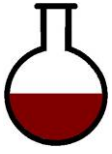


8. Laboratory Safety

8.1. General Laboratory Safety

The goal of the safety program is not to have you memorize an arbitrary set of rules – it is much better if you try to understand the rationale behind the rules. In a lab, we need to do three fundamental things:

1) **protect ourselves from exposure to the hazards present**
2) **prevent the migration of contaminants out of the lab**
3) **put systems in place to mitigate the impact of a serious incident (e.g., fire, spill)**

Key points:

- Report all potential hazards or safety issues to lab supervisor/advisor.
- Familiarize yourself with the emergency response procedures.

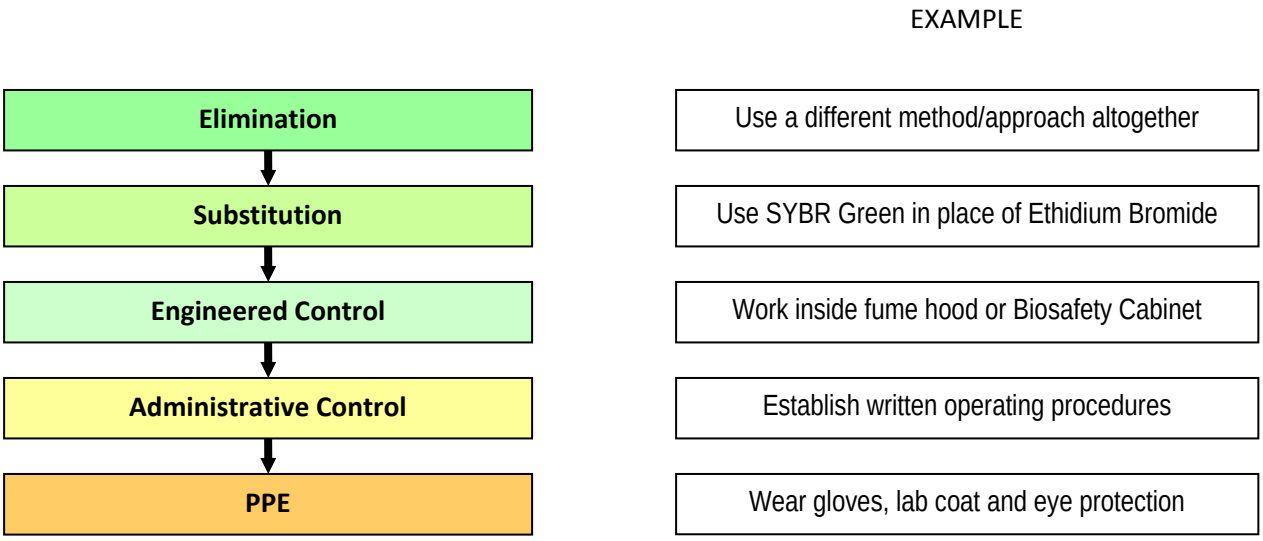
- Know evacuation routes from your lab and the location of emergency equipment such as fire extinguishers, spill kits, emergency showers/eyewashes, first aid kits, phones and emergency call boxes.
- Do not bring food, drinks, tobacco products or cosmetics into the lab.
- Always wear suitable clothing, closed-toed/heeled shoes, and required personal protective equipment (PPE) when working with potentially hazardous materials.
- Dispense hazardous materials inside a fume hood.
- Never allow gloved hands to touch surfaces outside of the lab, or 'clean' surfaces in the lab such as door knobs, phone receivers, or computer keyboards.
- Do not wear lab coats in common areas or stairwells.
- Keep personal items separated from hazardous materials.
- Never leave lab doors propped open.
- All materials dispensed from their original containers must be labeled.
- Place a sign on any unattended experiments, and provide contact information so you can be reached if something goes awry.
- Avoid use of personal music players when doing lab work – you need to be able to hear if equipment is functioning properly and it's important to be aware of the location of people around you.
- Keep incompatible chemicals separate (no acids with bases, no flammables with oxidizers) – look at the labels and/or MSDSs if you aren't sure.
- Practice good housekeeping and good hygiene.

Safety rules and regulations in a laboratory environment are unavoidable - it is an environment where fires, explosions, injuries, and exposures to chemical/biological/radiological/physical threats are a very real possibility. We have had serious incidents in CBS in the past that we do not want to repeat, so please take lab safety seriously.

