RED RIVER COLLEGE

Revision Number: 01
September 10 2019

BIOLOGICAL SAFETY MANUAL

Safety and Health Services
Red River College
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EMERGENCY NUMBERS

- Fire, Police, Ambulance
  911

- Security Services, Room C-115, 24/7
  204-632-2323

- Safety and Health Services, Monday – Friday, 8:00 am to 4:00 pm
  204-632-2511

- Biological Safety Officer
- 204-632-2511

- Risk Management, Monday – Friday, 8:00 am to 4:00 pm
  204-632-2593

- Health Services, Room HM-08, Monday – Friday, 8:00 am to 4:00 pm
  204-632-2238

1 PURPOSE/SCOPE

The Safety and Health Services (SHS) department articulates Red River College's (here-in RRC, the College) 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 SHS 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 and for maintaining a safe and healthy work environment, including senior management, the department chair, Security Services, Safety and Health Services, Health Services, the Risk Control Committee, the Biological Safety Officer (BSO), the IBC and the biosafety certificate holders.

2.1 Senior 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 and compliance 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 Safety document outlining a commitment to comply with the Manitoba Workplace Safety and Health Act and Regulation, including biological safety and biosecurity, and the protection of personnel involved in biohazardous work.

2.2 Department Chair

At the department level, the Chair is responsible for facilitating the protection of the health and safety of people within their areas of responsibilities by:

- Ensuring that their staff and faculty are trained in Biosafety procedures, including the Biological Safety Manual and the Plan for Administrative Oversight (the Plan, 0).
- Ensuring completion of outstanding biosafety related matters in their respective areas and reporting back to IBC.
- Ensuring that any new activities in their areas are assessed for risk level and are presented to the IBC prior to commencement of activities.
- 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.
- Knowing, understanding and complying with the components of the Biosafety program that apply to their areas of responsibility.

2.3 Security Services

The Security Services department is responsible for:

- Maintaining control access to the Containment Level 2 laboratories by enabling/disabling alarm codes as required.
- For investigating unauthorized entries to the containment zone.
- For emergency response in case of theft, loss or misuse of biological agents.

2.4 Safety and Health Services (SHS)

The Safety and Health Services department is responsible for:

- Developing a comprehensive safety management system to direct and provide guidance to the College community with respect to health and safety, including biological safety.
- Supporting any biosafety activities and biosecurity practices.
- Understanding and mitigating the level of risk surrounding the activities being carried at the College.
- Advising the IBC on the development of the Biosafety Program to achieve compliance with applicable legislation.

- Ensuring that an annual laboratory inspection program is in place to ensure continued compliance with applicable legislation.

2.5 Health Services

The Department of Health Services is responsible for:

- Administering a medical surveillance program (section 6.4) for all personnel engaged in biosafety activities.
- Conducting periodic health assessments of personnel, with attention given to factors or conditions associated with a particular biological agent that a given individual may handle.
- Conducting periodic reassessments of personnel to determine if medical conditions associated with employment are prevalent and if so, to undertake measures to alleviate them.
- Recommending appropriate medical precautions to be followed, depending on:
    1. The nature of the work activities
    2. The biological agents in use
    3. The current or previous health status of the individual
- Providing immunizations with appropriate vaccines for personnel engaged in biosafety activities.

2.6 Risk Control Committee

The Risk Control Committee considers any matters relating to the identification, assessment, monitoring and management of risks associated with the operation of the College that it determines to be appropriate in its sole discretion. The duties of the Risk Control Committee include:

- Identification and evaluation of exposures and hazards.
- Development and implementation of internal policies, procedures, compliance and control systems to manage risk.
- Assessment and monitoring of the effectiveness of existing control measures.
- Reporting the College's risk profile and making recommendations with respect to the College's Risk Management Strategy.
- Selecting insurance advisors (a broker or agent) as deemed prudent to assist in negotiating insurance arrangements.
- Communicating the risk management plan and loss control procedures to affected parties, including employees, volunteers, the board of governors, clients and the public.
- Overseeing loss prevention activities.

