RED RIVER COLLEGE
OF APPLIED ARTS, SCIENCE AND TECHNOLOGY

Plan for Administrative Oversight for Pathogens and Toxins

Author:

Name	Position	Signature	YYYY/MMM/DD
Soha Baddour	Environmental Safety Coordinator, EHSS	SRB	2016/Feb/12

Reviewed and Approved:

Name	Position	Signature	YYYY/MMM/DD
Christine Crowe	Vice President, Academic and Research	CCrowe	2016/Feb/12

List of Abbreviations and Definition of Terms

BSO	Biological Safety Officer
CL	Containment Level
EHSS	Environmental Health and Safety Services
HPTA	Human Pathogens and Toxins Act
IBC	Institutional Biosafety Committee
JWSHC	Joint Workplace Safety and Health Committee
PHAC	Public Health Agency of Canada
RG	Risk Group
RO	Responsible Owner
RRC	Red River College

1 OBJECTIVE

Red River College (RRC, the College) is committed to providing a healthy and safe environment for students, faculty and staff and to ensuring regulatory compliance as relevant to the College's operations. The Plan for Administrative Oversight for Pathogens and Toxins (herein the Plan) is required under section 3 of the Human Pathogens and Toxins Regulations. The Plan is intended to mitigate potential biosafety and biosecurity risks associated with activities conducted on the College premises and to serve as an accountability system for Red River College personnel involved in those activities.

2 PLAN DESCRIPTION

The Plan is comprised of ten elements. This document presents how these elements are managed and represented at RRC.

2.1 Element 1 - Commitment from Senior Management to manage and control biosafety and biosecurity risks at the institution/organization

2.1.1 The Vice President of Academic and Research at RRC approves and signs the College's Plan, demonstrating RRC's senior management commitment to manage and control biosafety and biosecurity risks at the institution.

2.1.2 The RRC Health and Safety policy is approved by President's Council and describes the College's commitment to health and safety at all levels with responsibilities outlined.

2.1.3 The Institutional Biosafety Committee (IBC) is comprised of members from every program in which biological agents are in use, including the program chairs or designates. The IBC meets on a regular basis to discuss biosafety issues, performs biosafety inspections on a yearly basis, supports and enforces corrective actions on multiple managerial levels.

2.2 Element 2 - Delineation of the roles and responsibilities for committees, individuals, departments, etc., that have a role in the control/management of biosafety and biosecurity risks.

2.2.1 The Institutional Biosafety Committee is comprised of all laboratory personnel (instructors and educational assistants) either carrying out activities with biological agents or using the containment zone space, along with the programs Chairs or designates, Health Services manager, Environmental Health and Safety Services (EHSS) manager, Biological Safety Officer (BSO) and EHSS administrative assistant as the committee minute taker. Individuals in those roles will always be on the IBC, there is no term expiry date. Any member who misses

three IBC meetings consecutively will have their membership and/or their biosafety certificate, reviewed by the IBC.

2.2.2 Financial budgetary resources for biosafety enhancements are provided for by the programs using the containment zone. Biosafety enhancement requests are discussed at the IBC meetings, and work orders are placed by the relevant program administrative assistant. The facilities department, in consultation with the BSO and the program chairs, facilitates the execution of the work order in a timely manner. The pest control and maintenance program is provided for and maintained by the Building Services department. The medical surveillance program is provided for and facilitated by the Health Services department.

2.2.3 Responsibilities as outlined in section 2 of the Biological Safety Manual (Appendix I) are adhered to under the Plan, in addition to the responsibilities presented below.

- The Biosafety Officer is responsible for reporting back to the statutory Joint Workplace Safety and Health Committee (JWSHC) all biosafety and biosecurity matters that were not resolved at the IBC level.
- At the departmental level, the Chair is responsible:
  1. for ensuring that their staff and faculty are trained in Biosafety procedures, including the Biological Safety Manual and the Plan
  2. for ensuring completion of outstanding biosafety related matters in their respective areas and reporting back to IBC
  3. for ensuring that any new activities in their areas are assessed for risk level and are presented to the IBC prior to commencement of activities
  4. for providing to the BSO and Security Services a list of individuals who are allowed access to Containment Level 2 zones and for updating access privileges as personnel transfer, quit, etc.
- All responsible owners (ROs) of biohazardous material at RRC are responsible for registering their work with biological agents and must agree to follow the conditions under which the work for the registered materials can proceed. They are responsible for keeping the biological agents secure and for updating the inventory. They ensure that students are trained and supervised at all times.
- Students or lab workers must follow biosafety procedures that they have been trained in, report incidents to supervisor, report unauthorized personnel to Security Services.
- The Environmental Health and Safety Services department supports any biosafety activities and biosecurity practices.

- Security Services department is responsible for maintaining control access to Containment Level 2 laboratories by enabling/disabling alarm codes as required. The department is also responsible for investigating unauthorized entries to the containment zone and for emergency response in case of a theft, loss or misuse of biological agents.
- Health Services department is responsible for the coordination and execution of the medical surveillance program.
- Corporate Legal and Insurance Services department is involved in understanding the level of risk surrounding the activities being carried at the College. In case of a loss, misuse or theft of biological agents, the risk control committee would meet with the BSO and with representatives from IBC.

2.3 Element 3 - Establishment of a single point of contact to provide guidance on the Plan and a senior level "champion" who can represent biosafety issues at a senior level on his/her behalf

At RRC, the single point of contact for guidance on the Plan and on biosafety and biosecurity matters is the Biological Safety Officer.

The senior level champion is the Vice President of Human Resources and Sustainability who represents health and safety and biosafety and biosecurity matters to senior management and the Board of Governors.

2.4 Element 4 - Overview of how biosafety and biosecurity risks, including those from research with dual-use potential, are identified at the institution/organization

The College has implemented multiple levels to identify and control dual-use potential.

