DRAFT BIOSAFETY MANUAL

1st Edition, 2007
Office of Environment, Health & Safety
www.brocku.ca/oehs

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1.0 Introduction: The Biosafety Program

Research and teaching activities may involve working with real or potential biological hazards. Brock is committed, through the provision of safe facilities, activities, and legislative compliance, to protect its workers and students therefore; the Biosafety Program at Brock University has been established. The overall goal is to take every reasonable precaution in protecting the various stakeholders including employees, students, the community, and the environment, from exposure to hazardous biological materials. This in turn requires that all staff, students, and visitors who may be potentially exposed to such materials participate and comply with the program. This underlying philosophy is called the internal responsibility system, and is the basis of all health and safety programs.

1.1 Scope

(1) Teaching and research activities that require the use of biological materials, in particular:
- Potentially infectious biological materials such as microorganisms and parasites, including their toxins and/or allergens
- Potentially oncogenic biological materials
- Recombinant DNA which may be hazardous to humans, animals, plants, or any other forms of life
- Human and animal tissues and bodily fluids
- Human and simian cell cultures
- Transgenic material which has the potential to be hazardous to humans, animals, plants, or any other forms of life

(2) Brock employees and students who work with or arrange for the purchase, storage, transportation, use and disposal of biohazardous material.

(3) Brock employees, students and visitors who work in or near an area where teaching or research activities with biohazardous material occurs.

The biosafety program will work in conjunction with other programs and committees at the University where safety concerns overlap.

Radiation Safety Committee
Animal Use and Care Committee
Pandemic Planning and Brock's Emergency Medical Committee
Emergency Management Plan

2.0 Legal Requirements

2.1 Internal Policy and Administration

The following Brock policies apply to the biosafety program:

Occupational Health and Safety Policy
Policy on Working Alone In Hazardous Areas

2.2 Government Legislation

Brock University must comply with the Ontario Occupational Health and Safety Act and Regulations, to ensure a safe and healthy work environment. Research activities must also be compliant with policies and guidelines set out by internal research operations, and external granting agency requirements such as the Tri-council funding agencies: the National Science and Engineering Research Council (NSERC), the Canadian Institutes for Health Research (CIHR), and the Social Sciences and Humanities Research Council (SSHRC). Some research activities will therefore require compliance with guidelines established by the Public Health Agency of Canada (PHAC), and the Canadian Food Inspection Agency (CFIA).

Specifically, Brock must comply with:

Municipal Legislation
Solid Waste Bylaw No. 145-1999
Sewage Waste Bylaw No. 39-2002

Provincial Legislation
Ministry of Labour:
Occupational Health and Safety Act (OHSA)
O.Reg. 833 1990 Control of Exposure to Biological or Chemical Agents
O.Reg. 860 1990 WHMIS

Ministry of Environment:
Environmental Protection Act
O.Reg. 347, Waste Management
Guideline C-4, Biomedical Waste Management
Guideline C-17, Non-incineration Technologies
Draft Regulation, Biomedical Waste Requirements in Ontario

Federal Legislation/Tri-council Requirement:
Public Health Agency of Canada:
Laboratory Biosafety Guidelines, 3rd Edition 2004
Canadian Food Inspection Agency:
Containment Standards for Veterinarian Facilities
Environment Canada:
Canadian Environmental Protection Act
Transport Canada:
Transportation of Dangerous Goods Act

3.0 The Biosafety Program Components

3.1 Permit Application and Approval

A risk assessment in the form of a permit application (Appendix 1) will be instituted for research and teaching labs that work with biological hazards. The purpose is to determine the level of containment required for the biological materials used in each lab based on the nature of the biological material(s), as well as the handling, storage, and disposal facilities and practices. The risk assessment will then be reviewed by the Brock Biosafety Committee (BBSC). Level one containment labs will not require an operating permit, but must attest to safe lab practices by completing the Level One Containment Laboratory Checklist (Appendix 2). Level two containment labs will complete PHAC and/or CFIA level two checklists with the Brock Biosafety Officer (BSO) and obtain a biosafety operating permit through the BBSC.

3.2 Stakeholder Responsibilities

The **Office of Research Services (ORS)** shall ensure that:

- research funds are not released until the appropriate biosafety assessment has been submitted and approved by the BBSC

The **Faculty Dean** shall ensure that:

- all facilities and activities related to biosafety are approved by the BBSC before any teaching or research activities with biological materials begin
- the Principal Investigators (PI) or supervisors in the department carry out their biohazardous work as outlined in the biosafety manual, the laboratory biosafety guidelines, and lab-specific standard operating procedures (SOP)s
- they are aware of all biohazardous work occurring in their department/division and that compliance is monitored

The **Department Chair** shall ensure that:

- all facilities and activities related to biosafety are approved by the BBSC before any teaching or research activities with biological materials begin

The Principal Investigator/Lab Supervisor plays a key role in the biosafety program. They have the primary responsibility for the safety of staff, students, volunteers, and the public with respect to their research and teaching activities. They are responsible for providing safe work and biohazard handling procedures for their lab, and ensuring those they supervise follow their safety rules.

Specifically, they shall:

- Submit a risk assessment and permit application for approval to handle biological materials before commencing research or teaching activities which will include:
    - a summary of the proposed work
    - facility requirements, and suggested containment level
    - names of all workers and students that will take part of the teaching or research activity, and their training requirements
    - safety protocols, emergency plans and security provisions
    - MSDSs available from PHAC
- Ensure the appropriate facilities and equipment are in place to meet adequate containment requirements and safe lab practices
- Arrange lab-specific training, given by themselves or a designate, and keep training records (Appendix 3)
- Ensure attendance of their staff and students to the hazard awareness training, given through Human Resources- Environment, Health and Safety (HR-EHS)
- Ensure that all workers, students, and visitors follow the lab safety procedures to ensure biohazards are properly stored, handled, and disposed according to the law and University policies
- Ensure that all personnel are informed and follow prudent biosafety practices in the laboratory, including providing appropriate personal protection equipment
- Ensure that all laboratory accidents/incidents are reported, and to participate in necessary follow-up actions
- Coordinate all purchases, acquisitions, and transfers of biological agents, with the Biosafety Officer (BSO) before such items are imported/exported
- Maintain a biological agent database, including containment requirements, storage location, and log of use and destruction/disposal
- Liaise with HR-EHS to ensure that medical surveillance is done, where necessary. All medical records are to be kept confidential in HR-EHS
- Post door signage and biosafety operating permit, as required
- Abide by all legal requirements associated with handling biological materials