2.7 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 IBC.
- Signing off on completed certificate applications and is the College contact 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.

2.8 Institutional Biosafety Committee (IBC)

The IBC assists in managing the biosafety program and ensuring its effectiveness. The Committee shall review applications for any work 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 IBC'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 personnel who contravene policies and procedures governing facility use
- Disputes about biosafety matters and other biosafety or biosecurity concerns
- Requesting change to the work activity where the risk assessment identifies a potential for dual-use.
- Annually reviews the training needs assessment.

2.9 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.
- Submit their biological agents' inventories to the IBC on a yearly basis.

2.10 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).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.

Risk assessments are conducted for many components of a biosafety program, including an overarching risk assessment, a pathogen risk assessment and a local risk assessment.

3.1 Overarching Risk Assessment (ORA)

A broad risk assessment of the activities being conducted at the College was performed during the initial development of the Biological Safety Program. A top-down ORA is also performed upon the review of the Plan, every three years.

The ORA is conducted and documented to identify the hazards, potential routes of exposure, and appropriate mitigation strategies.

The ORA includes, but is not limited to, biosecurity, emergency response plan, medical surveillance, and communication plan risk assessments.

4. Biosecurity Risk Assessment
    - Biosecurity is implemented to prevent theft, misuse or intentional release of pathogens.
    - Biosecurity RA includes physical security, personnel security, material control, transport security, information security and program management.
5. Emergency Response Plan Risk Assessment
    - The emergency response risk assessment involves possible scenarios of exposure such as splashes or cuts, spills, loss of power affecting pathogens storage and ventilation.

- The College Emergency Preparedness Coordinator is responsible for overseeing the College's emergency response plan.

6. Medical Surveillance Risk Assessment
    - The medical surveillance risk assessment identifies and assesses the potential of biological agents to cause infection or disease.
    - It involves the assessment of the consequences of infection, vaccine availability, treatment availability, pre-placement worker evaluation and medical surveillance of employees.
7. Communication Plan Risk Assessment
    - The communication plan assessment includes the notification of staff and faculty of their responsibilities and duties under the Biosafety program, training requirements and notification of regulators, medical staff and the public in case of exposure to or accidental release of biological agents.

3.2 Pathogen Risk Assessment

A pathogen RA is used to assess the risks posed to employees who work with the biological agents. It is the responsibility of the responsible owner of biological agents to conduct the pathogen RA based on the pathogen safety data sheet (PSDS). PSDSs are readily available to all personnel working with biological agents. Pathogen risk assessment 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.

3.3 Local Risk Assessment (LRA)

- LRAs are site and activity specific RAs that help to support the ORA. They are a step-by-step RA of specific experimental protocols and standard operating procedures.