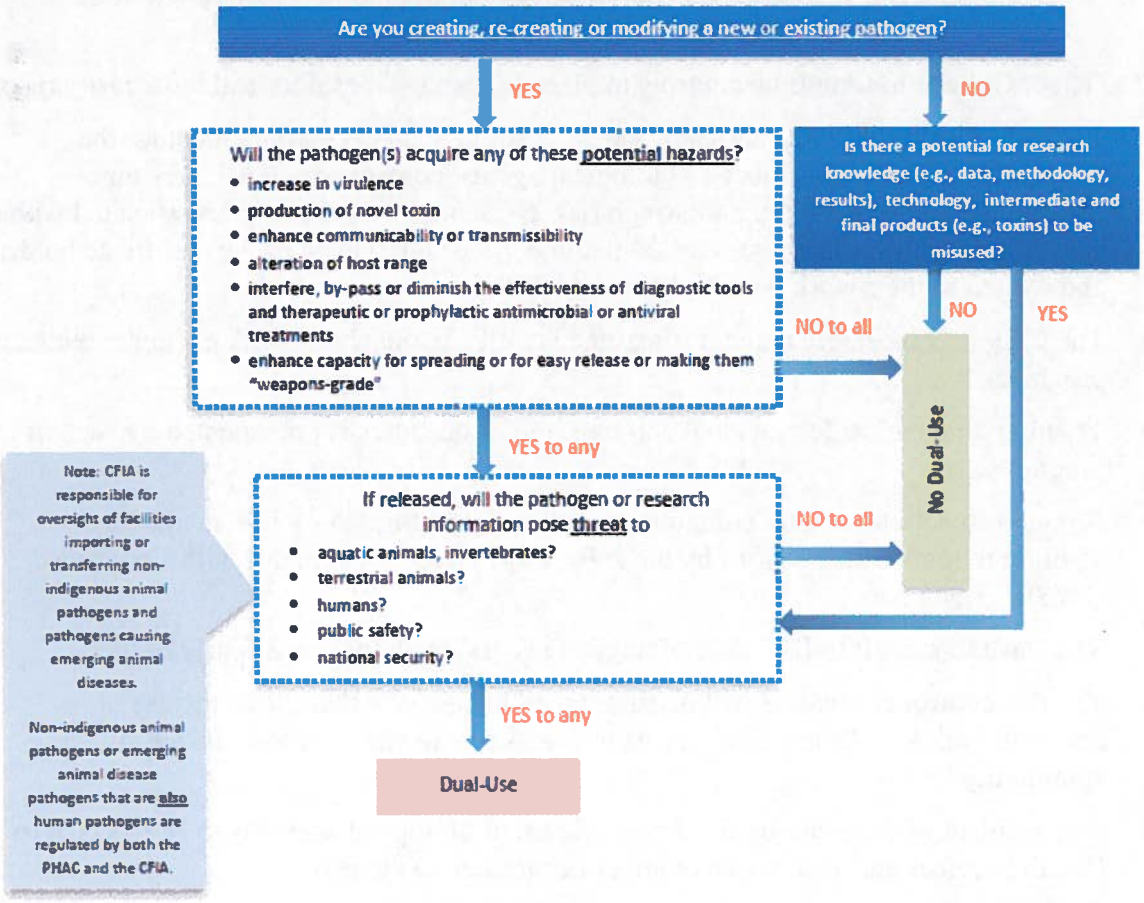
2.4.1 In order for new staff, faculty and students to be aware of the College's biosafety and biosecurity practices, the Health and Safety Orientation has been amended to include information on the College's biosafety program.

2.4.2 The Advisory Curriculum Committee must bring any new learning involving biosafety to the IBC for review prior to being approved as part of the College's curriculum.

2.4.3 Responsible owners of biological agents will need to identify and assess dual-use potential prior to applying for a biosafety certificate and present their findings to the IBC for review. Dual-use potential identification is performed by following the decision tree in Figure 2:1 and by answering the following questions (as presented in the Plan for Administrative oversight for Pathogens and Toxins in a Research Setting – Required Elements and Guidance document):

1. What types of pathogens, knowledge, technology, or products are anticipated to be generated through the research?
2. How could pathogens, knowledge, technology, or products resulting from the research be misused to pose harm to public health and safety or national security?
3. What type of technical skills will be required to repeat the experiment?
4. Are the materials, tools and equipment expensive or difficult to acquire?
5. If released outside the laboratory, will the pathogen affect humans and/or animals?
6. What is the likelihood that the knowledge, information, technology, or products from the research will be used to harm public health and safety, the environment (including animals) or national security?
7. What is the scope and magnitude of the potential risk(s) identified?

Figure 2:1 Decision Tree – Identification of dual use potential



2.5 Element 5 - Overview of how biosafety and biosecurity risks, including those from research with dual-use potential, are assessed once they have been identified at an institutional/organizational level

In order to assess biosafety and biosecurity risks, the following measures are implemented at RRC:

- Any work with Risk Group 2 pathogens is performed in the CL2 containment zones. Access to CL2 labs is controlled and maintained by Security Services.
- ROs must assess dual-use potential of their work and present their findings to the IBC, both on initial submission and on renewal of their biosafety certificate.
- ROs must submit their biological agents' inventory to the IBC on a yearly basis.
- The biosafety certificate is only to be used as agreed by IBC. If there are any changes in the interim to the program, facility, or personnel, notification must be submitted to the Committee 30 days prior to any changes occurring.

2.6 Element 6 - Overview of how the biosafety and biosecurity risks, including those from research with dual-use potential, are managed and controlled at an institutional/organizational level

Red River College has multiple controls in place to manage biosafety and biosecurity risks:

- The IBC administers the internal biosafety certificate process which includes the responsible owners' inventory of biological agents, containment level, personnel, facilities, safety equipment, a thorough risk assessment on the hazards associated with the agents used and the processes carried out under the supervision of the certificate holder and related to their work with biological agents.
- The College's biosafety manual is assigned to all personnel and students in the relevant programs.
- Training on the biosafety manual and biosafety procedures is documented by each of the programs.
- Annual inspections of CL2 containment zones are performed by IBC members in addition to regular inspections by the Joint Workplace Safety and Health Committee (JWSHC) members.
- ROs have to submit to IBC their biological agents' inventory on a yearly basis.
- The risk control committee will be summoned in case of a theft, loss, misuse or accidental release of biological agents to assess risk to staff, student and surrounding community.
- Any incident of exposure or accidental release of biological agents is to be reported to Health Services and within two hours of occurrence to the BSO.
- ROs who are found to be in non-compliance of any of the terms of their biosafety certificates will have their CL2 access and biosafety certificate reviewed by the IBC.

2.7 Element 7 - Description of all work areas covered by the Plan (research areas, teaching, off-site, etc.)

The Plan covers laboratories at Red River College where Risk Group 2 pathogens are used. Biosafety measures implemented under the Plan apply to all laboratories that work with human and/or animal blood and body fluids.

