, must have water in them to prevent the entrance of sewer gas. Any water tap equipped with a hose must have a back-flow preventer to stop the back siphoning of water into the water lines.

- **Electrical apparatus** is to be checked for frayed wires, missing ground prongs and exposed high-voltage shock points. All pulleys must have guards (old vacuum pumps are the biggest offender). Check that there are enough power outlets in the room and that extension cords are not used.

**General Lab Safety Practices**

- A documented procedural manual with safety guidelines must be available for all staff working on a specific project, and its requirements followed; it must be reviewed and updated regularly.

- Personnel must receive training on the potential hazards associated with the work involved and the necessary precautions to prevent exposure to infectious agents and release of contained material; personnel must show evidence that they understood the training provided; training must be documented and signed by both the employee and supervisor; retraining programs should also be implemented.
• Outside coats and bags are not to be brought into the lab. If locker space is not available for staff (often the case in Pathobiology) and there is no assigned office space for staff, coats should be hung in ‘clean’ space, separate from daily lab coats and scrubs. Similarly, personal bags should be stored in clean, locked cupboards away from chemicals and active workbenches.

• Eating, drinking, smoking, storing of either food, personal belongings, or utensils, applying cosmetics, and inserting or removing contact lenses are not permitted in any laboratory.

• Oral pipetting of any substance is prohibited in any laboratory. Use appropriate bulbs and pipetting tools.

• Long hair should be tied back or restrained so that it cannot come into contact with hands, specimens, containers, or equipment. Use your discretion depending on the task you are performing.

• Children are not permitted in the laboratory or support areas.

• Doors to laboratories must not be propped open (this does not apply to an open area within a laboratory).

• Open wounds, cuts, scratches, and grazes should be covered with waterproof dressings.

• Laboratories are to be kept clean and tidy.

• Storage of materials that are not pertinent to the work and cannot be easily decontaminated (e.g. journals, books, correspondence) should be minimized; paperwork and report writing should be kept separate from such biohazardous materials work areas.

• Remove gloves when answering telephone, opening doors, entering corridors.

• Disinfectants effective against the agents in use must be available at all times within the areas where the biohazardous material is handled or stored.

• Use of needles, syringes, and other sharp objects should be strictly limited to those occasions when other alternatives are not suitable. Caution should be used when handling needles and syringes to avoid auto-inoculation and the generation of aerosols during use and disposal; where appropriate, procedures should be performed in a biological safety cabinet or fume hood; needles should not be bent, sheared, or recapped; they should be promptly placed in a University Sharps container.

CSU Overview ORIENTATION  Autoclaving Procedure

• Leak-proof containers are to be used for the transport of infectious

• Materials within facilities (e.g., between laboratories in the same facility).
• All spills, accidents, or exposures to infectious materials and losses of containment must be reported immediately to the laboratory supervisor.

Personal Protection:

1. **Eyes and Face** – What appears to be a minor accident can have tragic consequences if it damages your eyes. Whenever you are working with the following materials you must wear protective eyewear:
   - Toxic or corrosive chemicals
   - Power tools
   - Materials under pressure or partial vacuum
   - Ultraviolet or intense visible light
   - Liquified gases
   - Intensely radioactive materials
   - Reagents that are hot or being heated

   **Note that eye protection from best to worst is as follows:**
   1. Goggles
   2. Face shields
   3. Safety glasses
   4. Regular glasses
   5. Nothing
   6. Contact lenses

2. **Feet** – The greatest risk comes from dropping hot, toxic, or corrosive agents on feet unprotected by proper shoes. Therefore, don’t wear open-toed shoes, sandals, or canvas-topped shoes in the laboratory.

3. **Hands** – Wear gloves when handling hazardous reagents. The choice of glove material will depend upon the hazard and the MSDS should be consulted if in doubt about the suitability of one’s choice of glove. Nitrile and neoprene gloves generally provide superior protection to vinyl. Latex gloves are not allowed in Pathobiology.

   While wearing gloves, you should not handle telephones, doorknobs, or other objects that others might handle without using gloves.