- Ensure all biohazardous work is conducted in accordance to the PHAC Laboratory Biosafety Guidelines, and the Biosafety Program at Brock University
- Notification to the BBSC, through the BSO, when a permit holder will not be available to supervise (e.g. sabbatical, or leave of absence)

Facilities Management shall:
- Support research and teaching through provision and maintenance of facilities to appropriately contain biohazardous and infectious materials
- Be responsible for ensuring custodial staff receives hazardous awareness training if working in or near an area that contains biological hazards

Environment, Health and Safety shall:
- Provide advice, counsel and risk management services
- Organize and regularly provide general science safety training including biosafety and other relevant training
- Facilitate the implementation of the biosafety program
- Liaise with regulators, communicate with the Joint Health and Safety Committee, employees, and the public
- Liaise with Campus Security Services (CSS), Health Services, and other responders on issues related to security risk management and emergency response
- Liaise with insurers, placement employers, and alternate research sites on issues related to risk transfer and financing
- Oversee and coordinate chemical and biohazardous waste disposal
- Perform incident investigation and program audits

The **Brock Biosafety Committee (BBSC)** shall:
- Develop a comprehensive biosafety program for all work that requires the handling of biological materials
- Identify and approve work activities that involve using biohazardous materials
- Perform risk assessments of permit applications, including proposed work procedures, storage and handling, and determine containment levels required
- Assess the qualifications of the Principal Investigator and ensure they are fully aware of the guidelines and conditions of the permit approval
- Monitor and ensure compliance of the workers and facilities where biohazards are handled and stored
- Ensure that training is given and is adequate
- Provide copies of the minutes of the meeting and permit application listings to the Joint Health and Safety Committee
- Annually review the biosafety program
- Advise the Associate VP Research Services and the HR-EHS of any issues pertaining to biosafety

The Biosafety Committee will elect a **Biosafety Chair** who shall:
- Chair and set the agenda for BBSC meetings
- Provide expert advice in:
    - reviewing and assessing permit applications
    - training and safety procedures
    - compliance and monitoring

The **Biosafety Officer (BSO)** shall:
- Manage and administer the biosafety program on behalf of the BBSC
- Perform visits, inspections, and audits to ensure compliance with the biosafety program, report to the BBSC any compliance issues
- Provide support and assistance to Principal Investigators in their permit application process
- Liaise with facilities management staff in work related to maintaining biohazard containment areas

- Maintain and provide information on biohazardous materials, policy and procedures, safety equipment, personnel training material, regulations and guidelines, contingency and decontamination procedures, and material safety data sheets (MSDSs) for biohazards
- Act as a consultant in providing advice on biohazardous materials and work procedures
- Order, on behalf of the BBSC, ORS, and HR-EHS the suspension of work activities that cause Brock to be in breach of its regulatory obligations, or if there is reason to suspect that people or the environment may be exposed to a biohazard risk due to poor containment practices

Staff and **Students** handling biohazardous materials shall:

- Ensure that safe and adequate practices are followed when working with or near biological hazards
- Wear protective equipment and follow appropriate decontamination procedures
- Participate in any necessary medical surveillance programs
- Comply with Brock's biosafety program and permit system, related policies and procedures
- Report and document unsafe conditions or procedures to the Principal Investigator or Lab Supervisor
- Report any incident or illness suspect to be related to working with biological hazards to the Principal Investigator, and BBSO
- Participate in biosafety training and any other relevant training programs as instructed by the supervisor

3.2 Biosafety Committee and Terms of Reference

Authority: The Biosafety Committee receives authority and reports through the Vice-President Academic, to the University President

Membership: Membership will normally be for two years. Re-appointments of the same person may occur, with at least 2 voting members being replaced by someone new. There will be at least seven voting members.

The Committee shall be composed of voting and non-voting members. The voting members consist of experts ideally representing the following subjects: Cell biology, Molecular Biology, Biotechnology, Microbiology, Virology, and Infectious Diseases. The voting members will also include technical representation. The BBSC will be composed of one representative from each of the following:

1 Biological Sciences
1 The Centre of Biotechnology
1 The Cool Climate Oenology and Viticulture Institute (CCOVI)
1 Community Health Sciences
1 Physical Education and Kinesiology
1 Psychology/Neuroscience

1 Medical Advisor, Health Services

1 Technical staff, Faculty of Applied Health Sciences
1 Technical staff, Faculty of Mathematics and Science

1 Brock Biosafety Officer

Records
Minutes of the meetings, training and audits of laboratories will be kept with the biosafety officer for a minimum of seven years.

Records of organisms will be kept with the PI, and autoclave monitoring will be kept with Biological Sciences.
Records of biomedical waste disposal will be kept with the Environment, Health and Safety.

4.0 Laboratory Set-up for Research Involving Biohazards

4.1 Training Requirements

Lab-specific Training
The Lab Supervisor or PI is responsible for providing lab-specific training. It is expected that safe practices are incorporated into lab protocols. These are the protocols required to set-up, perform, and clean up/disinfect after lab experiments. This task may be delegated to a senior staff member or experienced lab member. The protocols should be written and kept centrally located in the lab. This training will be mandatory before any person beginning working in the lab. Training records must also be maintained (see Appendix 3).

Biohazard Awareness Training
Environment, Health and Safety provides a one-hour seminar on biohazard awareness and related legislation once per semester (three times a year). Attendance is mandatory for anyone who may be exposed to biological hazards. Employees and students are required to attend the next available session. Under special circumstances, training may be provided as needed. Training registration is at: www.brocku.ca/hr/training/focus

Safety in the Sciences Training
Environment, Health and Safety provides a three-hour lab safety seminar once per semester (three times a year). Attendance is mandatory for anyone who may be exposed to any hazardous materials. The session will review related legislation, including the Workplace Hazardous Material Information System (WHMIS), and emergency procedures at the University. Staff and students are required to attend the next available session. Training registration is at: www.brocku.ca/hr/training/focus

Autoclave Training
All work with biohazards will require operation of the Steris autoclave in Room MC H-321. Autoclave training is provided once per semester, following the 'Safety in the Sciences' training. It is provided through Biological Sciences. This training is mandatory before operating the autoclave and must be given by designated Brock staff. Training can also be arranged by contacting John Ciolfi (x3763).