2.8 Element 8 - Description of all individuals covered by the Plan (researchers, faculty, students etc.)

The individuals at RRC who are covered by the Plan are the deans, chairs, instructors, coordinators, Educational assistants (EAs) and students in the following programs:

- Life Sciences
- Allied Health Sciences
- Nursing
- Continuing Education – only for courses using the Containment Level 2 zone

2.9 Element 9 - Summary of how the Plan is communicated

The College communicates the Plan to different stakeholders as follows:

- On the senior management level, the Plan is communicated to the Vice President of Academic and Research and to the Vice President of Human Resources and Sustainability.
- For each of the areas affected by the Plan, the BSO meets with the department manager, director or chair and discusses their involvement in the Plan and any action required on their behalf to ensure that the Plan is executed. Deans and chairs are to communicate the Plan to their staff and faculty. Instructors and EAs are to inform their students of the Plan.
- New employees are informed of the College's Biological Safety program through their Health and Safety Orientation.

2.10 Element 10 - Overview of the procedures to review and monitor the Plan

Review and monitoring of the Plan is performed through the following procedures:

1. The annual inspection of CL2 labs by IBC members
2. Regular workplace inspections by JWSHC members
3. Hazard occurrence monitoring and incident analysis by EHSS
4. The IBC is to perform a complete review of the Plan once every three years.
5. Any physical changes to the CL2 zones (renovation, remodelling, etc.) or any changes to the RG2 pathogens inventory will trigger a review of the biosafety certificate, and consequently the plan can be reviewed as required.

APPENDIX I BIOLOGICAL SAFETY MANUAL

RED RIVER COLLEGE

Revision Number: 00
October 2015

BIOLOGICAL SAFETY MANUAL

Environmental Health and Safety Services
Red River College
C507 – 2055 Notre Dame Avenue
Winnipeg, Manitoba R3H 0J9
Telephone: 204-631-3482 / Fax: 204-632-8675
safety@rrc.ca

EMERGENCY NUMBERS

Fire, Police, Ambulance	911
First Aid	204-632-2323
Security	204-632-2323
Hazardous Materials Response	204-631-3482
Biosafety Office	204-631-3482
Risk Management	204-632-2593
Health Services	204-632-2238
Poison Control	1-855-776-4766

1 PURPOSE/SCOPE

The Environmental Health and Safety Services (EHSS) department articulates Red River College's commitment to protect the health and safety of its faculty, staff, students and visitors and to ensure the protection of the community and the environment.

This manual has been developed by EHSS with the endorsement of the College's Institutional Biosafety Committee (IBC). It is intended to provide information to protect workers and the surrounding environment from possible exposure to biohazardous agents, to prevent laboratory-acquired infections and to eliminate the spread of contamination.

1.1 Definition of Biosafety

Biosafety is a combination of containment principles, technologies and practices that, together, help prevent exposure to, or release of, infectious material or toxins that can cause harm to humans or animals.

Biosafety applies to pathogenic or potentially pathogenic biological materials or toxins. A pathogen is a microorganism, nucleic acid, or protein that is capable of causing disease in humans and/or animals. Biohazardous agents are classified as follows:

- Conventional microorganisms like bacteria, viruses, fungi, rickettsia, parasites, etc.
- Prions
- Toxins derived from biological agents
- Recombinant organisms
- Human and animal tissue, blood and body fluids
- Human and animal cell lines, primary and continuous

2 RESPONSIBILITIES

Lab workers handling pathogens must ensure that they are handling them as safely as possible. However, others share the responsibility for biosafety, including senior management, the biological safety officer, the institutional biosafety committee and the biosafety permit holders.

2.1 Management

Senior management is the ultimate authority and is responsible for delegating appropriate authority for biosafety.

Management is responsible for ensuring compliance with biosafety related legislation and regulations, including registration with the Public Health Agency of Canada (PHAC) under the Human Pathogens and Toxins Act (HPTA) for any activities involving human pathogens and toxins.

Management is also responsible for a high level biosafety document outlining a commitment to:

- Biosafety
- Guiding principles
- Protection of personnel
- Biological Safety Program objectives
- Accountabilities and responsibilities
- Consequences of non-compliance

2.2 Biological Safety Officer (BSO)

The Biological Safety Officer oversees biosafety and biosecurity practices. The responsibilities of the BSO include:

- Administering the Biological Safety Program in consultation with the Institutional Biosafety Committee
- Signing off on completed permit applications and is the College contact and signature with respect to HPTA licensing and on PHAC and Canadian Food Inspection Agency (CFIA) matters.
- Facilitating compliance with federal regulatory agency requirements.
- Liaising with management, support staff, housekeeping personnel, and contractors on biosafety related matters.

2.3 Institutional Biosafety Committee (IBC)

The IBC can assist in managing the biosafety program. The Committee shall review applications for research involving biohazardous materials to determine whether the facilities, procedures and practices meet the standards required by the College and the PHAC. Every effort should be made to ensure that all programs in which biological agents are in use are represented. The Committee's responsibilities include:

- Registering laboratories and approving containment and procedures to be used
- Risk assessments
- Biosafety manual and protocol reviews and approvals
- Suspension of access privileges for staff who contravene policies and procedures governing facility use
- Disputes about biosafety matters and other biosafety or biosecurity concerns

2.4 Biosafety Certificate Holder

A biosafety certificate is a registration process that is required for the possession and use of biological agents or potentially biohazardous material that may contain these agents in all research, teaching and clinical/diagnostic laboratories at Red River College.

Biosafety certificate holders are the responsible owners of the biological agents: usually they are instructors or educational assistants who report to RRC Deans and Department Chairs. They are responsible to:

- Ensure that all lab workers are aware of and trained in biological safety procedures.
- Regularly assess and inspect their areas for compliance with biological safety procedures.
- Ensure the prompt reporting of any incidents that occur in their area.
- Adhere to all duties and responsibilities as listed on their Certificate.

2.5 Lab Workers

Lab workers are responsible for using the resources provided to handle pathogens as safely as possible in accordance with biological safety procedures in order to prevent potential exposure and accidental release into the environment. The lab worker is also responsible for informing the BSO and facilities management if the biosafety resources available are insufficient, or could be improved for an increased margin of safety.

3 RISK ASSESSMENT

Risk is the probability of exposure to a hazardous substance (event) resulting in an adverse health effect (consequence).