To demonstrate the type of precautions needed to protect oneself, consider the simple task of decanting strong acid into a beaker for dilution. To do this properly one would:

- plan ahead, ensuring there was a clear space to work in the fume hood (a work practice control that reduces the likelihood of a spill/accidental exposure)
- be wearing close-toed shoes, long pants, a lab coat, acid-resistant gloves, and goggles (personal protective equipment to protect the skin and eyes in the event of small spills and splashes)
- perform all tasks inside a fume hood, with the sash in a low position (an engineered control that keeps corrosive fumes from entering the breathing zone)
- slowly pour the acid into a beaker partially filled with water (a work practice control that reduces the amount of undiluted acid splashing up)

The above emphasizes the use of engineered controls, safe work practices, and personal protective equipment to maintain exposures at a safe level: It is a demonstration in the hierarchy of controls, which is a model for the evaluation of protective measures. The schematic below depicts the order in which alternatives should be ranked; the more reliable and effective preventative measures are given preference. In practice, usually a combination of controls are used together to reduce exposure to a hazard.



Keep these concepts in mind when critically evaluating the work that you do in your lab.

Some key points about preventing contamination:

- Always assume gloves are contaminated. You put on gloves to prevent one thing or another from touching your skin. The logical conclusion is that whatever it was you didn't want on your skin is now on the exterior of the glove. Change gloves frequently and never allow a gloved hand to touch a common surface (like a door knob, phone receiver, etc.).
- Lab coats protect you, and the clothes that you own, from becoming contaminated. It is a requirement that lab coats be worn in all labs for any work involving hazardous materials. Lab coats can not be worn outside of the research wings in CBS. If you will need a lab coat at your destination on another floor, simply place your coat in a plastic bag and carry it with you.
- A clean work area goes a long way to reducing cross-contamination. When working with radioisotopes, we have the benefit of being able to detect contamination with a survey meter; with biological and chemical contaminants, we aren't so lucky. For any hazardous agent it is important to consider how the inevitable small spills, droplets and splashes can be controlled. Working over disposable bench paper is an easy way to control contamination, alternatively you can work over a low tray that has cleanable surfaces. Regardless of the method you use, be sure to clean your work area when finished, and if there are any small spills, clean them up using an appropriate method as soon as possible (refer to CBS SOPs on spills for more details).
- Another area with high potential for spreading chemical/biological or radiological contamination is the transport of materials through hallways. Make use of carts, trays and bottle carriers when moving materials around the building.
- Another factor to consider is the storage of your personal belongings; as much as possible, you should keep personal items out of the lab. If you do have items you need in the lab, keep them well separated from potentially contaminated areas.

There are additional aspects of contamination control that pertain to the design of equipment and the laboratory itself, but the list above covers most of the basic responsibilities.

Finally, to manage the potential impact of emergencies, the general responsibilities of lab personnel include:

- Familiarizing yourself with evacuation routes, emergency procedures, as well as the locations of phones, call boxes, and emergency equipment in your work area.
- Notifying others of incidents such as spills or fires; verbally for minor incidents, or by activating an alarm pull station for more serious situations.
- Keeping aisle and exit routes clear.
- Ensuring that the access to eyewash stations, showers, and fire extinguishers is unobstructed, and that extinguishers have adequate charge (needle on pressure gauge is in green zone).
- Ensuring spill kits and first aid kits are readily accessible and appropriately stocked.

Further information can be found in the University's Laboratory Safety manual located on the EHS website at: http://www.uoguelph.ca/ehs/programs/lab-safety/

8.2. Workplace Hazardous Materials Information System (WHMIS)

The Workplace Hazardous Materials Information System, or WHMIS, is a very important component of the hazard communication scheme in a university laboratory. WHMIS regulations set out requirements for the training of personnel, the labeling of hazardous materials, and the provision of Material Safety Data Sheets (MSDSs).

Anyone working in a laboratory environment must receive WHMIS training.

All hazardous materials decanted from their original container must be labeled. Containers that will not leave the laboratory require only a product identifier (i.e. the name of the product written on the exterior). If a decanted hazardous material will be moved out of the lab, it requires a workplace label, which needs to include a product identifier, directions for safe handling, and a reference to the MSDS.