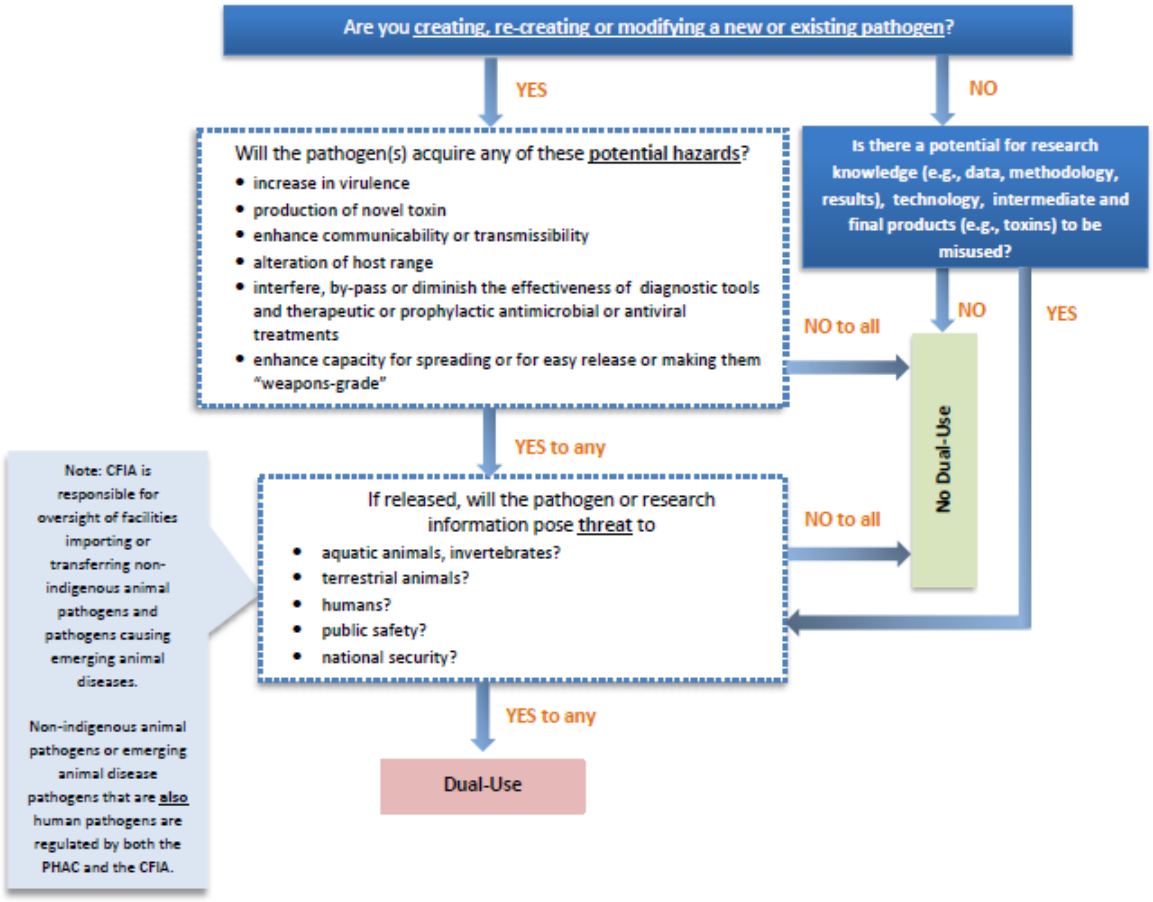
- LRAs are performed by responsible owners of biological agents and involve the identification of tasks and/or procedures, the breakdown of tasks into steps, the identification of potential exposure risk for each step, and the determination of the appropriate mitigation strategy.
- The step-by-step description includes parameters such as manipulation of pathogen, location of the work (Biological safety cabinet, open bench, etc.), risk potential (quantity, aerosol generation, etc.) and precautionary measures.
- The consequences of exposure are assessed by identifying the pathogenicity of the biological agent, the infectious dose, route of infection and mode of transmission.
- LRA is performed by responsible owners of biological agents as part of the biosafety certificate application (internal process) and presented to IBC for review prior to the Biosafety Certificate being granted to the RO. The RO can involve the BSO in this process.

3.4 Dual-Use Risk Assessment

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 3:1 and by answering the following questions, as presented in the Plan:

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 3:1 Decision Tree – Identification of dual use potential



3.5 Completing Risk Assessments

The Responsible Owner is responsible for performing a risk assessment prior to the start of any work with a new agent, with a new procedure, and for submitting their completed risk assessments to the IBC for review and approval. The IBC and the BSO are available to assist with the risk assessments.

To determine the level of risk, the ORA, Pathogen RA and LRAs are used to assess the level of risk. The individual performing the risk assessment must answer the following questions: how likely is it to happen? (Occurrence likelihood) and what are the consequences of the event? (Occurrence).