   **Gloves are not to be worn in hallways**

4. **Clothes** - Lab coats not only protect the wearer from chemical and biohazards, they are also part of the containment barrier that protects other people from these hazards. When used properly, chemicals and biological agents should be contained on lab coats rather than your clothes. By taking off your lab coat before leaving the lab, these contaminants are then contained within the lab. You are required to wear a lab coat when working in a Level 2 lab, and it is certainly a recommended practice in all labs.

   **Lab Coat Policy**
5. **Lungs** – Many compounds produce toxic vapors or dusts. Chemical fume hoods provide primary protection against these agents. If toxic agents are spilled outside of a ventilated work area, respirators should be worn during the cleanup.

6. **Hygiene** – Wash your hands before leaving for lunch or home. This is a surprisingly effective way of minimizing the spread of chemicals and biologicals out of the laboratory.

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**WASTE STREAM MANAGEMENT**

Pathobiology has three different types of waste streams: Recyclables, Special Waste, and Garbage.

**Recyclables:**
- Blue and White Labeled containers for fine paper, metal, recyclable plastic. Fine paper containers are located in offices and labs. Large recycling box located under mailboxes in Administrative area.
- Boxboard, corrugated cardboard, brown paper bags placed in hallways to be picked up by housekeeping staff. Boxes must be broken down and placed in neat pile outside doorways. Please do not obstruct hallways.
- Glass in designated white pails labeled non-infectious laboratory glass waste for broken glass, empty reagent bottles, autoclaved plates and slides, empty glass vials to be emptied by Housekeeping staff.

**Special Waste:**
- **BioHazardous**
  Tissue culture plastics, animal parts, tissues, fluids, vacutainer tubes, blood vials, biologics of any kind, protective gloves, medical related plastics (syringes, fluid lines, medical glass—drug bottles), blood soaked paper, gauze, protective gloves, masks, BioHazardous virus, bacterial, animal products all to be collected in clear, commercial, BioHazardous bags with logo to be autoclaved before disposal. Deliver to Room 1130 for Lab Waste Disposal identified with Principal Investigator and room number
  - [CSU Overview ORIENTATION](#)
  - [Autoclaving Procedure](#)
- **Sharps**
  Yellow plastic containers labeled with Principle Investigator’s Name and Lab Room number, available in several sizes, used for scalpels, needles, used vacutainers, micro capillary tubes, glass slides. Available from Bob Watson, Central
Services Area, Ext. 54763, or Physical Resources, Trent Lane. Delivered to Room 1130 for Lab Waste Disposal

**Autoclaving Procedure**

- **Hazardous**
  Dead batteries can be delivered to Room 1130 for disposal

- **Radioactive Waste**
  Radioactive paper, plastic waste is streamed into P\(^{32}\) radioactive and non P\(^{32}\) radioactive. These garbage bins are located in Room 2120A. Special keyed access to those holding Radioisotope License. Liquid radioactive waste is collected in special containers containing absorbent material as per license requirements. An outside contractor hired by Environmental Health and Safety picks up this garbage. This is an ‘honour’ system. Upon noticing the bins are full, the researcher FAXES a ‘request for disposal’ form to EH&S. (supplied in Room 2120A)

- **Liquid Wastes**
  - Halogenated solvents (e.g., chloroform, methylene chloride, iodoform)
  - Non-halogenated solvents and oil (vacuum pump oil, varsol, turpentine, acetone, ethyl alcohol, ether)
  - “Lean” solvents (solvents containing more than 50% water, e.g., formalin, glycol)
  - Aqueous wastes (water-based materials that cannot be disposed in the sanitary sewer, e.g., heavy metal wastes like silver stain, dyes and stains)
  - Sulfuric acid waste
  - Hydrochloric acid waste
  - Nitric acid waste
  - Caustic wastes (e.g., sodium hydroxide solutions)
  - Ammonia wastes (e.g., solutions from blueprint machines)
  - Liquid pesticides
  - Certain liquid wastes that cannot safely co-mingle. These include strong oxidizing acids such perchloric and chromic acids, water-reactive materials such as acetic anhydride, and cyanide solutions.