3.1 Biosafety encompasses the identification of risks, and the implementation of mechanisms to reduce or eliminate those risks. Risk assessments are used for identifying hazards and appropriate mitigation strategies prior to handling infectious material or toxins. Risks should be assessed and reassessed as components are added or removed. Everyone handling pathogens needs to understand the risks associated with the pathogens they are handling, and ways to prevent exposure of workers and release into the environment.

3.2 Risk assessments are conducted for many components of a biosafety program, including the pathogen risk assessment which is based on the close examination of key risk factors to determine the pathogen risk group. The factors used are described below:

- Pathogenicity: The ability of biological material (including toxins) to infect a human, animal, or plant host.
- Virulence: The severity of the disease that the pathogenic biological agent causes.
- Infectious Dose: The amount of infectious biological material needed to cause disease.
- Stability: The ability of the biological agent to remain biologically active when outside a host.

- Route of Exposure: The way the biological agent can infect a host: typically, through the following routes: airborne, ingestion, direct inoculation, mucous membrane and skin contact.
- Communicability: Looks at how easily a microorganism can be passed from one host to another.

4 RISK GROUPS

Using a pathogen risk assessment process, pathogens are assigned a risk group (RG) category based on the risk to the individual/animal and the risk to public health, livestock or poultry. These categories range from risk group 1 to 4.

1. Risk Group 1 (RG1): Low individual and community risk

   RG1 Pathogens pose a low risk to the health of individuals and/or animals, and a low risk to public health and the animal population. RG1 pathogens are not regulated by the PHAC or the CFIA.

2. Risk Group 2 (RG2): Moderate individual risk, low community risk

   RG2 pathogens pose a moderate risk to the health of individuals and/or animals and a low risk to public health and the animal population. For immuno-compromised individuals, these agents are able to cause serious disease and even death. If your immune system is compromised by a cold or if you are pregnant, additional safety considerations may be required.

   Risk Group 2 agents fall under provincial Workplace Hazardous Materials Information System (WHMIS) regulations and therefore a pathogen safety data sheet (PSDS) is required. PSDS App is available for free download to your mobile device. PSDSs for human pathogens are also available on the PHAC website at:

   http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/index-eng.php

   Animal PSDSs and animal disease fact sheets can be found at:

   http://www.inspection.gc.ca/english/sci/bio/anima/disemala/disemalae.shtml

3. Risk Group 3 (RG3): High individual risk and low community risk

   RG3 pathogens pose a high risk to the health of individuals and/or animals and a low risk to public health. At Red River College, no work with RG3 pathogens is currently done, consult the BSO to initiate this process.

4. Risk Group 4 (RG4): High individual risk and high community risk

   RG4 pathogens pose a high risk to the health of individuals and/or animals and a high risk to public health. No work with RG4 pathogens is allowed at RRC.

5 CONTAINMENT LEVELS

Pathogens are handled in containment laboratories appropriate for their risk group, designed to contain the pathogen safely within the laboratory environment and to prevent it from

infecting workers and the community. PHAC and CFIA currently define four containment levels (CL1 to CL4).

When determining the minimum physical and operational requirements for handling a pathogen, the following factors are considered:

- Aerosol generation
- Quantity
- Concentration of pathogen
- Type of proposed work
- Shedding (specific to animals)

5.1.1 Containment Level 1

Containment level 1 laboratories are meant for handling RG1 organisms and provide the foundation for all containment laboratories.

- Lab surfaces (walls, countertops, furniture and floors) should be cleanable.
- Open windows should have insect screens.
- Street clothes and lab coats are separated
- Eyewash stations and handwashing facilities should be available
- Open bench work is acceptable
- The lab is separated from public areas by a door which is kept closed when experiments are in progress.
- Disinfection should be carried out as required, using effective concentrations and contact times for disinfectants.

5.1.2 Containment Level 2

In addition to the CL1 requirements, the following describe the minimum additional physical characteristics and operational practices required for Containment Level 2.

- Doors to CL2 labs are lockable and should be kept closed.
- Appropriate signage should be posted at the entrance(s) to each CL2 lab including the biohazard sign, containment level, contact information of the laboratory supervisor or other responsible person(s) and entry requirements.
- Post a universal biohazard label on equipment where infectious agents are used/stored.
- Allow only persons informed of the research to enter CL2 areas.
- Wear personal protective equipment when appropriate; do not wear PPE outside of the laboratory.
- Hand washing sink required, preferred near the door and hands-free.

- Interior coatings are gas and chemically resistant according to function.
- Negative directional air flow into the labs preferred or work is to be done in a Biological Safety Cabinet (BSC).
- Substitute plastic for glass where feasible.
- Wash hands after completing experimental procedures and before leaving the laboratory.
- Disinfect work surfaces daily and immediately after a spill.
- Maintain a biological spill kit within the laboratory.
- Report spills, accidents, near misses and disease symptoms related to laboratory acquired infection to the laboratory supervisor or to the BSO.
- Decontaminate all biological wastes before discard. Decontaminate other contaminated materials before washing, reuse, or discard.
- Control insect and rodent infestations.
- SDSs must be available for all RG2 biological agents.

5.1.3 Containment Level 3

Containment level 3 laboratories require stringent facility design and engineering controls including HEPA filtration of exhaust air, inward directional airflow and the use of a BSC for all work with open vessels of infectious materials.

Please consult the BSO prior to initiation of any work with RG3 agents.

5.1.4 Containment Level 4

Containment level 4 is the highest containment level and requires a highly complex facility design, a maximum of engineering controls and specialized biosafety features. CL4 laboratories are used for work with RG4 agents such as the Ebola virus.

There are no CL4 laboratories at RRC.

6 BIOSAFETY REQUIREMENTS

The following information describes the requirements for those at RRC who are currently working or proposing to work with biological agents.

6.1 Registration of Biohazardous Material

6.1.1 All responsible owners (ROs) of biohazardous material at RRC must register their work with biological agents and agree to follow the conditions under which the work for the registered materials can proceed. This includes research undertaken by RRC appointees in facilities controlled by the College or directly by RRC personnel. Information required for registration includes an inventory of

biological agents in use and in storage, a list of personnel and their training, location of facilities, safety equipment and intended Containment Level, and risk assessment of dual-use potential.

6.1.2 The IBC will review the application and issue a biosafety certificate after all the prescribed requirements have been met. This certificate is valid for five years. If there are any changes in the interim to the research program, facility, or research personnel, notification must be submitted to the Committee. ROs are required to post the signed biosafety certificate in all approved rooms in a conspicuous and visible location.