Other related training
Transportation of Dangerous Goods (TDG) certification training is offered to Brock employees who ship or receive hazardous materials, or may respond to a spill resulting from the transportation of hazardous materials.

To help support emergency response capabilities, spill response and first aid/CPR training is also available for Brock employees with benefits. Students can access first aid/CPR training through Campus Recreation: www.brocku.ca/recserve/interest/firstaid.php

4.2 Health and Medical Surveillance

In some cases, medical surveillance may be required (pre-employment and periodic testing) depending on the risk assessment of the proposed work. This may include such things as: a medical examination; serum screening, testing and/or storage, and immunizations. This is especially critical in cases of high risk agents, where the immune status is critical for making decisions related to immunizations and prophylaxis. All associated medical records are considered confidential information and will be filed with HR-EHS who will interpret the results while maintaining individual privacy.

4.3 Importing and Exporting Biological Agents

To import biological materials, a permit from the PHAC and/or CFIA might be required. For biological materials that are a risk group two or higher, a copy of the import permit must be submitted to the BBSO before placing an order, or arranging for delivery from another institution.

Public Health Agency of Canada (PHAC)

PHAC regulates human pathogens. If importing a microorganism that is a human pathogen, or is a material capable of harboring a human pathogen, a one-page form must be completed and sent to PHAC. To understand the process, review the following:

Application to Import Human Pathogens:

Completing the 'Application for Permit to Import Human Pathogen(s)'
www.phac-aspc.gc.ca/ols-bsl/pathogen/pdf/2006_infoapp_e.pdf

Application for permit to Import Human Pathogen(s)- updated Dec. 2006
www.phac-aspc.gc.ca/ols-bsl/pathogen/pdf/permit_application.pdf

Information:
What you should know about importing human pathogens into Canada:
www.phac-aspc.gc.ca/ols-bsl/pathogen/pdf/2006_infoapp_e.pdf

Human Pathogens Importation Regulations:
http://laws.justice.gc.ca/en/ShowTdm/cr/SOR-94-558///en

PHAC list of Non-Pathogenic Organisms
www.phac-aspc.gc.ca/ols-bsl/pathogen/pdf/pathogensfinal-092001.pdf

For specific questions you can review questions and answers available on the PHAC website:
www.phac-aspc.gc.ca/ols-bsl/pathogen/h-patogen-importing_e.html

You may also contact the Office of Laboratory Security:
Tel: (613) 957-1779
Fax: (613) 941-0596
Email: biosafety_biosecuritee@phac-aspc.gc.ca

Canadian Food Inspection Agency (CFIA)

CFIA regulates food, animals and plants, and participates in setting laboratory standards for animal health and plant protection. As part of their Animal Importation Program, it may be required to complete their forms:

Application for Permit to Import:
www.inspection.gc.ca/english/for/pdf/c5083perimpe.pdf

Facility Certification
www.inspection.gc.ca/english/for/pdf/c5083apaze.pdf

Statement of Renewal:
www.inspection.gc.ca/english/sci/bio/anima/inspect/renrene.pdf

Frequently asked Questions:
www.inspection.gc.ca/english/sci/bio/anima/animaqueste.shtml

Import Contact:
Dr Susan Wray
(Ms. Sharlene Veenstra - Animal Products or By-Products)
(Ms. Chris Paolini - Live Animals & Germplasm)

Import Contact, Animal Health, CFIA
174 Stone Road West
Guelph, Ontario
N1G 4S9
Telephone: 519-826-2810
Facsimile: 519-837-9771

4.4 Biohazard Classification, Containment and Risk Assessment

The following information is condensed from the Laboratory Biosafety Guidelines, 3rd Ed.

Biohazards have been traditionally classified into risk groups according to its particular characteristics. Such characteristics include pathogenicity, infectious dose, mode of transmission, host range, availability of effective treatment and preventative measures. This information is used when performing a risk assessment.

Table One: PHAC Risk Groups

Risk Group	Description
1	Low Individual and Community Risk This risk group is unlikely to cause disease in healthy workers or animals
2	Moderate Individual Risk, Low Community Risk Pathogens that can cause disease, but under normal circumstances, unlikely to be a serious hazard to health workers, animals, the community, or environment. Laboratory exposures rarely cause infection leading to serious disease. Effective treatment and preventative measures are available.
3	High Individual Risk, Low Community Risk Pathogens that can cause serious human disease but does not easily spread by casual contact between individuals, and are generally treatable.
4	High Individual Risk, High Community Risk Pathogens that cause very serious human disease, often treatable, but is readily transmitted between individuals, or between species.

Classification of biological agents is used in conjunction with handling procedures to determine what type of containment will be adequate for the proposed lab activities. Risk groups do not indicate the containment level that will be required. Therefore, risk assessments must be done on a case-by-case basis. A containment system considers engineering, operational, technical, and physical requirements in managing particular pathogens. PHAC outlines four containment levels.

Table Two: PHAC Containment Levels

Containment Level	Description
1	No special design features are required beyond a suitable and functioning laboratory. Biological safety cabinets (BSC) are not required, and work may be done on an open bench. Containment is achieved by basic lab practices followed in a microbiology laboratory. ***Brock Level One Containment Checklist*** (Appendix 3) Level one containment labs will be required to complete a level one checklist.