To determine the likelihood and consequences of occurrence, three factors will be considered: the biological agent infection and disease potential, assessment of the host, and assessment of the work activities and laboratory environment.

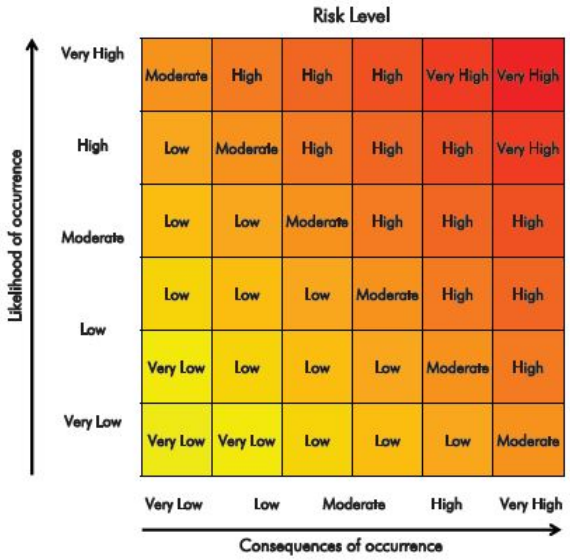
1. The biological properties of the biological agent that would cause an infection must be considered along with the routes of infection, the natural environment and the infectious dose. These are important to assess the risk to human and/or animal community within the laboratory and outside of the laboratory and in assessing the

potential for secondary transmission. Also, an assessment of the disease or consequences of the disease caused by the biological agent must be considered including treatment options and mortality rates.

2. The assessment of the medical condition of individuals working with biological agents is necessary, especially if the individual is susceptible to infection due to a weakened immune system. The potential consequences of disease to these individuals must be assessed.
3. The assessment of the work activities and laboratory environment should identify any potential areas where an exposure to the biological agent is likely to occur. Mitigation measures must then be implemented to control those risks.

In order to characterize the overall level of risk, the overall likelihood of occurrence along with the consequences of occurrence for each of the three factors are combined to determine the level of risk and provide a guide for the selection of appropriate biosafety levels, microbiological practices, safety equipment and facility safeguards to prevent laboratory acquired infections and exposure to personnel. The risk level is determined according to Figure 3:2.

Figure 3:2 Risk Assessment Matrix



The IBC may form a risk assessment sub-committee that meets more frequently than the IBC to review and assess biosafety and biosecurity risks on an-ongoing basis at the College. In addition, the risk control committee meets at least five times per calendar year to identify risk from a College-wide perspective and to provide advice to various College departments and stakeholders with respect to risk management. Any biosafety and biosecurity risks that are identified to affect the College community are brought forth to the risk control committee for consideration and for risk mitigation.

Review of the biosafety and biosecurity risks assessments are triggered by:

- a change to the approved CL2 work activities
- introduction of a new program or new work activities into the CL2 zones
- a change to the current biological agents inventory
- hiring a new responsible owner of biological agents or a change of responsible owner and consequent assessment of their work
- a renovation or alteration to the CL2 zones
- an incident involving a Risk Group 2 microorganism
- Non-compliance with biosafety and biosecurity measures

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.

3. 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, Animal PSDSs and animal disease fact sheet are also available on the PHAC website. 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.
- Decontamination should be carried out as required, using effective concentrations and contact times for decontaminants.

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 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 name of the responsible owner, the date the inventory was prepared, the room number, 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). Refer to 0 for the Biological Agents Inventory Log.

6.2.2 Importing/Exporting of Biological Agents

An import permit for both human and terrestrial animal pathogens are required by PHAC. The Canadian Food Inspection Agency (CFIA) issues permits for animal pathogens that are indigenous to Canada, aquatic and plant pathogens as well as for animals, animal products and by-products, tissue, sera and blood that are infected with animal pathogens. 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. Notify the BSO of any pathogens being imported into Canada or exported out of Canada.