Historically, each lab was required to keep a binder of printed Material Safety Data Sheets, which are only valid for 3 years. To eliminate this labour intensive inventory and updating requirement, the University has implemented an electronic MSDS system. It is still advised that each lab keep a hardcopy of the 20 most used solvents or chemicals on hand, but for the majority of chemicals, access to MSDSs can be through the internet via a computer terminal. MSDSs can be accessed from the University of Guelph network at: http://hq.msdsonline.com/uoguelph/Search/Default.aspx

8.3. Monthly Laboratory Self-inspections

Key Points:

- Activate eyewash stations weekly to flush out contaminants, discourage microbial growth and ensure the flow is adequate.
- Ensure the access to the emergency eyewash/shower is not obstructed.
- Check the fire extinguisher – it should be easy to access (i.e. unobstructed), and the pressure indicator should be in the green area of the gauge.
- Check the spill kit – it should contain neutralizers (usually 3 – acid, base, and organic solvent suppressant), absorbent materials, gloves, goggles, a dustpan/scraper or dustpan/broom and bags for waste material.
- Check first aid boxes – the kit should contain gloves, tweezers, scissors, adhesive bandages, tape, gauze, and pads or compress bandages.
- Visually inspect chemical storage areas to ensure there is no leakage and incompatibles are separated each month.
- Look for issues with unsecured gas cylinders, poor housekeeping, electrical hazards, and access to exits.
- Report any issues to your supervisor.

It is important that laboratory inspections be completed regularly to monitor and maintain the safety of each work area. In any given lab there can be a combination of physical, chemical, biological and radiological hazards - diligence is required to control these hazards and keep the work environment safe.

8.4. Fume Hoods

Key Points:

- Keep sash closed when not in use.
- Ensure that the fume hood is on prior to use.
- Work with sash as low as possible (less than 18”/50cm).
- Keep all work at least 6”/15cm back from front edge.
- Do not obstruct air vents at rear of hood.
- Do not allow hoods to become cluttered or to be used as extra storage.
- Uncap containers inside the hood, recap them as soon as you are finished.
- Do not use a fume hood if the alarm indicates low flow.
- Any solution of perchloric acid above 70% being heated must be handled in a specially designed hood with wash-down features.
- Completely close the sash if you are working in a hood when the fire alarm goes off.

Further instructions on the proper use of fume hoods are provided in the CBS SOP at: http://www.uoguelph.ca/cbs/safety/cbs_ehs_procedures.html.

When a hood is not in use, keep the sash fully closed. This is a simple thing that can conserve a lot of energy - fume hoods exhaust a large volume of air when they are open, and it requires a great deal of energy to heat or cool the replacement air.

When you are working in a hood, keep the sash as low as you reasonably can. This improves ability of the hood to keep airborne contaminants out of your breathing space, offers some protection to your face should there be a splash or spill, and conserves energy.

Fume hoods on campus are equipped with a warning device that will alarm when the airflow is inadequate for the hood to function as designed. The alarm will go off if the airflow falls below a preset threshold (face velocity of 80 feet per minute). Do not attempt to use the hood if the alarm is going off and stop any experiments taking place inside the hood if the alarm persists. Close the sash fully to prevent hazardous vapours from migrating into the lab.

To determine if low flow may be resulting from a disruption of airflow, remove items that may be obstructing the movement of air through the vents at the back of the hood. Also, lower the sash and reset the alarm if possible. Sash position will affect the face velocity, which is an important factor in effective capture of airborne contaminants. Baffles should not be adjusted by users.

Large disruptions in the air around a hood (e.g., the opening/closing of a door) may temporarily affect the airflow through the hood; if this is suspected as the cause of the problem, try resetting the alarm if possible. If the above changes do not rectify the issue, label the hood as 'out of order' and notify Physical Resources (x53854) or the appropriate departmental contact for equipment problems.

8.5. Biosafety Cabinets (BSCs)

Key Points:

- Any time your work requires use of the BSC, you should wear a lab coat and gloves to protect you skin and your clothing from contamination. As well, long hair should be tied back, as required by the Laboratory Biosafety Guidelines.
- Plan your work and minimize movement in and out of the hood.
- Chemically disinfect before and after use
- Allow time for air currents to stabilize before starting work in the cabinet

Review the CBS SOP at: http://www.uoguelph.ca/cbs/safety/cbs_ehs_procedures.html for additional details on the use and care of this equipment.

8.6. Liquid Nitrogen

Key Points:

- Always wear gloves and eye protection when handling liquid nitrogen

- Follow the operational practices outlined in the CBS SOP at: http://www.uoguelph.ca/cbs/safety/cbs_ehs_procedures.html
- Keep the door open when dispensing from bulk storage dewars.
- If you have a spill, the only thing you can do is evacuate immediately. Make sure everyone gets out of the immediate area, and wait 30 minutes for the air to clear. If a spill is >4L, call EHS, as air testing may be required to verify the oxygen level has returned to normal.

Some storage areas for dewars are equipped with an oxygen monitor. When the alarm sounds, close any open valves immediately and leave the room.