2	Primary exposure hazards are by ingestion, inoculation, and contact with a mucous membrane. Aerosol generation must be avoided and therefore primary containment devices, such as BSCs and centrifuges with sealed rotors or safety cups are used. Personal protective equipment (PPE), and decontamination facilities (e.g. autoclaves) are required. ***External Level Two Checklists*** In addition to an internal operating permit, if a lab will require Level two containment, PHAC requires completion of the following form: www.phac-aspc.gc.ca/ols-bsl/containment/pdf/cl2-checklist_e.doc CFIA also has an inspection checklist, Animal Pathogen Containment Level 2 Laboratories: www.inspection.gc.ca/english/sci/bio/anima/inspect/appnive.pdf
3	Agents that may be transmitted by the airborne route, and often have a low infectious dose to produce serious or life-threatening disease. Primary and secondary barriers are required to minimize the release of the agent into the immediate laboratory and the environment. Respiratory protection, HEPA filtration and exhausted laboratory air is required. Laboratory access is strictly controlled. In addition to the internal permit application, external inspections are required for level three facilities.
4	Agents that may be transmitted by the airborne route, and often have a low infectious does which can produce very serious and often fatal disease. Treatments and vaccines are generally not available. The laboratory must be isolated functionally or structurally, where a complete sealing of the facility perimeter is required and tested. The pathogen is isolated from the lab worker by means of a positive pressure suit or containment of the pathogen in a Class III BSC. All air and effluents must be decontaminated in the facility. In addition to an internal permit application, external inspections are required for level four facilities.

The first risk assessment is performed by the PI who completes a permit application (Appendix 1). The information is then brought to the BBSC, who will use their knowledge and expertise to perform a detailed risk assessment of the proposed work. In addition to considering the nature of the agents, other factors will be examined including:

- Potential for aerosol generation
- Quantity
- Concentration
- Agent stability (inherent biological decay rate)
- Type of work proposed (e.g. *in vitro*, *in vivo*)
- Use of recombinant organisms (e.g. gene coding for virulence factors or toxins, host range alteration, replication capacity, capability to revert to wild type)

Further information on risk assessment and related information can be found in the following document by the Centers for Disease Control:
Biosafety in Microbiological and Biomedical Laboratories

4.5 Inventory and Equipment

All labs are required to keep inventories of all hazards that are stored and handled, including chemical, radiological, and biological materials. MSDSs for chemicals, and microorganisms (if available), must be read and kept in the lab as a reference. It is highly recommended to keep inventories of equipment, and log their use, hazard exposure and decontamination, and any maintenance or repair work.

Equipment
Technical Services provides instrument maintenance and repair work in support of the research and teaching laboratories. To protect their workers, please use the following form when requesting their services:
Instrument maintenance/repair form

Testing and certification of biological safety cabinets is arranged annually through EHS.

4.6 Lab Practices and SOPs

General safe lab practices must be followed when working with biohazards regardless of the determined containment levels of a lab. Universal precautions, treating all agents as infectious, must also be practiced when handling biohazards. Safe lab practices must also be documented in lab-specific SOPs.

4.5 Biohazard and Other Waste Disposal at Brock

Custodial services is responsible for the management of waste disposed through the regular waste stream. Any hazardous waste must be segregated from the regular waste stream and disposed following municipal by-laws, as well as provincial and federal regulations. It is the responsibility of those working in the laboratories to keep hazardous waste separate from the regular waste stream. If a member of Custodial Services suspects hazardous materials have not been segregated, they may refuse to collect it.

Regular waste:
This includes any waste that is put in a black garbage bag, or recyclables (e.g. cardboard & plastics). Some used containers that once held low-level hazards (e.g. non-hazardous buffers), can be rinsed and recycled. Most labs will dispose of packaging, uncontaminated gloves, and paper towels in their regular waste bins. Some chemicals that are non-hazardous may also be disposed in the waste bin. Broken glass that is not contaminated with hazardous materials is collected separately and disposed through custodial services (see section on waste sharps).

Hazardous waste:
This is a general term that refers to chemicals, biological, or radioactive materials that are no longer needed in a laboratory. Hazardous materials are classified under WHMIS, and MSDS sheets provide specific information describing the actual or potential hazard a material may pose. Hazardous material may be corrosive, toxic, flammable, reactive, or a biological material that is potentially infectious.

Biohazardous waste:
Biohazardous waste refers to waste that is of a biological origin. If biohazardous waste is also pathogenic or infectious, the waste must be treated as biomedical or pathological waste. Biohazardous materials are typically destroyed chemically or by steam sterilization (e.g. destroying living microbes in a liquid broth by adding bleach, or killing microbes on a petri dish by autoclaving it). Clearly labeled waste bags with a biohazard label must be used, and will not be handled by custodial staff. In addition, the bags must be labeled with the generator's name and lab room. All biohazard waste to be autoclaved must be transported using secondary containment and autoclaved using a Steris autoclave, in room MC H-321. Unautoclaved waste may not be left unattended. Once the biological material has been destroyed, the waste is no longer considered biohazardous and is then added to the regular waste stream. A treated biohazardous bag is apparent because it will have a 'wilted' appearance. The waste, however, should not be removed from campus until the autoclave passes its weekly testing.

Biomedical or pathologic waste:
This is a term used in government documents to describe biohazardous materials that are known to be infectious. Biomedical waste is generally thought of as the soft tissues of human or animal anatomical waste, but is also non-anatomical waste (e.g. blood, needle sharps, unused cytotoxic drugs, cell lines exposed to infectious materials). The legal definition is described in detail in Guideline C-4, The Management of Biomedical Waste in Ontario, and O. Reg. 347, Waste Management. Such items must be handled carefully and removed by an external waste company certified to treat such waste.

Waste Sharps:
The term 'sharps' is used to describe materials such as needles, syringes, blades, or laboratory glass capable of causing punctures or cuts.

Glassware:
Glassware must be kept separate from the regular waste stream. This is done to prevent those who handle it from an accidental puncture if the glass is, or becomes, broken. All labs are provided with separate plastic containers for discarded glass items. This waste stream will be removed by custodial staff only if:

- It is not contaminated with any hazardous material. This includes chemical and biological materials. Glassware contaminated with chemicals must be washed free of residual contamination. If used with biological materials, it must be decontaminated before disposal.
- It is not leaking, or overflowing with discarded glassware.
- It is labeled clearly as: "**NON-HAZARDOUS GLASS FOR DISPOSAL**"

If hazardous materials cannot be removed, then contact Science Stores for the disposal of contaminated glassware. If the biological material is considered infectious, it must be disposed of as biomedical waste through Science Stores.

'Sharps':

Brock University disposes of all its other sharps, such as needles, syringes, razor blades, and scalpels in puncture-proof containers, which are then removed and destroyed by a biomedical waste processor. Do not put such sharps in a non-hazardous glass disposal container, even if they are free of biological materials. The sharps will be autoclaved and then shredded by the contractor, and therefore must not be contaminated with chemical that should not be autoclaved.