6.1.3 Contact the BSO before:

1. Initiating work with a new infectious agent
2. Changing the scope or location of existing work
3. Providing infectious agents to another RO on or off campus
4. Arranging for visiting researchers to work in your laboratory

6.1.4 PHAC licence is required before the initiation of any work with human pathogens and toxins. The CFIA is the regulatory agency for animal, plant and aquatic pathogens. The BSO will assist with the licensing process and any required updates.

6.2 Inventories, Importing, Exporting, Transfers and Transportation

6.2.1 Inventories

Inventories are records that allow individuals who are accountable for the control of pathogens, toxins, and other regulated infectious material in a containment zone/facility to manage and control the material. An inventory includes the full name of the biohazardous material, risk group, location (room, freezer or cabinet, rack or shelf, box) and quantity (number of vials and amount in each vial or container).

6.2.2 Importing

Any person importing a human pathogen in risk group 2, 3 or 4 or an animal pathogen into Canada is required to fill a form and a checklist for each, depending on the agent being imported. Risk group 1 organisms do not require an import permit but do need to be inventoried and a record of the purchase kept on file.

It is important to know that this permit allows the applicant access to the agent; it may not be transferred to any other users unless permission from the regulatory body has been obtained.

- Importing human pathogens: Application and Permits

http://www.phac-aspc.gc.ca/lab-bio/permits/imp-permit/index-eng.php

- Importing animal pathogens: Application. Permits. Facility certifications

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

6.2.3 Exporting

Export permits may be needed to ship certain biohazardous materials outside of Canada. Contact the Export and Import Controls Systems division of Global Affairs Canada via phone 1-877-808-8838 or email eics.scei@international.gc.ca for information and advice regarding a specific agent.

6.2.4 Transfer

Biosafety Certificate holders who are retiring or terminating employment with the College must decommission their certificates. All biological materials in their possession must be decontaminated or transferred to another certificate holder. Submit the request for termination or transfer to the IBC.

6.2.5 Transportation

Biohazardous materials may not be transported in public transportation. or in personal vehicles. Individuals who ship. receive or transport dangerous goods must be certified for the applicable means of transport. Contact EHSS for ground and air transportation of dangerous goods certification. Note that medical samples and dry ice are regulated as dangerous goods.

6.2.5.1 Transportation within or between laboratories

- Place the biohazard in a leak proof container. using a screw-top cap whenever possible.
- Place within a secondary leak proof and breakage resistant container.
- Transport either by hand or on a cart for heavier samples.
- If transferring materials then ensure an appropriate record is kept on file.

6.2.5.2 Transportation between buildings within RRC sites

- Place the biohazard in a leak proof container. as above.
- Place within a secondary leak proof and breakage resistant container.
- Place absorbent material around the primary container inside the secondary container.
- If a cooling material is required place this in a tertiary container.
- If transferring materials then ensure an appropriate record is kept on file.

6.2.5.3 Transportation to other RRC sites or institutions

The transport of biohazardous materials within Canada is regulated by the Transportation of Dangerous Goods (TDG) Regulations. Internationally it is regulated by the International Air

Transport Association (IATA), Universal Postal Union (UPU) and the United Nations Committee of Experts on the Transport of Dangerous Goods. It is prohibited to ship dangerous goods via Canada Post. All shippers and receivers must be trained in TDG practices to ship and receive risk group 2 or higher infectious materials. Please contact EHSS for more information.

6.3 Training

6.3.1 The IBC is committed to ensuring that training remains an important aspect of the College's Biosafety Program. Prior to any initiation of work with biohazardous materials, a new worker must read the RRC Biosafety Manual and sign acknowledgment of having done so. Supervisors are responsible for ensuring that all their workers receive safety education and competency training in their laboratory specific procedures as defined in the Standard Operating Procedures (SOPs). The IBC will assess training needs at a minimum every three years.

6.3.2 In addition to completing WHMIS and employee safety orientation training, personnel working with biohazardous materials are to complete, as required, the PHAC Biosafety e-Learning training modules available at https://training-formation.phac-aspc.gc.ca/course/index.php?categoryid=2&lang=en

You will need to register a user name, password and email address to log-in to the modules. It is recommended that you become familiar with the PHAC Laboratory Biosafety and Biosecurity links and resources.

All IBC members are required to complete two PHAC Biosafety courses: "Introduction to Biosafety" and "Containment Level 2 Operational Practices". These training records are sent to the BSO for filing.

6.4 Medical surveillance program

6.4.1 A medical surveillance program of College personnel engaged in biological activities is conducted by Heath Services. The purpose of the program is to help prevent and detect illnesses related to the exposure of personnel to infectious materials or toxins. For a particular employee, the medical surveillance program might call for any of a number of precautionary measures, including immunizations, a periodic physical examination and collection of a serum specimen.

6.4.2 All new and current laboratory staff and students are encouraged to consult with their personal health care provider to ensure that their general immunizations status meets with current Manitoba Health Immunization Schedule

(http://www.gov.mb.ca/health/publichealth/cdc/div/schedules.html#adult) and with the Canadian Immunization Guide (http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-eng.php). In no case shall an employed staff or student be placed at serious risk of contracting a vaccine-preventable potentially infectious disease. Departments will confirm that staff and students have met these conditions before beginning work with any of the identified vaccine-preventable potentially infectious material. At risk staff or student who refuse to accept immunization must receive documented counseling regarding the risks they are accepting by the refusal.

Table 6:1 Recommended Vaccines for RRC personnel

Vaccine	Recommended for persons working with
Rabies Vaccine	Animals and in animal facilities
Hepatitis B Vaccine	Human blood, body fluids or tissues

6.4.3 Any occupationally required immunization not covered by Manitoba Health is provided without charge for any College employee whose job may result in potential exposure. Students will be advised to consult with their personal health care provider or Health Services regarding immunization.

6.4.4 Lab personnel are encouraged to inform their supervisor or Health Services of any medical restrictions that could make them as an individual more susceptible to the biohazards in their area, including pregnancy, diabetes, HIV infection, immunosuppressive conditions and drug therapy that suppress the immune system. This information is maintained in accordance with the Personal Health Information Act (PHIA).