8.7. Chemical Safety

Key Points:

- Know the hazards of the materials with which you are working. Review the MSDS prior to handling a new chemical.
- Don't accumulate unnecessary inventory - check to see if your lab already has the chemical, and order only as much as you need.
- Never store incompatible materials together. Acids cannot be stored with bases, flammables cannot be stored with oxidizers.
- Never put flammable solvents in a fridge unless the fridge is specifically designed to accommodate flammables. There are far too many recorded cases of fridges and freezers exploding in laboratories as a result of improper storage of flammable materials.

8.8. Compressed Gas Cylinders

Key points:

- When moving a tank – ensure the safety cap is completely screwed on and the tank is chained or strapped to a cylinder cart.
- Always secure tanks vertically using a strap or chain whether in storage or in use.
- Tanks in use must be secured in an upright position with a regulator attached.
- Do not attempt to change a tank unless you have been trained to do so.
- Never store tanks of incompatible materials together (e.g., flammable gases beside oxygen).

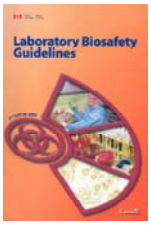
Compressed gas cylinders are under high pressure, and contain a lot of potential energy. The principle hazards are that a failure in the tank or the valve will cause a rapid release of pressure (i.e. an explosion), and a release of the contents (leaking or open valve) that could be hazardous.

Even non-toxic gases such as nitrogen are potentially harmful, as the leaking gas can displace oxygen and lead to asphyxiation. A leak of a toxic gas can rapidly reach a hazardous level. Similarly a leaking cylinder of flammable gas could potentially lead to a fire or explosion.

To prevent leaks, always use the right type of regulator, fittings, and hoses for your application. Inspect all components prior to assembling to ensure they are clean, dry, and functioning properly. When

appropriate, check all connections by brushing on a soapy solution to ensure there is no errant gas escaping. In some applications a gas detector may be required.

8.9. Biosafety



Risk Groups and Containment Levels

Biological materials are classified into 'Risk Groups' on the basis of their ability to cause disease in humans and/or animals.

Risk Group 1 – low individual and community risk

Risk Group 2 – moderate individual risk, limited community risk

Risk Group 3 – high individual risk, low community risk

Risk Group 4 – high individual risk, high community risk

The Risk Group indicates the relative level of risk to workers and to public health, but the more relevant classification from an operational perspective is the **Containment Level**. The Containment Level defines the nature of the engineering and procedural controls required for handling different organisms. For common organisms, the Containment Level can be obtained from the MSDS posted on the Public Health Agency of Canada website, at this URL: http://www.phac-aspc.gc.ca/msds-ftss/index.html

If you are unable to find information on an organism of interest, contact the University of Guelph Biosafety Officer for assistance.

The containment level for recombinant DNA and genetic manipulation is not something that can feasibly be defined in advance. It will depend on a risk assessment that takes into account the pathogenicity of the donor/source organism and the recipient organism, as well as the properties of the recombinant organism with respect to protein expression and replication. For assistance in determining the proper containment level, you may contact the Office of Laboratory Safety in Ottawa at (613) 957-1779.

Cell lines may be biohazardous as a result of the organism's inherent pathogenicity, or due to contamination with other agents such as viruses, fungi, bacteria or prions. At the University of Guelph, the policy is to work with cell lines/cell cultures under Containment Level 2. In cases where there is a high potential for laboratory-acquired infection (e.g., cell lines derived from macaques that may be contaminated with *Herpesvirus simiae*) Containment Level 3 will be required; conversely in cases where the risk is assessed and deemed to be low, work with cell lines may be downgraded to Containment Level 1.

Anyone performing work with human pathogens must familiarize themselves with the Laboratory Biosafety Guidelines issued by Health Canada. If you are doing work with animal pathogens, you must review the Canadian Food Inspection Agency's Containment Standards for Veterinary Facilities. The

general safety precautions for handling pathogenic biological agents are discussed in the section on operational requirements below.