If anyone handling waste sharps accidentally punctures or cuts themselves, they must inform their supervisor and complete an accident/incident report, to be submitted to EHS.

4.6 Emergency Procedures

FOR ALL MEDICAL EMERGENCIES CALL CAMPUS SECURITY X3200
IF YOU CALL 911 DIRECTLY, HAVE SOMEONE CALL X3200

If you call campus security first: Security will call 911 and meet the responders at Brock's entrance to escort them to the correct location
If you call 911 first: Either call or have someone else call campus security immediately
In both cases: Inform them of the nature of the medical emergency and the location

Regular Business Hours (8:30am-4:30pm)
Environment, Health and Safety
905-688-5550 x3994

After-hours call campus security
905-688-5550 x3200

Biohazard Exposure:

In all cases:

- Inform your supervisor as soon as practical
- Seek proper medical attention at the closest hospital emergency department, clinic or medical practitioner, if required
- Fill out an incident report, have it signed by your supervisor and file it with Environment, Health, and Safety

Accidental Inoculation	• Skin punctures, cuts, or animal bites must be washed immediately • Allow the wound to bleed out or squeeze the wound site to force the blood out before covering with dressing or band aid
Accidental Eye/Skin Exposure	• If exposure occurs in the eye/nose/mouth, or on compromised skin (e.g. rash, dermatitis), flush with water at the closest faucet or eye wash station

Biohazard Spill:

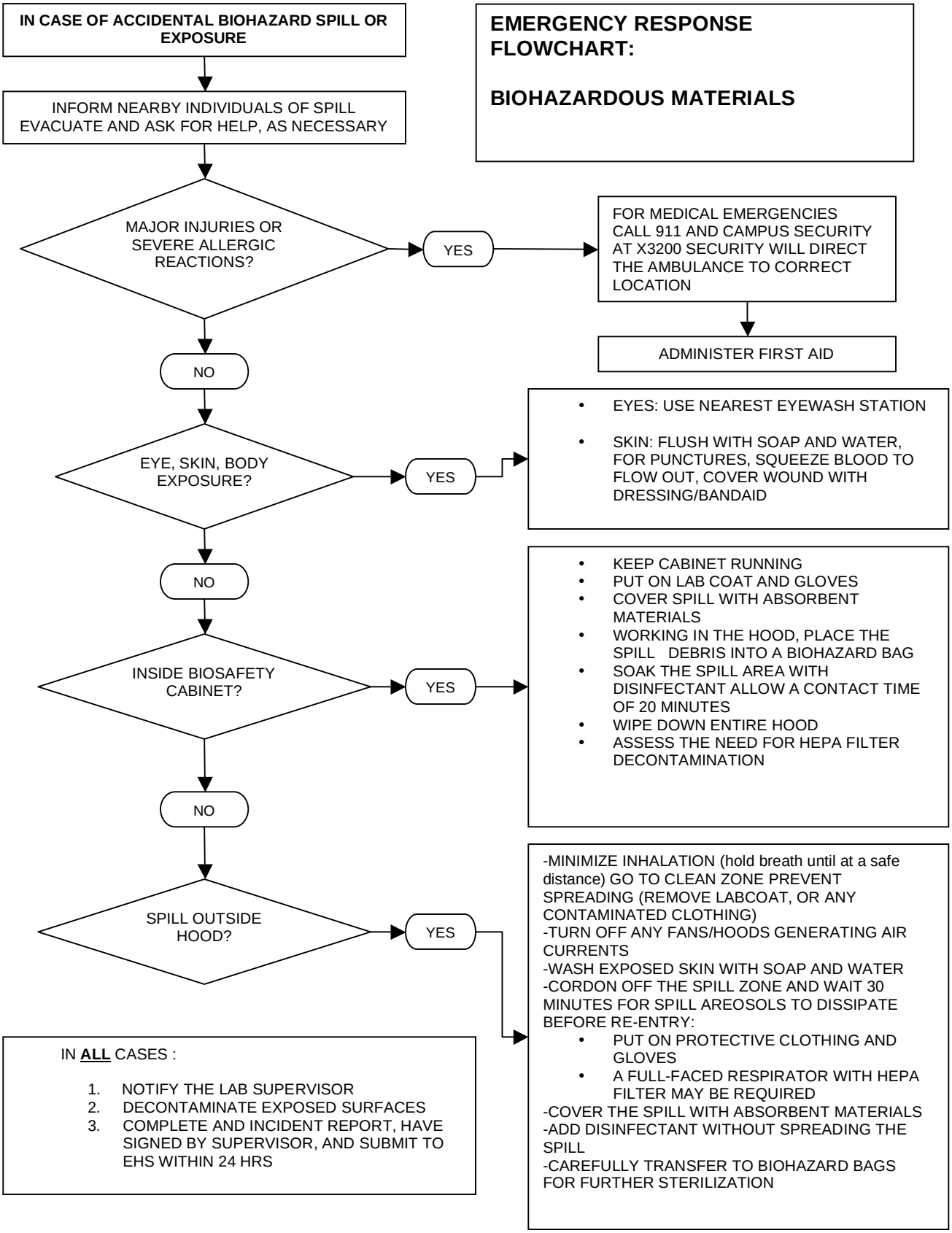
In all cases:

- Alert others of the incident and evacuate persons near the spill site. Place a sign by the spill to warn others before leaving the spill area
- Leave the immediate vicinity of the spill site and allow 20-30 minutes for aerosols to settle
- Protect yourself (respiratory protection, labcoat, double-gloves, googles) before returning to the lab/spill area
- ***If you are not comfortable cleaning up a spill, ask for help*!**
- Once the spill has been cleaned, fill out an incident report