  **Separate containers for collection of this waste are located in Room 1137**

**CSU Overview ORIENTATION**

**Other Special Wastes**

- Flammable solids (e.g., sodium dithionite, zinc dust)
- Cyanide
- Water-reactive materials
- Air-reactive materials
- Compressed gases
- Explosives
- Radioactive wastes

It is very important to segregate incompatible wastes; serious accidents have occurred because of the mixing of incompatible wastes, even in small quantities.
**Surplus, Dated, no longer required Chemicals and Solutions**

Pathobiology has an arranged pick up area in Room 1137 for such chemicals. If they are no longer needed, get excess chemicals and solutions out of the lab.

Pathobiology Chemical Disposal

**Garbage:**

Bins labeled ‘Garbage Only’, black plastic bags. Garbage is anything that does not fit into the above categories or that has been contaminated with food.

**DEALING WITH SPILLS**

**Be aware: know how to deal with a spill before you start using a chemical or biohazardous agent**

**Chemical Spills:**

Each lab is equipped with a large Universal Spill Kit for chemical, oil and solvent spills, contained in a large, white pail.

Contents include:
- Small broom and dustpan
- Absorbent padding or paper
- Protective gloves
- Acid Neutralizer
- Alkali Neutralizer
- Solvent Vapour Suppressant

These kits are not to be used for strong oxidizers.

**Complex Spills:**

- Considered too large (>4 Litres) or too hazardous to be cleaned up without special equipment.
- Phone extension 52000 for assistance in cleaning up these

**Mercury:**

Mercury and mercury containing compounds are "designated substance" under the Occupational Health and Safety Act and Regulations. Do not use mercury thermometers or other instruments containing metallic mercury when a substitute is available.

Phone the Fire Division, extension 52071, 8 a.m. to midnight, Monday to Friday. The Fire Prevention Officer will clean up the spill using a special mercury vacuum cleaner.
**Substances with extremely noxious odors:**
Some substances such as mercaptoethanol have potent odors that may cause nausea and vomiting in susceptible people or mimic the odor of a gas leak. Phone the Fire Division, extension 52071 during regular hours Monday to Friday for clean-up assistance. Outside of regular hours, phone extension 52000 to report the incident. It is very important to report these spills immediately to inform the authorities that the odors are not caused by a gas leak.

**Ammonia Spills:**
Concentrated ammonia (ammonium hydroxide solution) releases very caustic vapours that necessitate the use of respiratory protection. Phone extension 52000 for assistance in cleaning up these spills.

**Hydrochloric Acid Spills:**
Concentrated hydrochloric acid releases very corrosive vapours that necessitate the use of respiratory protection. Spills larger than a litre may require assistance, call extension 52000; otherwise use acid neutralizer located in the spill kits.

**Flammable Solvent Spills:**
Ensure all Bunsen burners or other sources of ignition are switched off. Work quickly to prevent the spread of flammable vapours toward any ignition sources. Use the vapour suppressant spill control material in the spill kit and place all used material in the fume hood until hazardous waste pickup can be arranged.

**Radioisotope Spills:**
Cordon off the area. Clean up the spill as outlined in your radiation safety training. All radioisotope spills are to be reported to the Radiation Safety Officer, extension 52888.

**Biohazardous Spills (bacteria, virus, tissue cultures, animal products):**
Wearing gloves, pick up saturated paper towels and dispose of in biohazardous bag. Rinse floor with disinfectant. Wait 20 minutes, absorb with paper towels. Pick up all material. Insure floor is dry. Take biohazardous bag with contents to be autoclaved.

**Contaminated Labcoats:** Immediately remove lab coat. Soak in disinfectant in sink for 20 minutes, place in laundry pick-up bag.

**Contaminated Shoes:** Step on disinfectant soaked paper towels or soak spill with disinfectant. If necessary, soak shoe soles in bath containing disinfectant for 20 minutes. Dry all surfaces and ‘footprints’ before leaving the lab. Do not walk out of the lab until shoes are thoroughly decontaminated.
<table>
<thead>
<tr>
<th>Disinfectant</th>
<th>Working Dilution</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>70% Ethyl Alcohol Spray</td>
<td>70% in ddH₂O from 99% stock dispensed from dept. storage</td>
<td>sprayed and wiped from surface laminar flow hood, incubator 1 minute potency</td>
</tr>
<tr>
<td>NH₃ spray</td>
<td>4 Litre -40°C windshield washer fluid + 100 ml ammonium hydroxide</td>
<td>spray on surface laminar flow hoods, incubators, 2 min. potency for parasites and fungal spores</td>
</tr>
<tr>
<td>Household Bleach</td>
<td>1:10 in water</td>
<td>decant waste from tissue culture, inactivate DAB dye, cleaning agent, 20 minute potency</td>
</tr>
<tr>
<td>Rocal</td>
<td>as indicated on bottle (depending on task)</td>
<td>cleaning incubators, rinse with ddH₂O</td>
</tr>
<tr>
<td>7X</td>
<td>as indicated on bottle (depending on task)</td>
<td>removes protein buildup</td>
</tr>
</tbody>
</table>

Many commercial products are available. Each should be assessed for lab functions.