Permits

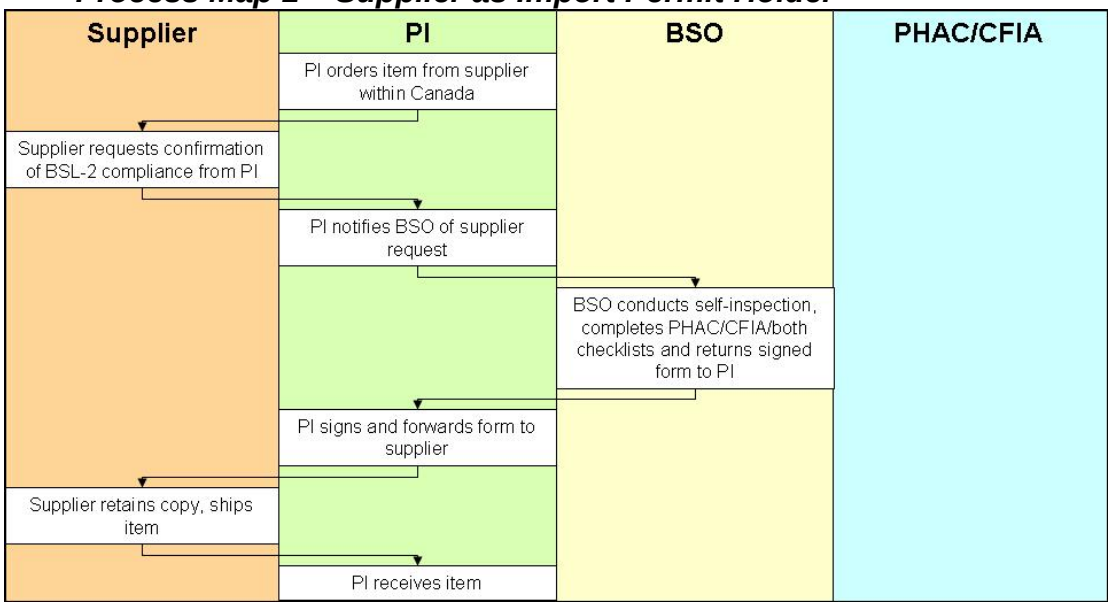
A valid biosafety permit, issued by the University of Guelph Biosafety Committee, must be obtained for all activities involving use or storage of biohazardous materials. For more details, please refer to the information provided on: http://www.uoguelph.ca/ehs/programs/biosafety/.

Additional resources are available on the CBS Health & Safety website to assist in preparing biosafety permit applications.

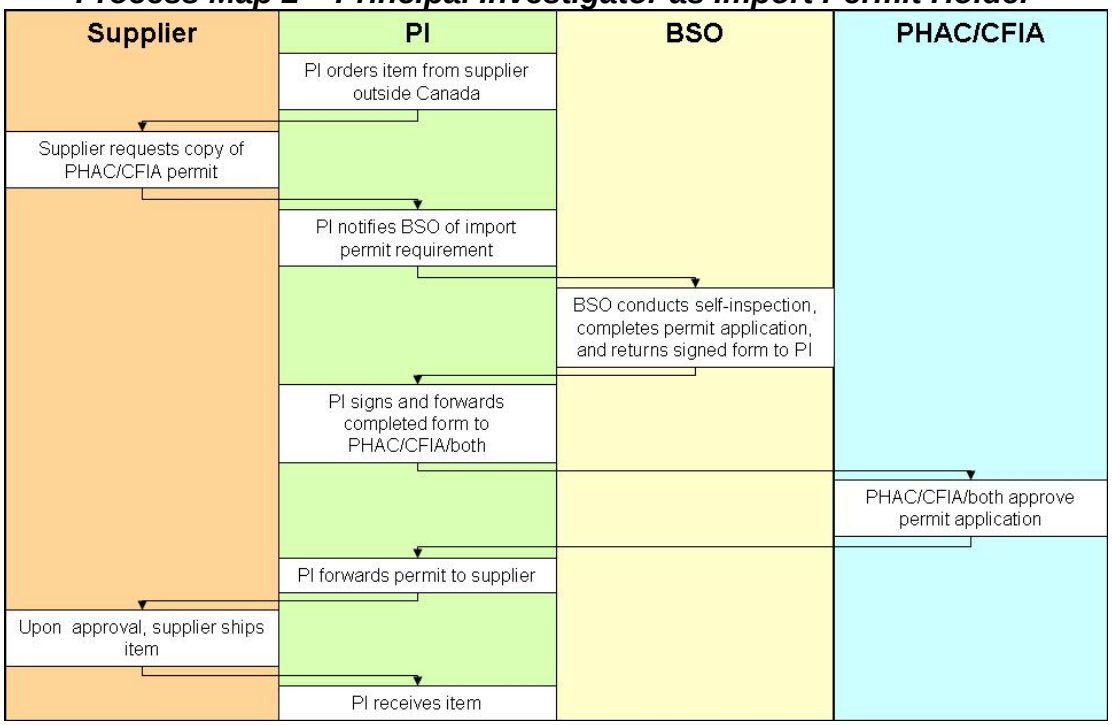
Import of Pathogens

In order to bring pathogenic agents into Canada, one of, or both, the Public Health Agency of Canada (PHAC) and the Canadian Food Inspection Agency (CFIA) must approve the importation. In some cases we must obtain the permits ourselves, in other cases we import under the permit of a supplier or distributor. The flowcharts below depict the process for importation of risk group 2 materials for circumstances where the supplier is the permit holder, and for situations where the PI applies for the import permit.