Small spills (~10mL)	• If the spill is small absorb directly onto an absorbent material and place into an autoclavable biohazard bag • Autoclave as soon as possible • Clean spill site and surrounding area with disinfectant
Medium spills (~1L or an area you are comfortable cleaning)	• Carefully pour disinfectant solution, *which must be available in the lab at all times*, around the spill area, but not directly on the spill site to minimize spreading. Gently, mix the disinfectant and spill material without creating new aerosols *Note: once you treat the spill with chemicals, it can no longer be autoclaved!* • Leave the immediate spill site and allow 20-30 minutes for disinfection • Carefully absorb the liquid with absorbent materials and place into a durable plastic container and place into a chemical fume hood. Add more disinfectant, if needed, to ensure total destruction of the biohazardous material. Label the waste and allow it to sit overnight • Wipe down spill site and surrounding area with more disinfectant • The following day, drain the disinfectant from the waste and dispose the remaining solid waste into the regular waste garbage. If large amounts of chemicals have been used to disinfect, you may need to dispose as chemical hazardous waste
Large or extremely dangerous spills	• If a major spill has occurred, an outside company might be required to safely clean the spill. Call Campus Security or Environment, Health and Safety for further assisstance

EMERGENCY RESPONSE FLOWCHART:

BIOHAZARDOUS MATERIALS



5.0 Compliance Monitoring

Compliance monitoring is important in ensuring that the internal responsibility system, the underlying philosophy of the program, is working successfully. It is useful to monitor the labs, to identify areas of weakness, and to improve the overall safety of the working environment. A graduated level of enforcement will be followed in issues of noncompliance.

5.1 Inspections and Reporting

Lab Inspections

This form will be used by the biosafety officer, on behalf of the committee, who will perform two inspections per year for labs requiring level-two containment. Labs requiring level-one containment will be inspected once per year. Both inspections will also include an interview and review with the lab supervisor. In addition to this inspection, it is recommended that labs also monitor themselves, using the same form, on a monthly basis.

Incident reporting

Another monitoring tool used is reporting incidents and 'near-misses', by those who are actually working with the biohazards in the lab. EHS strongly encourages reporting incidents. The forms are used universally across campus for all health and safety matters. Some examples of reportable incidents include theft, loss, or release of an agent, cuts, ingestion, inhalation, and other exposure events. An incident could also be a hazardous condition or act, or physical conditions that are not considered safe. Before filling out a form, all concerns in a workplace should always be discussed with your supervisor, who should be able to provide immediate corrective action. The supervisor, or his/her designate, is also required to sign the form before it is submitted. In some cases, the entire incident may be managed between the worker and supervisor, but it is still useful to report it to EHS. All incident reports are summarized and shared with the Joint Health and Safety Committee (JHSC), the Science Safety Committee (SSC), and the Biosafety Committee (BBSC) as appropriate.

5.2 Non-compliance and Enforcement

Permit holders are responsible for ensuring that anyone working under their permit, including themselves, follows all the safety practices outlined in their risk assessment and permit application. A lack of adherence to such practices will result in either a major or minor offence. Once the type of offence has been determined, a set of procedures will be followed.

Stage One: Minor Offences

Minor offences are actions or inactions that result in noncompliance, but do not pose any immediate risk to safety, health, the environment or security. Some examples include the lack of proper placards (e.g. no waste labels, warning labels, or posting the operating permit), or poor record-keeping.

In the case of a minor offence, the following will take place:

Step 1: The lab supervisor is given a verbal warning at the time the offence was observed or reported. Recommended corrective action will be given by the Biosafety Officer.

Step 2: Recurrence of the infraction within a year will result in a written notice from the Biosafety Officer, with recommended corrective action, a deadline, and a warning that continual non-compliance may result in revoking the permit. The BBSC is informed of the notice.

Step 3: If the lab supervisor/permit holder continues to remain in non-compliance, the permit will be transferred to the Biosafety Chair or another qualified Lab Supervisor. Any activities that occur under the transferred permit will require their approval. The lab supervisor will be informed in writing.

Step 4: If no corrective action has been taken by the lab supervisor/permit holder, a meeting will be held with the Biosafety Chair, Biosafety Officer, and the Chair of the department. This meeting will provide the opportunity to explain why the level two operating permit or level one checklist should not be revoked. The final decision will be made at the next Biosafety Committee meeting. The lab supervisor/permit holder will be given the chance to appeal the decision at the next scheduled meeting. The permit or level one checklist will remain revoked until the BBSC is satisfied that they will comply with all of the internal and external requirements of the program.

Stage Two: Major Offences

Major offences are actions or inactions that result in noncompliance, and pose a moderate to high risk to safety, health, environment, or security in areas under the responsibility of the lab supervisor. This includes such things as improper storage and waste disposal, lack of training to those under their supervision, multiple minor offences, significantly poor or lack of record keeping, unauthorized possession of biological materials, or use in an unauthorized location.

In the case of a major offence, the following will take place:

Step 1: The lab supervisor/permit holder is given a written notice at the time the offence was observed or reported. Recommended corrective action and deadline to comply will be given by the Biosafety Officer.

Step 2: If the lab supervisor/permit holder has not replied by the deadline or if the same infraction remains at a follow up inspection, the corrective action and/or deadline will be revised, and non-compliance consequences will be given to the lab supervisor/permit holder in writing. The BBSC and the Chair of the Department is also informed of the current status of the offence.

Step 3: If no corrective action has been taken by the lab supervisor/permit holder, the BBSC will discuss the case at the next committee meeting. The consequences may include permit transfer to the Biosafety Chair, or another qualified lab supervisor/permit holder, suspension of purchasing biological materials, confiscation of biological materials, or the loss of an operating permit. The University Joint Health and Safety Committee (JHSC) will also be informed.

Stage Three: High Risk Violations

Immediate action may be taken by the Biosafety Officer, on behalf of the BBSC, if there is a real or perceived and significant risk to health, safety, environment, or security. This might include a temporary stop to the work activities, or immediate suspension of the operating permit. The Biosafey Committee and Chair are informed immediately of such actions.

Appendix 1: Biosafety Risk Assessment and Permit Application

Instructions:

- Researchers whose grants require biohazard clearance must complete this form for review by the Brock Biosafety Committee (BBSC). Teaching laboratories may also be required to complete this form.
- Labs where level two containment practices are required will need a Brock level two operating permit issued via the BBSC. Inform the BBSC of any changes to such permits (e.g. new biohazardous agent, location, lab protocol, change in personnel).
- Submit this completed form to the Research and Academic Safety Officer in HR-EHS.