**BIOSAFETY**

**RISK GROUPS AND CONTAINMENT LEVELS**

Excerpts from Laboratory Biosafety Guidelines—Health Canada Laboratory Biosafety Guidelines, 3rd Edition 2004

Biological agents are classified into four categories, based on their perceived ability to cause disease in humans and animals and the level of risk to individuals and the community and is determined by particular characteristics including:

- Pathogenicity
- Infectious dose
- Mode of transmission
- Host range
- Availability of effective preventative measures
- Availability of effective treatment
**Risk Group 1** (low individual and community risk)  
Microorganisms that are unlikely to cause disease in healthy workers or animals. These agents can be handled on an open bench top in a well designed and functional laboratory using the practices normally employed in a basic microbiology laboratory. Also referred to as Containment Level 1. (CL1)

**Risk Group 2** (moderate individual risk, limited community risk)  
A pathogen that can cause human or animal disease but, under normal circumstances, is unlikely to be a serious hazard to laboratory workers, the community, livestock, or the environment. Laboratory exposures rarely cause infection leading to serious disease; effective treatment and preventative measures are available and the risk of spread is limited.

Work with these agents should be done in a Containment Level 2 (CL2) laboratory, with a biological safety cabinet available for manipulations that may create an aerosol. Risk Group 2 bacteria are not uncommon isolates from natural sources - such as soil, water, food, and your body.

When working in a lab that uses Risk Group 2 bacteria you must be aware of the particular bacteria involved, and the particular risks posed by these bacteria. The primary exposure hazards associated with organisms requiring CL2 are through the ingestion, inoculation and mucous membrane route. Agents requiring CL2 facilities are not generally transmitted by airborne routes, but care must be taken to avoid the generation of aerosols (aerosols can settle on bench tops and become an ingestion hazard through contamination of the hands) or splashes. Primary containment devices such as Biological Safety Cabinets (BSCs) and centrifuges with sealed rotors or safety cups are to be used as well as appropriate personal protective equipment (i.e., gloves, laboratory coats, protective eyewear). As well, environmental contamination must be minimized by the use of handwashing sinks and decontamination facilities (autoclaves).

**Risk Group 3** (high individual risk, low community risk)  
A pathogen that usually causes serious human or animal disease, or that can result in serious economic consequences but does not ordinarily spread by casual contact from one individual to another, or that can be treated by antimicrobial or antiparasitic agents. These agents require a Containment Level 3 facility, which is specially constructed to minimize the chances of environmental release of biohazards. The requirements - physical, procedural, training, and testing - for a CL3 are substantially greater than those for CL1 or CL2. There is not a CL3 facility in Pathobiology and only one on University of Guelph campus.

**Risk Group 4** (high individual risk, high community risk)  
A pathogen that usually produces very serious human or animal disease, often untreatable, and may be readily transmitted from one individual to another, or from animal to human or vice-versa directly or indirectly, or by casual contact. No bacteria are currently classified in this group - only viruses. There is no CL4 Containment Facility on campus (and only one CL4 lab in Canada).
Worker Responsibilities When Working with BioHazardous Agents

All Lab workers should be aware that underlying and/or preexisting personal health conditions might put them at increased risk of infection when working with Level 2 Pathogens. These clinical conditions may include: open skin lesions, steroid therapy, psoriasis, splenectomy, chemotherapy, immunosuppression therapy, immunodeficiency disorders, cystic fibrosis and other chronic respiratory diseases. It is the responsibility of the lab worker to inform the Principle Investigator/Supervisor of any underlying conditions that predispose them to Level 2 pathogens.