6.4.5 Where a known incident/exposure occurs (example: sharps injury, splash to mucous membranes, broken tubes, spill outside the BSC), report the injury to Health Services and to the BSO within two hours of exposure and to the IBC within 30 days of occurrence. If the incident occurred after hours, report the injury to Security Services and proceed to the hospital emergency care. Post-exposure protocol (PEP) for managing exposure to blood and body fluids is available at http://www.gov.mb.ca/health/publichealth/cdc/protocol/hiv_postexp.pdf

6.5 Laboratory Operational Practices

6.5.1 Biosecurity and Access Control

Biosecurity measures are designed to prevent the loss, theft, misuse, diversion, or intentional release of infectious material or toxins. Any individual who contravenes these measures may lose their access privileges.

6.5.1.1 CL2 laboratories must have a biohazard door sign posted on all access doors. The sign includes the international biohazard symbol, bears the legend "Biohazard", the containment level (i.e. CL2), name and telephone number of responsible contact person(s), and special entry requirements including required training, Personal Protective Equipment (PPE), etc.

6.5.1.2 Doors to the containment zone are closed at all times. Doors are locked when unoccupied.

6.5.1.3 Only laboratory personnel who are authorized to have access to the CL2 containment zones will be assigned security codes by Security Services. Security codes are individualized and are to be kept confidential.

6.5.1.4 Students are not permitted to be in the CL2 containment zones without direct supervision by authorized staff. Visitors, maintenance and janitorial staff, contractors, and others who require temporary access to the containment zone are to be accompanied in accordance with their anticipated activities in the containment zone.

6.5.1.5 The ROs are responsible for ensuring that all biological materials have been stored properly and securely when the work is completed for the day. Inventories are to be maintained as per section 6.2.1.

6.5.1.6 Incidents, such as missing infectious materials or toxins, unauthorized entry or loss of containment, should be reported, documented and investigated as per section 7.

6.5.2 Housekeeping

1. Eating, drinking, smoking, storing of food and personal belongings, applying cosmetics, chewing gum, inserting or removing contact lenses and wearing dangling jewelry are not permitted in any laboratory.
2. Long hair is to be tied back or restrained so that it cannot come into contact with hands, specimens, containers or equipment.
3. Open wounds, cuts, scratches and grazes must be covered with waterproof dressings.
4. Wear PPE when appropriate, do not wear PPE outside of the laboratory.
5. Laboratory clothing must be stored separately from street clothing.
6. Laboratory clothing, properly fastened, must be worn by all personnel, including visitors, trainees and others entering or working in the laboratory.
7. Suitable footwear with closed toes and heels must be worn in all laboratory areas.
8. Gloves must be worn for all procedures that might involve direct skin contact with biohazardous material. Gloves are to be removed immediately when work is

completed or if compromised. Wash hands after removing gloves as well as before leaving the laboratory.

9. Practice good personal hygiene and do not touch face with gloves or non-gloved hands.
10. Do not mouth pipette. Use mechanical pipetting devices.
11. Disinfect work surfaces daily and immediately after a spill. Disinfectants effective against the agents in use must be available at all times within the areas where the biohazardous material is handled or stored.
12. Maintain a biological spill kit within the laboratory.
13. Ensure that all biomedical waste containers are labeled with the biohazard symbol.
14. Control rodent and insect infestations.
15. Containers of pathogens, toxins, or other regulated infectious material stored outside the containment zone to be labelled, leak-proof, impact resistant, and kept either in locked storage equipment or within an area with limited access.
16. Samples of pathogens, toxins, or other regulated infectious material to be opened only in containment zones that meet the containment level requirements to which that infectious material or toxin has been assigned.
17. The use of needles, syringes and other sharp objects should be strictly limited. 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 BSC. Needles should not be bent, sheared, recapped or removed from the syringe; they should be promptly placed in a puncture resistant sharps container before disposal.
18. An approved sharps container (in accordance with Canadian Standards Association (CSA) standard Z316.6-95(R2000)) is non-breakable, rigid, puncture-resistant, autoclavable or chemically resistant container as per method of disposal, labeled with the biohazard warning logo and with a non-removable lid with a mail-slot type opening that does not allow access to the disposed material.
19. Sharps containers must not be filled to more than ¾ of their total volume. These containers are not to be reused as all sharps containers are to be appropriately decontaminated and disposed of as per section 6.5.3.

6.5.3 Decontamination and waste management

All infectious materials and all contaminated equipment or apparatus should be appropriately decontaminated before being washed and stored and before final disposal regardless of risk level of agent. You must consult with EHSS to receive an exemption from decontaminating your biological materials before disposal.

6.5.3.1 Chemical Methods of Biologic Decontamination

1. Sodium Hypochlorite (NaOCl)

   Contact time: 10 minutes. Household or laundry bleach contains 5.25% chlorine or 52,500 ppm and loses most of its activity in one year. Using 5.25% hypochlorite (Clorox) in a 1:5 dilution (one part Clorox and four parts water) yields 10,500 ppm or a 1.05% hypochlorite solution, for use within 30 days. Hypochlorite solutions are classified as irritant and corrosive. Chlorine solutions should never be mixed or stored with cleaning products containing ammonia, ammonium chloride, or phosphoric acid. Bleach solution is corrosive to stainless steel and prolonged contact should be avoided. Alternatively, ensure that surfaces are rinsed with water and alcohol after the appropriate contact time with the bleach solution. Do not autoclave bleach solutions.

2. Alcohols

   Contact time: immediate to 10 minutes. A 70% ethanol or isopropyl solution is made by adding three parts water to seven parts 95% ethanol. Methanol should not be substituted for ethanol or isopropyl alcohol, because it is not as effective. Always keep ethanol and isopropyl solutions away from potential sources of ignition. These solutions should be labeled and dated, with an expiration date of six months.

6.5.3.2 Physical Methods of Biologic Decontamination

The physical means most frequently used in decontamination are dry heat, moist heat and incineration.

6.5.3.2.1 Autoclaves may provide dry or moist heat, with moist heat being the most effective. Refer to RRC's safe work procedure for the Operation of Autoclaves.

6.5.3.2.2 A minimum of one hour autoclave time at 121°C is required. The amount of time the material is heated and the sustained temperature can be modified to achieve higher levels of decontamination.

6.5.3.2.3 Biohazardous materials should not be stored in autoclaves overnight for autoclaving the next day.

6.5.3.2.4 Laboratory staff is responsible for over-packing autoclaved waste in dark garbage bags for disposal and for placing it at the end of the day with the regular trash for disposal by custodial staff.