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. Inform the BSO of all transfers of regulated pathogens within Canada, and between Biosafety Certificate holders.

6.2.3 Transfer of Biological Agents

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.

6.2.4 Transportation of Biological Agents

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 SHS for ground and air transportation of dangerous goods certification. Note that medical samples and dry ice are regulated as dangerous goods. Refer to 0 for the Standard Operating Procedure for the Transport of Infectious Materials at Red River College.

6.2.5 Transportation within the Containment Zone

6.2.5.1 Place the biohazard in a leak proof container.

6.2.5.2 Primary containers such as petri-dishes, culture tubes, cell culture dishes, cryovials, etc. must be sealed in a manner to prevent the loss of containment and a spill from the primary container. If the primary container does not have an air-tight seal, use materials such as Parafilm.

6.2.5.3 Place the primary container in a tube rack, tray or other container to keep the load secure.

6.2.5.4 If the volume of the biological agent including culture or preservation medium is equal to or exceeds one litre, use a cart that is lipped on all four sides to transport the load.

6.2.6 Transportation between Containment Zones on RRC Property

6.2.6.1 Using a cart lipped on all four sides, place the biohazard in a leak proof primary container, as described in section 6.2.5.

6.2.6.2 Place within a secondary leak proof and breakage resistant container such as a polypropylene Rubbermaid or Sterilite container.

6.2.6.3 Place absorbent material around the primary container inside the secondary container.

6.2.6.4 If a cooling material is required, place this in a tertiary container.

6.2.6.5 Transport a spill kit along with the agent that, at a minimum, contains:

a. absorbent media capable of containing and collecting the total volume of spilled material
b. an effective decontaminant solution capable of disinfecting the spill site, and
c. appropriate PPE for spill cleanup.

6.2.6.6 If transferring material, update the biological agent inventory log (refer to 0) and ensure an appropriate record is kept on file.

6.2.7 Transportation in Public Spaces off RRC Property

For the transport of biological agents off of Red River College property, contact the BSO prior to transport.

6.2.7.1 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, Universal Postal Union 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

6.3 Training

6.3.1 The IBC is committed to ensuring that training remains an important aspect of the College's Biosafety Program. A training needs assessment has been carried out to identify what training is required from all personnel working with regulated infectious material:

- 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 on the Biosafety Manual Training Log (Appendix IV).
- 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).
- Responsible owners are responsible for ensuring that each person under their direction is trained and understands the hazards associated with their work and how to protect themselves from those hazards. This training must be documented, so that the training that the students, faculty and staff have received can be tracked. Examples of work that requires specific training include biosafety techniques, exposure routes, waste disinfection, use of BSCs, and biohazard spill response.
- Training on the contents of the biosafety manual, including the emergency response plan (section 7) will be provided on an annual basis to all personnel working with biological agents.
- All personnel accessing the containment zone, who are not handling biological agents, such as visitors, contractors, janitorial staff, security staff, and maintenance staff are provided with training by the BSO on the hazards, risks and control measures to protect themselves from those hazards in accordance with their anticipated activities in the containment zone. Janitorial staff who are accessing the Containment Level 2 laboratories have been trained on and are to follow the RRC Safe Work Procedure for Non-Hazardous Waste Disposal and Floor Cleaning of Laboratories.
- The IBC will assess training needs at a minimum annually to identify gaps for instructors and students working with regulated infectious material, and to evaluate the e-learning training modules that are provided by PHAC. If the training re-assessment by the IBC identifies gaps in the existing biosafety training program, specific training will be developed to include the missing elements identified.

6.3.2 In addition to completing WHMIS training and Employee Safety Orientation training through Learn, RRC's learning management system, personnel working with biohazardous materials are to complete, as required, the PHAC Biosafety e-Learning training modules available on the PHAC website.