This application is for:

Research Funding Agency: _____

Grant Reference#_____

Teaching

Renewal/Change Permit# _____

OFFICE USE ONLY
Permit number:
Valid until:

Section 1

Project Supervisor/Principal Investigator:	
Designate* in absence of Supervisor/PI:	

* If you are designating another person to be a supervisor, this person must meet the requirements of being a competent supervisor. Specifically, they have the knowledge, training and experience in the work, familiarity with potential risks associated with such work and how to mitigate them, and is familiar with any environment, health and safety legislation that applies to the work. Supervisors are required to take every precaution reasonable in the circumstances for the protection of a worker, including students.

Designate signature: _____

Section 2

Project Title/Description of Research Activities *or* Class course and Description: (include start and end dates)	
Research/Teaching Location(s): (include department, building, room#, extension)	

Section 3

Persons working on Project: (include name/title, extension) For teaching include names of Senior Lab Demonstrators, Teaching assistants etc…	

Section 4: Biological Hazards

- Specify biological agents/materials that apply, and attach additional sheets as needed. If category does not apply, indicate by checking 'No'. Provide MSDS, if available.

4.1 Use of Microorganisms: Yes No If no, proceed to section 4.2

Name of Microbe or parasite	Known to be human pathogen?	Known to be animal pathogen?	Known to be a plant pathogen?	Max. quantity cultured	Source
	Yes No	Yes No	Yes No		
	Yes No	Yes No	Yes No		
	Yes No	Yes No	Yes No		
	Yes No	Yes No	Yes No		

For the above organisms, circle the containment level required: 1 2 3
(Indicate based on the most stringent requirement)

Circle the agency(s) the containment level refers to: PHAC CFIA
(Public Health Agency of Canada- PHAC, Canadian Food Inspection Agency- CFIA)

4.2 Use of Cell Culture: Yes No If no, proceed to section 4.3

Cell Type	Will this be cell type be used?	Established or Primary	Specific cell lines	Supplier
Human	Yes No Yes No	Established Primary Established Primary		
Non-human primate	Yes No Yes No	Established Primary Established Primary		
Rodent	Yes No Yes No	Established Primary Established Primary		
Other (specify)				

For the above cell lines, circle the containment level required: 1 2 3
(Indicate based on the most stringent requirement)

Circle the agency(s) the containment level refers to: PHAC CFIA

4.3 Use of Human Source Materials: Yes No If no, proceed to section 4.4

Material	Used in lab?	Specify source/use
Human blood (whole)	Yes No	
Human blood (fraction)	Yes No	
Human tissue/organs (preserved)	Yes No	
Human tissue/organs (unpreserved)	Yes No	
Any human source known to have an infectious agent	Yes No	

For the above human source materials, circle the containment level required: 1 2 3
(Indicate based on the most stringent requirement)

Circle the agency the containment level refers to: PHAC CFIA

Does your Research Project also require approval through the Research Ethics Board?

If yes, provide your REB file number: _____

4.4 Use of Genetically Modified Organisms/Cell lines:
If no, proceed to section 4.5 Yes No

Will the genetic sequences be from the following:

A human or animal pathogen and their toxins?: Yes No
A Risk Group One microorganism? Yes No
A Risk Group Two microorganism? Yes No
Known oncogenes? Yes No

Gene transduction:
Will you use a live vecor(s)? Yes No
If yes, specify source/origin(s):

If viral, is it (are they) replication defective? Yes No
If no, specify source/origin(s):

Is the virus infectious to humans or animals? Yes No

4.5 Use of agents (in above sections) in Animal Experiments:
If no, proceed to section 4.6 Yes No

Name animal species to be used:

Provide your AUPP number: _____

4.6 Use of other agents.

Will toxins of a biological origin be used? Yes No
If yes, specify toxin and its source:

Will your work also involve the use of radioisotopes? Yes No
If yes, provide your radioisotope permit number: _____
List the radioisotopes that will be used:

If there is any other item that you will use that has not been addressed in Section 4, please provide any other information that could affect your required containment level:

Section 5: Containment Control

Does your work require Level 2 containment? Yes No
If yes, provide the biocontainment you will use, and the biosafety cabinet (BSC) class II hood location:

Section 6: Import Control

Will you be required to import/export any biohazards? Yes No

Has an import permit been obtained from PHAC for human pathogens?
If yes, provide permit number: _____ Yes No
Has an import permit been obtained from CIFA for plant/animal pathogens?
If yes, provide permit number: _____ Yes No

Section 7: Training and Safe Handling

Please attach the standard operating procedures (SOPs) and safety protocols, including waste handling and spills response, that all lab workers will follow when handling the biohazardous materials specified in this application. Applications cannot be processed without these written procedures.

The following training courses, given through HR-EHS once per semester, are required:

- Biosafety Awareness Training
- Safety in the Sciences Training (WHMIS, chemical safety)

As the Principal Investigator, I will ensure that all personnel named on this form receive lab-specific training before they work with any biohazards, and that they will attend the next available safety training sessions given through HR-EHS.

Signature: _____

Does your work also require medical surveillance? Yes No
If yes, describe what medical surveillance is required:

Briefly describe the waste management (chemical and biological) procedures you will follow:

Section 8: Required Signatures

1. Project Supervisor/Principal Investigator:

_____ _____ Date: _____
(print name) (signature) (m/d/y)

2. Department Chair:

_____ _____ Date: _____
(print name) (signature) (m/d/y)

Date Reviewed by BBSC: _____

Date Approved by BBSC: _____

Brock Biosafety Officer (signed on behalf of BBSC):

_____ _____ Date: _____
(name) (signature) (d/m/y)

Brock University protects your privacy and your personal information. The personal information requested on this form is collected under the authority of *The Brock University Act, 1964,* and in accordance with the *Freedom of Information and Protection of Privacy Act (FIPPA)* section 39(2) for the administration of the University and its programs and services. Direct any questions about this collection to the Manager, of Environment, Health and Safety (EHS) at Brock University at (905) 688-5550, ext. 4027 or see www.brocku.ca/oehs

Appendix 2: Level One Containment Checklist

Instructions:

- *This form is to be used after completing a Biosafety Risk Assessment Form and it has been determined that your lab requires Level One Containment, as described in the Laboratory Biosafety Guidelines by the Public Health Agency of Canada.*
- *To be completed by the Principal Investigator or Laboratory Supervisor.*
- *Please indicate with a check, that the safe practices described are followed, and sign below.*
- *Submit two copies of the completed form, one to the departmental Chair, and another to the RASO in HR-EHS.*
- *Labs are subject to inspections by the Science Safety Committee, and/or Biosafety Officer to ensure compliance, a requirement of the Tri-Council MOU Schedule 13.*

Principal Investigator: _____ Lab: _____

Lab Supervisor: _____
(PI or designate*)

* If you are designating another person to be a supervisor, this person must meet the requirements of being a competent supervisor. Specifically, they have the knowledge, training and experience in the work, familiarity with potential risks associated with such work and how to mitigate them, and is familiar with any environment, health and safety legislation that applies to the work. Supervisors are required to take every precaution reasonable in the circumstances for the protection of a worker, including students.