Process Map 1 – Supplier as Import Permit Holder



Process Map 2 – Principal Investigator as Import Permit Holder



The PHAC and CFIA operate as separate entities, so at present, documentation may be required by both. Each agency provides a checklist to help users confirm whether they comply with all the requirements of the relevant guidelines - the checklists are available at the following URLs:

http://www.phac-aspc.gc.ca/ols-bsl/containment/pdf/cl2-checklist_e.doc

http://www.inspection.gc.ca/english/sci/bio/anima/path/animae.shtml

Material Transfer

Before we release biohazardous materials to another individual, organization or institution, it is incumbent on us take reasonable steps to ensure that the material will be handled properly.

For materials that fall into Risk Group 2 (or higher), we must ensure the destination facility fulfills all requirements of a Containment Level 2 laboratory, as described in the PHAC and/or CFIA guidelines. As well, shipments of risk group 2 or higher materials may fall under the Transportation of Dangerous Goods (TDG); refer to the CBS SOP on Transport of Dangerous Goods for further details at: http://www.uoguelph.ca/cbs/safety/cbs_ehs_procedures.html.

Another consideration is the protection of intellectual property of the university; the Business Development Office in the Office of Research has a Material Transfer Agreement form which is available online: http://bdo.uoguelph.ca/assets/Material_Transfer_Agreement.pdf

Biosecurity

In recent years the level of concern over the security of pathogenic materials has grown. From the perspective of the end user, the key points surround access and inventory control.

Access control is an important aspect of biosecurity. Never prop open doors or tamper with locking mechanisms, and please report any suspicious activities or behaviour. Generally speaking, doors can be unlocked during the day when the lab is occupied, but after hours lab doors must be securely closed and locked.

To facilitate proper inventory control, make sure you keep your materials well organized, properly labeled, and accounted for using the inventory system in your lab. If freezers or storage rooms are kept locked, be sure to relock them when you are finished using them. Dispose of biological wastes properly so that pathogens are effectively destroyed.

Operational Requirements

The requirements for the various Biosafety Containment Levels are defined in detail in the Health Canada and CFIA guideline documents, and reiterated in the reference materials that support the biosafety program. Take time to review the Health Canada Laboratory Biosafety Guidelines prior to starting any work with biological organisms.

As discussed in the section on lab safety, the purpose of the various requirements are to keep you, as a worker, from being exposed; to prevent contamination from being carried out of the lab and spread to other parts of our facilities; and to put plans in place to deal with emergencies that may arise.

A few of the essential operational requirements for Containment Level 2 (many of which are applicable in all labs) are listed below:

- All personnel must wear fastened lab coats when working in the lab. Lab coats are not to be worn in stairwells or common areas of the building. Contaminated lab coats should be autoclaved or chemically disinfected prior to laundering (unless laundry has been proven to effectively decontaminate lab coats).
- Eye or face protection is required whenever there is a risk of splashes, aerosols or flying objects.
- Closed toed shoes are required when working in all laboratories, including Containment Level 2 areas.
- Gloves must be worn whenever there is a potential for skin contact with a biohazard, and removed prior to leaving the work area. Any cuts or scrapes must remain covered at all times with a waterproof dressing. Hands should be washed whenever gloves are removed, and prior to leaving the laboratory.
- To prevent accidental contamination, long hair must be tied back and lab coats must be worn by all personnel when working in the lab. Jewelry is not recommended.
- To reduce the probability of ingestion, food, drink and cosmetics are not permitted in the lab, and oral pipetting is prohibited.

- Routine chemical disinfection of work surfaces is necessary to prevent the spread of potentially pathogenic material, and non-essential items and personal belongings must be kept away from areas where biohazards are handled. Benchkote should be changed on a regular basis and following any minor spills.
- All biohazardous waste materials must be decontaminated (i.e. autoclaved) prior to disposal or collected by a disposal company specializing in the handling of biohazardous waste.

8.10. Radiation Safety

Permits

All radioactive materials must be ordered through the Radiation Safety Officer and may only be handled by laboratories that have a permit granted by the campus Radiation Safety Committee.