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

Operational Practices". These training records are to be 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 the current Manitoba Health Immunization Schedule and with the Canadian Immunization Guide. In no case shall an employed staff, faculty or student be placed at serious risk of contracting a vaccine-preventable potentially infectious disease. Departments will confirm that staff, faculty and students have met these conditions before beginning work with any of the identified vaccine-preventable potentially infectious material. At risk staff, faculty or student who refuses to accept immunization must receive documented counseling regarding the risks they are accepting by the refusal.

Table 6:1 Minimal Requirements for 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 as soon as reasonably practicable. If the incident occurred after hours, report the incident to Security Services and proceed to the nearest hospital emergency care. Refer to section 7.3 for emergency procedures for exposure incidents. Post-exposure protocol for managing exposure to blood and body fluids is available at Health Services.

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, rooms A-239 and A-346 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), to contact Security Services in case of emergency, and special entry requirements including required training, Personal Protective Equipment (PPE), etc. Refer to 0 for entry and exit procedure for room A-239.

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 by the BSO 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. Any individual who shares their security code will lose their access privileges and their access will be revised by the IBC.

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, require the pre-authorization of the BSO and an orientation to the hazards and precautions to be observed while 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. Decontaminate work surfaces daily and immediately after a spill. Decontaminants 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 are 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 SHS to receive an exemption from decontaminating your biological materials before disposal.

6.5.3.1 Chemical Methods of Biologic Decontamination

5. 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.

6. 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.

7. Hydrogen Peroxide

   Contact time: one minute. Accelerated Hydrogen Peroxide (AHP) is a single-step product solution, such as Oxivir Tb or equivalent, that is effective against key pathogens such as Tb, MRSA, Norovirus, etc. and that is safe for use on most surfaces.

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 autoclave validation protocol and standard operating procedure for the Operation of Autoclaves.

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

6.5.3.2.3 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 SHS 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 SHS.
- 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 SHS.
    2. Packaging the waste as directed to prevent exposure or injury (needle sticks, cuts) to anyone handling the waste; and
    3. Labeling the waste according to WHMIS labeling requirements, including the generator's name and the room number of the lab where the waste was generated.
- Biohazardous infectious waste must not be left in hallways. It must be secured at all times.

6.5.4 Biological Safety Cabinets (BSCs)

6.5.4.1 The biological safety cabinet is a type of primary containment equipment designed to protect the user from exposure to infectious material or toxins, to prevent loss of containment and to protect 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 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 BSO..

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 laboratory, 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 SHS 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 SHS to assist in evaluating the procedure, selecting the proper respirator and providing the required training and fit testing.

7 EMERGENCY RESPONSE PLAN

The emergency response plan is intended to outline the actions to be taken and the parties responsible in emergency situations. These include chemical/biological spill, exposure, release of infectious material, personnel injury or illness, power failure, fire, natural disaster, failure of primary containment devices such as a BSC, notification of key personnel and relevant federal regulatory agencies, incident follow-up and recommendations to mitigate future risks. Training personnel and providing annual refresher training on emergency response procedures confirms that personnel remain knowledgeable on these infrequently used procedures and that they can respond appropriately in case of an emergency. The annual refresher training also provides the opportunity to educate personnel on any new information about the infectious material that is being used, about changes to regulatory requirements and changes to recommended practices.

7.1 Responsibilities

Each responsible owner, in collaboration with the BSO, is responsible for developing spill clean-up procedures appropriate for the materials being used in the laboratory, as well as ensuring that a biological spill kit is available in an easily accessible location. Also, SHS is

responsible for providing those working with biological agents training in spill clean-up appropriate for the agents being used.

All RRC personnel are responsible for reporting incidents and near-misses. Any incident, exposure or unauthorized use of biological agents must be reported to Health Services and to the BSO as soon as is reasonably practicable and within 24 hours of the incident. Reporting of an incident or near-miss outside of regular business hours must be done to Security Services.