6.5.3.3 Hazardous waste Disposal

6.5.3.3.1 Hazardous waste is any product, substance, or organism that is dangerous to human health or to the environment, and is no longer used for its original purpose at the time of disposal, or during storage or transportation prior to treatment or disposal. Biological waste may be hazardous due to its quantity, concentration, physical, or infectious characteristics.

6.5.3.3.2 All RRC waste generators need to be aware of the environmental and financial impacts of hazardous waste and actively seek to minimize the amount of waste generated. It is extremely important to remember that although the waste is removed from the laboratory, there are still many individuals handling the waste. For this reason, it is critical to segregate, package, and identify the waste properly:

- All waste must be segregated at the source. Segregations enables EHSS to use the best available disposal option for each chemical.
- Waste should not be accumulated in the laboratory for longer than six months. If it takes longer than six months to fill a waste container, a smaller container should be used.
- All biohazardous waste should be disposed of daily or minimum weekly. If weekly, the container must have a lid.
- Empty hazardous materials containers are still considered hazardous waste because of their residue, and the rinsate may not be poured down the drain. Containers which held buffers, media, enzymes, salts and lab-mixed chemicals do not need to be collected by EHSS.
- Biohazardous waste generators are responsible for:
  1. Ensuring that the waste is either correctly treated and disposed of within the lab, or properly packaged for collection by EHSS.
  2. Packaging the waste as directed to prevent exposure or injury (needle sticks, cuts) to anyone handling the waste; and
  3. Labeling the waste with the generator's name and the room number of the lab where the waste was generated.
- Untreated biohazardous material must be transported between floors in secondary containers with a secure lid. At a minimum, containers should be surface disinfected before leaving the lab and again after removal of biomedical waste. Transport should be done using service elevators (where available) and not passenger elevators.
- Biohazardous infectious waste must not be left in hallways. It must be secured at all times.

6.5.4 Biological Safety Cabinets

6.5.4.1 The biological safety cabinet, or BSC, is a type of primary containment equipment designed to protect you from exposure to infectious material or toxins, to prevent loss of containment and to protect your specimens from contamination. BSCs must be certified upon initial installation, annually, and after any repairs or relocation.

6.5.4.2 Use a BSC that has been designed, manufactured and tested in accordance with NSF/ANSI Standard 49:

- When there is the possibility of producing infectious aerosols such as opening tubes, using an inoculating loop, mixing and homogenizing, pouring infectious material.
- For procedures that involve high concentrations or large volumes of biohazardous material as determined by risk assessments.
- For inoculation, surgical, and necropsy procedures with animals in CL2 Small Animal zones.

6.5.4.3 All BSCs at RRC must be placed on a certification/service contract and be certified at least annually. Any BSCs not under the certification/service contract will be placed in storage status. Notify the BSO in advance when you plan to have BSCs moved, placed in storage, transferred to a new owner, discarded, removed from RRC or obtained from another institution or manufacturer. Contact the Biosafety Officer if service or repairs are needed for your unit. BSCs must be professionally decontaminated with formaldehyde, by a certified technician, before a unit is relocated, stored, serviced (interior) or discarded. The purchase of BSCs is coordinated through RRC Purchasing Department and the IBC. The IBC reviews all BSCs purchase requests. Contact the Biosafety Officer for more information.

6.5.5 PPE

While Personal Protective Equipment (PPE) is an important component of any biological safety program. PPE is used with the understanding that PPE serves as a second line of defense. Good laboratory techniques, procedures and appropriate laboratory equipment are the primary barriers against potential exposure to hazardous agents.

All work with liquid nitrogen requires thermally resistant gloves, full face shield, lab coat, long pants and closed shoes and must only be done during regular working hours.

6.5.5.1 Laboratory Clothing

Lab coats, gowns and jumpsuits serve to protect the wearer, the experiment and the environmental against contamination. If proper precautions are not taken, contaminated

clothing may carry infectious materials outside the laboratory and into other work areas or the home.

- Properly fastened lab coats should be worn at all times when in the lab.
- PPE worn within the laboratory should not be worn outside the facility to the library, cafeteria, elevators or other places accessible to the public.
- Do not take PPE home to launder.
- Wear closed-toe shoes and long pants to guard against skin contamination or chemical exposure. Do not wear sandals or shorts in the laboratory.
- Wash hands whenever PPE is removed.

6.5.5.2 Gloves

Glove use is a basic precept of preventing infectious agent transmission. Breaks in the skin barrier of the hand (damaged cuticles, scrapes, micro-cuts, dermatitis, etc.) are common.

- Inside the lab area, gloves must not be worn when touching common fixtures such as the telephone, the computer keyboard, the door handles, printers/copiers, catalogues and reference books.
- Gloves shall be removed and hands washed before exiting the laboratory.
- Check gloves for visible tears before use.
- Change disposable gloves often.
- Consult with EHSS with details of your work to receive further information about the type and availability of gloves that will best meet your requirements.

6.5.5.3 Face and Eye Protection

Due to the potential for foreign material, both liquid and solid, to splash on the head, face and eyes, protection of the face and eyes is important in laboratories. A variety of face shields, hoods and protective goggles are available.

- Contact lenses do not provide eye protection. It is recommended that contact lenses not be worn when working around chemicals, fumes and other hazardous material and dust particles since these items may become trapped in the space between the contact lens and the cornea. When contact lenses are worn, eye protection such as tight fitting goggles must be worn.
- Safety glasses provide impact protection against projectiles and broken glass but should not be used to protect against chemical splashes in lieu of approved acid or chemical splash goggles or face shields.

6.5.5.4 Respiratory Protection

There are a number of toxic or infectious materials that pose a significant health risk in a laboratory environment. Engineering controls such as fume hoods, biosafety cabinets, rates of ventilation are all methods for protection; but when these measures are not feasible or

adequate. PPE becomes mandatory. "Dust" or surgical masks provide little if any protection from infectious aerosols or toxic fumes.

Whenever the use of respirators is considered, please make sure to notify EHSS to assist in evaluating the procedure, selecting the proper respirator and providing the required training and fit testing. Health Services must also be notified so that medical surveillance and clearance can be issued prior to wearing the respirator.