At the University of Guelph, we have Basic Level Laboratories (BLL) and Intermediate Level Laboratories (ILL). The open quantity of a radioisotope in a BLL is limited to less than 5 times the Annual Limit on Intake. An ILL may be used to handle radioactive material with activity up to 50 times the Annual Limit on Intake.

In addition to quantity limitations within permitted labs, there are extensive requirements for inventory tracking, use of shielding devices and exposure controls, monitoring of exposure and contamination, and management of waste. These topics are covered in detail as part of the Radiation Safety Training, and documented in the Radiation Safety Operational Guidance (RSOG) documents. More information is available on the EHS website at: http://www.uoguelph.ca/ehs/programs/radiation/

Requirements

Prior to any work with radioactive materials, staff and students must successfully complete Radiation Safety Training. The core set of RSOG documents are available to users in permitted labs, and treated as the primary reference for operational guidance (along with the specific protocols followed in your individual lab).

During experiments, in most circumstances it will be appropriate to have a survey meter on hand to periodically sweep the work area, verifying that contamination has been effectively controlled. As well, post-experiment wipe-testing must be performed to confirm the work area is adequately free from radioactive material. The wipe test protocol for the shared Intermediate Level Laboratories in the Science Complex is available online, and can be used as a template for setting up a protocol in your lab.

8.11. Human Testing

The use of human subjects for research has obvious ethical and safety implications. Any research projects that will involve human subjects must be approved by the University of Guelph Research Ethics Board. Further details are available online at: http://www.uoguelph.ca/research/services-divisions/ethics . In addition researchers involved in human clinical trials involving human fluid and/or

tissue require hands-on clinical training provided by Human Health and Nutritional Sciences. Please contact x53493 for more information.

8.12. Animal Care

The use of animals in biological research is under the oversight of the Animal Care Committee. Prior to initiating any study involving animals, an Animal Utilization Protocol (AUP) must be approved by the committee, and participants must successfully complete training as animal users. Further details are available online at:

http://www.uoguelph.ca/research/animals-in-research-teaching

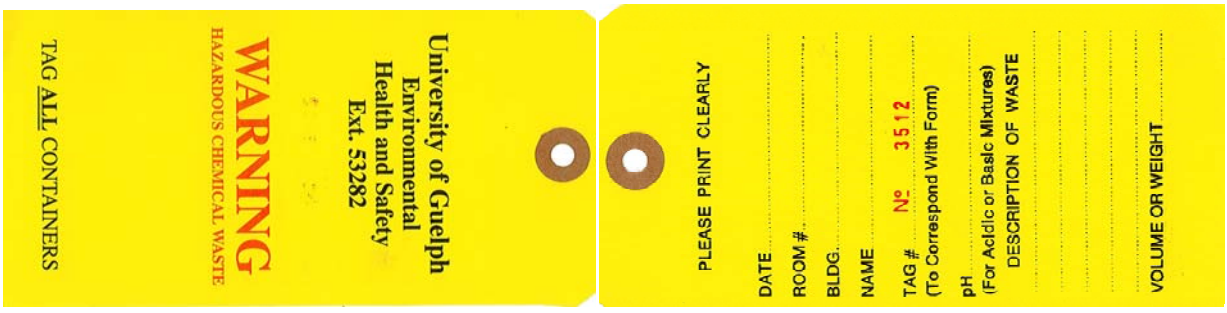
8.13. Laboratory Wastes

Across the college we generate many different types of waste. The proper segregation of waste is an important issue; placing hazardous waste in the normal garbage can put the safety of the custodial staff at risk, and lead to serious fines and penalties to the University. The pouring of chemicals down the drain is incredibly irresponsible, damaging to the environment, and is prohibited by law.

If you are unsure of how a certain chemical or material might be classified as a waste, hang on to it and ask for clarification from your supervisor, or the Laboratory Safety Officer in the EHS department.

The table below itemizes the types of waste we routinely have in the college, and what should be done with each.

Hazardous Waste tags, like the one shown below are available from the Stockroom or from the EHS Department. You may call x53282 and ask the Administrative Assistant to send you a supply of tags through interoffice mail. Affix a tag to the waste container when you begin collecting waste.