Brock's Science Safety Manual is available and followed by staff and students: www.brocku.ca/oehs/graphics/science_safety-manual_2005.pdf

Lab procedures are written and made available to all staff and students working in the lab.

Best practices and legislative requirements in storage, handling and disposal of all hazardous materials are followed.

Lab personnel have been given adequate training and access to protective equipment and clothing. Staff and student training records are kept and available upon inspection.

Universal precautions are used when manipulating biological materials.

Lab-specific emergency procedures are in place and followed in case of fire, medical emergencies, and spill/release of hazardous materials.

All incidents and near misses are reported to the Supervisor, and Environment, Health, and Safety using an incident/injury form: www.brocku.ca/oehs/emergency/paccident.php

_____ _____
(Signature, Lab Supervisor) Date (m/d/y)

_____ _____
(Signature, Principal Investigator) Date (m/d/y)

Appendix 3: Record of Laboratory Training

Training record for:	
Title/Role in Lab:	
Laboratory/Location:	
Lab Supervisor:	

Training/Orientation	**Given By:**	**Date completed: (m/d/y)**	**Not Applicable (N/A)**
General Lab Orientation *(location of lab supplies, overview of lab etiquette followed e.g. sharing of lab duties and lab space, how to order products, location of materials, waste disposal procedures, use of instrument maintenance/repair form etc…)*			
Lab Safety Orientation *(closest fire exit, location of eye wash, shower, fire extinguisher, first aid, spill kits, use of personal protective equipment)*			
Safety in the Sciences Training *(includes safety legislation, WHMIS, internal safety policies, and emergency procedures)* *Offered through HR-EHS*			
Biosafety Awareness Training *Offered through HR-EHS*			
Radiation Safety Awareness Training *Offered through HR-EHS*			
Safe use of Hydrofluoric Acid *Offered through HR-EHS*			
Autoclave training *Offered through Biological Sciences*			
Lab-specific Training of Work Procedures			

I have read and understand the following internal policies:

Occupational Health and Safety Policy
Respectful Work and Learning Policy
Policy on Working Alone
Student Code of Conduct (students only)

_____ _____
Signature (trainee) Date (m/d/y)

_____ _____
Signature (Supervisor or designate*) Date (m/d/y)

* If you are designating another person to be a supervisor, this person must meet the requirements of being a competent supervisor. Specifically, they have the knowledge, training and experience in the work, familiarity with potential risks associated with such work and how to mitigate them, and is familiar with any environment, health and safety legislation that applies to the work. Supervisors are required to take every precaution reasonable in the circumstances for the protection of a worker, including students.

Appendix 4: Biosafety Committee 2008

Appendix 5: Abbreviations and definitions

Biosafety (biological safety)
Prevention of large-scale loss of biological integrity, focusing both on ecology and human health
Safety from exposure to infectious agents
The maintenance of safe conditions in biological research to prevent harm to workers, non-laboratory organisms, or the environment

Biohazardous materials: Biohazards are categorized in WHMIS as Class D, Division 3 which includes organisms, and their agents, that have been shown to cause, or is reasonably believed to cause disease in persons, and plants and animals. Biohazardous materials include bacteria, viruses, fungi, parasites, and other potentially infectious agents pathogenic to humans, animals, or plants. This also includes products of any biological organism that can produce deleterious effects, such as enzymes, toxins, allergens. Recombinant DNA, recombinant products, and genetically modified organisms, as well as cell cultures, tissues may contain infectious materials. Also blood and other fluids and tissues from humans or animals may contain infectious agents, making them biohazardous.

Biological Containment Area: An area, such as a lab, that is contained by various physical parameters. The degree of containment is dictated by a risk level determined by assessment of the nature of the materials being used (Risk Group), and how they are being manipulated. There are four containment levels, with one being the least stringent, and four being extremely stringent. The requirements for each containment level are described in Health Canada's Laboratory Biosafety Guidelines.

Pathogen
The properties and potential for biohazardous microbes to produce disease. The disease could be immediate or latent.

Principal Investigator: This is the lab supervisor who is responsible for the lab activities that occur in a particular lab. This is typically a professor, who ultimately supervises an area where biohazards are used in research and teaching.

Recombinant DNA: Nucleic acid molecules that are typically manipulated in a molecular biology laboratory. The segment of DNA often represents part of a gene of interest, and is manipulated depending on the goal of the teaching or research activity.

Risk Group: This refers to a classification system used to determine the degree of hazard a microbe presents based on such things as its infective dose, number of hosts, and how it is transmitted. Health Canada's Laboratory Biosafety Guidelines describe the risk groups 1-4, with 1 being having the least amount of associated risk, and 4 having the most risk.

Universal Precautions
These are the recommended physical requirements, procedures, and precautions required for the safe handling of pathogenic materials or microbes that are used in health-care, laboratories, and other relevant work environments.

Acronyms

ACUC- Animal Use and Care Committee
BSC- Biosafety Committee
CFIA- Canadian Food Inspection Agency
JHSC- Joint Health and Safety Committee
MSDS- Material Safety Data Sheets
OEHS- Office of Environment, Health, and Safety
PHAC- Public Health Agency of Canada
RSC- Radiation Safety Committee
SSC- Science Safety Committee
WHMIS- Workplace Hazardous Material Information System

Resources:

ABSA Resources and Tools
http://www.absa.org/restool.html