7 EMERGENCY RESPONSE PLAN

7.1 Spill Kit

Microbiology laboratories should prepare and maintain a biological spill kit. A basic spill kit should include:

- Concentrated household bleach
- A spray bottle for making 10% bleach solutions
- Forceps, autoclavable broom and dust pan, or other mechanical device for handling sharps
- Paper towels or other suitable absorbent
- Biohazard autoclave bags for the collection of contaminated spill clean-up items
- Utility gloves and medical examination gloves
- Face protection (eye wear and mask, or full face shield)

7.2 Spills inside a BSC

- Leave the BSC turned on.
- Remove your outer gloves and discard them inside the BSC.
- Assemble clean-up materials and put on new protective clothing.
- Surface decontaminate all objects in the cabinet and cover the spill with paper towels.
- Apply a disinfectant that is effective against the microorganisms:
- Pour disinfectant from the edge of the spill toward the centre. A gentle flooding action will avoid creating aerosols.
- If spilled material has gone through, pour disinfectant through the perforated grill onto catch tray beneath.
- Allow at least 30 minutes.
- Pick up broken glass or sharps with forceps and put them in a sharps container.
- Wipe up the spill and put all materials into an autoclave bag inside the cabinet.

- Items that cannot be autoclaved must be thoroughly disinfected before removing from cabinet.
- Put the protective clothing into bags and autoclave them.
- Wipe inside of cabinet with disinfectant.
- Allow BSC to run for at least 10 minutes before resuming work.

7.3 Spills outside the BSC

For extensive CL2 contamination (for example, a centrifuge incident) or incidents involving CL2 agents, EHSS must be notified.

- Avoid inhaling airborne material, while quickly leaving the room. Immediately notify other individuals in the area that there has been a biohazard spill.
- Close the door and post a warning sign.
- Remove contaminated clothing, turning exposed areas inward and place in a biohazard bag.
- Wash all exposed skin with soap and water.
- Inform supervisor, and if assistance is needed, consult the BSO.
- Allow aerosols to disperse for at least 30 minutes before re-entering the laboratory.
- Attain a spill kit containing the clean-up materials.
- Put on protective clothing (lab coat, face protection, utility gloves, and booties if necessary).
- Depending on the nature of the spill, it may be advisable to wear a HEPA filtered respirator instead of a surgical mask, consult with the BSO.
- Cover the area with disinfectant-soaked towels, and then carefully pour disinfectant around the spill. Avoid enlarging the contaminated area. Allow at least a 20 minute contact time.
- If sharps were involved in the spill:
    1. Pick up any sharp objects with forceps and discard in a sharps container.
    2. Soak up the disinfectant and spill using mechanical means, such as an autoclavable broom and dustpan, since there may be sharps under the paper towels, and place the materials into a sharps container.
    3. Smaller pieces of glass may be collected with paper towels held with forceps.
    4. If no sharps were involved in the spill, discard the materials into a biohazard bag.
- Wipe surrounding areas and where the spill may have splashed with disinfectant.
- Spray the area with 10% household bleach solution. Allow a 10 minute contact time.

- Wipe down with disinfectant-soaked towels.
- Place all contaminated paper towels and any contaminated protective clothing into a biohazard bag and autoclave.
- Wash hands and exposed skin areas with disinfectant or antiseptic soap and water.

7.4 Blood Spill Clean-up

For blood or other material with a high organic content and low concentration of infectious microorganisms:

- Don PPE including lab coat, gloves and eye protection.
- Absorb blood with paper towels and place in a biohazard bag. Collect any sharp objects with forceps or other mechanical device and place in a sharps container.
- Using a detergent solution, clean the spill site of all visible blood.
- Spray the spill site with 10% household bleach and allow a contact time of 15 minutes.
- Wipe the area down with disinfectant-soaked paper towels.
- Discard all disposable materials used to decontaminate the spill and any contaminated personal protective equipment into a biohazard bag.
- Wash your hands.

7.5 Emergency Procedures for Exposure Incidents

An exposure incident is contact of the eye, mouth, other mucous membrane, respiratory tract via inhalation, non-intact skin or parenteral contact with potentially infectious materials. An employee who sustains a known or potential exposure incident must remove gloves and treat the affected area immediately by following the appropriate exposure incident response as presented below. Report the incident to your supervisor and to Health Services within two hours of the incident. Report the incident to Security Services if it were to occur after working hours.

7.5.1 Percutaneous Injury

Wash affected area with antiseptic soap and warm water for 15 minutes.

7.5.2 Splash to the Face

Flush affected area in the eyewash station for 15 minutes.

7.5.3 Aerosol Exposure

Refer to section 7.3. Notify EHSS to clear the laboratory for re-entry.

7.5.4 Reporting Incidents

The worker is responsible for reporting the incident to their supervisor. The supervisor is then to report the incident to Health Services. Please also report incidents that did not result in an exposure (near miss) to EHSS. Evaluation of near misses can lead to alternative work practices and implementation of engineering controls to minimize future incidents.

7.5.5 Investigation of Laboratory Incidents

EHSS in cooperation with the area supervisor and their staff will conduct the necessary investigation of a laboratory incident. The goal of the investigation is the prevention of similar incidents as well as obtaining information concerning the circumstances and number of employees who have been exposed to the agent in question. EHSS must perform an investigation on all injuries involving a sharp and human material such as body fluid, tissue or cell line to prevent future occurrences of the injury. Investigation results and corrective actions will be communicated to the appropriate parties (personnel, IBC, Joint Workplace Safety and Health committee, senior management, etc.).

7.5.6 Removal of unauthorized personnel

Keep calm and report the location of the unauthorized personnel to Security Services.

8 REFERENCES

1. Public Health Agency of Canada. Canadian Biosafety Standard. Second Edition. http://canadianbiosafetystandards.collaboration.gc.ca/cbs-ncb/index-eng.php
2. Public Health Agency of Canada. Laboratory Biosafety and Biosecurity. http://www.phac-aspc.gc.ca/lab-bio/index-eng.php
3. Public Health Agency of Canada e-Learning Portal. Laboratory Biosafety and Biosecurity. Principles of Laboratory Biosafety. https://training-formation.phac-aspc.gc.ca/?lang=en
4. Government of Canada. Department of Justice. Laws. Acts. Human Pathogens and Toxins Act. http://laws-lois.justice.gc.ca/eng/acts/H-5.67/index.html
5. World Health Organization. Laboratory Biosafety Manual. Third Edition. http://www.who.int/csr/resources/publications/biosafety/en/Biosafety7.pdf

9 REVISION HISTORY

Table 9:1 outlines the revisions that have been made to this document.

Table 9:1 Revision History

Version No.	Revision Description	Date	Author
1	Original Document	2015-October-28	Soha Baddour