Waste	Examples	Disposal Procedure
Regular, non-hazardous garbage	Paper towel, gloves,	Place in garbage container (black bag).
Recyclable materials (not contaminated with hazardous materials)	Fine paper, newspaper	Place in blue bin (clear bag)
Aqueous solutions	Phosphate buffer Tris buffer	Aqueous solutions that contain any hazardous materials (metals, dyes, stains) must be collected and disposed of as hazardous waste. If a solution is a mixture of aqueous and organic solvents, treat as either halogenated or non-halogenated solvent. NOTE – if solutions are strongly acidic or basic, label and separate. Do not mix acids and bases in waste jugs.
Halogenated organic solvent waste	Chloroform, methylene chloride	Collect in either a safety can or an empty 4L bottle. Safety cans will be returned within a week of pick-up. If using a safety can, label to indicate the type of waste. Keep lid closed except when filling, and store in flammable storage cabinet. If using a 4L bottle, ensure it either contained a compatible chemical or has been cleaned of any residue. The original label must be defaced or removed, and the bottle must be labeled indicating the type of waste it contains. Store in the flammable storage cabinet.
Non-halogenated organic solvent waste	Acetone, ethanol, isopropanol	Collect in either a safety can or an empty 4L bottle. If using a safety can, label to indicate the type of waste. Keep lid closed except when filling, and store in flammable storage cabinet. If using a 4L bottle, ensure it either contained a compatible chemical or has been cleaned of any residue. The original label must be defaced or removed, and the bottle must be labeled to indicate the type of waste. Store in the flammable storage cabinet.
Biohazardous Waste	Used culture plates/tubes/flasks, disposable pipettes	Collect in an autoclavable bag (typically orange or red). Regularly (e.g. daily) close the top of the bag and use a cart to take it to the waste autoclave. Do not pack waste in tightly; penetration of the steam is imperative for effective decontamination. Note – in departments/areas where suitable autoclaves are not available, a specialized waste contractor can be contracted to regularly pick up collected biohazard waste. Contact EHS to initiate this type of agreement with a contractor in this area.

Biohazardous sharps	Syringes, blades, contaminated broken glass or other sharp object potentially contaminated with a biohazardous material	Biohazardous sharps can be disposed of in one of two ways. In both cases, sharps must be collected in a puncture-resistant container designed for sharps collection. When the bin has reached the fill line, the lid must be secured shut. Some departments autoclave the sharps container, and then submit a requisition to EHS to have the autoclaved waste removed. Alternatively, a waste company that specializes in biohazardous waste, can be contracted to pick up the secured containers without autoclaving. In this case, the sharps are classified as biohazardous waste.
Clean Glass Waste	Clean glassware, glass pipettes	Clean/sterilized glass, including broken glassware and pipettes, can be placed in the containers marked as 'Glass' (white pail, yellow bag). Ensure any glass going into this waste stream is clean.
Radioactive waste	C14, P32	There are 2 methods that may be applied for disposal of radioactive wastes, depending on the circumstances. The most common is to arrange for a radioactive waste pickup. Waste is collected in designated bins (separated by isotope). Complete the Request for Radioactive Waste Disposal and submit to EHS. Solutions with very low activity that contain no other hazardous ingredients can be discharged to drain, in accordance with the license issued to the University. The amount discharged must be less than the waste activity concentration listed on the permit issued to your lab, and this practice must be approved by the RSO, through submission of the RSOF100 Form.
Expired/Unneeded chemicals	Expired dry or liquid chemicals, chemicals that are no longer used	Do not remove from original container. Place in a safe area of the lab, affix a waste tag and submit requisition to EHS.
Compressed gas tanks	Empty N2 cylinder	In most cases, tanks can be return to the supplier. If you are left with a tank that can not be returned, affix a waste tag and submit requisition to EHS for disposal.
Formaldehyde	Formalin preservative	Formaldehyde is an irritant and a human carcinogen, and must be treated as a hazardous waste. Collect in a suitable container, and when full affix tag and submit requisition to EHS.

Ethidium bromide waste	Stock solutions	Stained gels and contaminated solid wastes (weigh paper/tray, benchkote) should be collected in a sealable container (e.g, 20L pail w/lid, lined with heavy gauge plastic bag & labeled as HAZARDOUS - EtBr WASTE). To dispose of container contents, submit requisition to EHS. Stock solutions should be collected in a labeled bottle and stored in a safe location. When necessary, submit requisition to EHS for disposal. Staining solutions can be treated in the same manner as stock solutions, or detoxified by chemical reaction or specialized filtration. By-products of the filtration method must be treated as hazardous waste.
Acrylamide	Stock solutions, polymerized gels	Acrylamide monomer (i.e. powder or in solution) must be treated as a hazardous waste. Uncontaminated polymerized gels can be discarded in the regular garbage.