Complying with safety procedures and wearing protective clothing, gloves, and eye wear designed for working in a Level 2 Lab are mandatory preventative measures for all personnel.

BIOSECURITY

Facilities handling infectious agents need not only a biosafety program but also a biosecurity plan in place. While biosafety deals with all aspects of containment to prevent any exposure to and accidental release of pathogens, biosecurity is implemented to prevent the theft, misuse or intentional release of pathogens. Whether it is for the advancement of science or the diagnosis of agents causing disease or the misuse of these technologies, there is unfortunately a dual use potential in the nature of the work (i.e., procedures, equipment, etc.) that takes place with these agents.

All laboratories should adopt biosecurity practices to minimize opportunities for unauthorized entry into laboratories, animal and chemical storage areas, as well as the unauthorized removal of infectious materials from their facility. Similarly, information security for data and electronic technology need to be addressed.

The greatest threat is posed during out of hours. At these times keep the lab locked at all times. Do not prop open doors. If you are suspicious of anyone entering the lab or anyone in the vicinity of the lab then contact Campus Security immediately, extension 52000. Do not challenge the person directly.

During normal working hours authorized personnel only are to be permitted in the lab.
REGULATORY ASPECTS FOR HANDLING INFECTIOUS SUBSTANCES

Importation and Transfer of Human Pathogens
The Human Pathogens Importation Regulations are the regulatory guidelines for facilities wishing to import human pathogens into and transfer specimens within Canada. These regulations were developed to ensure that facilities have appropriate containment for the pathogens they wish to handle. Any facility wishing to import a human pathogen requiring containment levels 2, 3 or 4 must have a valid Health Canada permit before importation. Applications for permits to import human pathogens can be obtained either by calling the Office of Laboratory Security directly at (613) 957-1779 or by downloading the application form from the Office of Laboratory Security's Website.

At the University of Guelph, Jennifer Minogue of EHS will perform the self-inspection and provide the necessary certification to accompany your import permit request.

Many human pathogens are pathogens of animals as well. The Canadian Food Inspection Agency (CFIA) regulates animal pathogens. For importation of pathogens that are common to both animals and humans, an import permit is required from the CFIA as well as Health Canada. It is the responsibility of the importer to ensure that all appropriate import permit documentation has been obtained prior to importation of any pathogen into Canada.

Export of Pathogens
Many pathogens and associated equipment that are destined for export from Canada require permits. For exporting pathogens to the US, the recipient must have an import permit issued by the Centre for Disease Control (for human pathogens) or United States Department of Agriculture (for animal pathogens). Your shipment will not be accepted by the courier without the necessary permit. A faxed copy from the recipient is often sufficient for these purposes.

Importation, Transfer and Containment of Animal Pathogens
Transportation of Dangerous Goods Regulations, Transport Canada, regulates the transportation of infectious substances within Canada. The International Civil Aviation Organization (ICAO) internationally regulates the air transportation of infectious substances.

The Canadian Food Inspection Agency regulates the use of imported animal pathogens and pathogens associated with reportable animal diseases. These include materials of animal origin that contain potential pathogens. Permits are required for the importation of all animal pathogens into Canada. In the case of pathogens that affect both humans and animals, import permits are required from both Health Canada and the Canadian Food Inspection Agency (CFIA). If an agent
is brought into Canada under an import permit that restricts its distribution, further approval must be obtained from the CFIA before transferring the agent to another location. [Current restrictions](#) are available online.

Laboratories that apply to import animal or zoonotic pathogens must demonstrate that they meet Containment Standards for Veterinary Facilities before the CFIA can issue an import permit. Application forms available from Jennifer Minogue, Environmental Health and Safety.

For guidelines and more information: [Biocontainment Level II](#)

There are incredibly precise requirements for packaging material, paperwork and wording on parcels and paperwork for sending Dangerous Goods. Any deviation from the prescribed packaging, paperwork or wording on paperwork or packaging will result in your parcel being returned. Kevin Ecott (mailroom, extension 52264, kecott@fin.uoguelph.ca) is the University’s certified Dangerous Goods shipper. He will complete all of the necessary paperwork for your shipment, is up to date on all of the necessary shipping requirements (they change frequently) and will advise you on the necessary packaging requirements for your shipment. He will save you a tremendous amount of time. Use him.