7.2 Spill Response

Spills are the most common incidents with the potential to cause exposure to infectious material. Due to the loss of containment, spills can contaminate surfaces, equipment, samples and workers. A pre-assembled biological spill kit that contains all items needed to contain and clean up a spill will facilitate spill response. Building services personnel should not be cleaning up spills of biological agents under any circumstances. Spill clean-up is the responsibility of the laboratory staff assigned to the area where the spill has occurred. The following procedures are provided as a guideline for cleaning up of biohazardous spills. If the spill is greater than one litre, is too dangerous to safely clean up, or occurs outside the containment zone, secure the affected area and immediately contact Security Services.

7.2.1 Spill Kit

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

- A decontaminant solution suitable for the biological agents being used in the laboratory
- 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)
- Signage indicating that entry is prohibited (for example Do Not Enter)

7.2.2 General Spill Clean-Up Procedure

Follow the steps outlined below to decontaminate the area affected by a spill and to contain a spill of infectious material:

1. Remove all contaminated or potentially contaminated PPE and discard in a biohazard bag.

2. Notify all personnel in the area that a spill has occurred and to immediately vacate the affected area.
3. If laboratory staff have been exposed or potentially exposed, proceed to Health Services without delay and inform the area supervisor and the BSO at once.
4. Post signage at all points of entry indicating that entry is prohibited. No one should enter the affected area for at least 30 minutes to allow aerosols to be carried away and heavier particles to settle.
5. After the appropriate time, decontamination can proceed under the supervision of the BSO.
6. Wear gloves and protective clothing, including face and eye protection, and respiratory protection if required.
7. Cover the spill with cloth or paper towels to contain it.
8. Pour an appropriate decontaminant over the paper towels and the immediately surrounding area, beginning at the outer margin of the spill area, working toward the centre.
9. After 30 minutes, clear away the materials. If there is broken glass or other sharps involved, use forceps to collect the material and dispose of in an appropriate sharps container.
10. Repeat steps 7 to 9 if necessary until the spill area has been completely cleaned and disinfected.
11. Dispose of all contaminated material and PPE into a biohazard bag.
12. After successful disinfection, inform the area supervisor that the site has now been decontaminated and the area is clear for re-entry.

7.2.3 Spill Outside the Containment Zone

The standard operating procedure for the transport of infectious material at RRC (0) outlines all the steps to be followed for the transport of biohazardous materials, in order to minimize the potential for spills.

If a spill occurs in a common hallway or a public space, cordon off the area, and immediately inform Security Services and the BSO. Restrict access to the affected area and decontaminate the spill with the appropriate decontaminant following the procedure for general spill clean-up (section 7.2.2). Consult with the BSO for assistance.

7.2.4 Spill Inside a BSC that did not Flow into the Front or Rear Grills

1. Leave the BSC turned on.
2. Remove your outer gloves and discard them inside the BSC.
3. Assemble clean-up materials and put on new protective clothing.

4. Surface decontaminate all objects in the cabinet and cover the spill with paper towels.
5. Apply a decontaminant that is effective against the microorganisms.
6. Pour decontaminant from the edge of the spill toward the centre. A gentle flooding action will avoid creating aerosols.
7. Allow at least 30 minutes.
8. Pick up broken glass or sharps with forceps and put them in a sharps container.
9. Wipe up the spill and put all materials into an autoclave bag inside the cabinet.
10. Items that cannot be autoclaved must be thoroughly disinfected before removing from cabinet.
11. Put the protective clothing into bags and autoclave them.
12. Wipe inside of cabinet with decontaminant.
13. Allow BSC to run for at least 10 minutes before resuming work.

7.2.5 Spill Inside a BSC that Flows into the Front or Rear Grills

If the spill overflows the drain pan under the BSC work surface, a more extensive decontamination of the BSC is required as follows:

1. Do not turn off the BSC during the spill clean-up.
2. Do not place your head under the sash or inside the BSC at any point during the clean-up.
3. If the drain valve under the BSC is open, close it.
4. If there are any sharp, contaminated objects, remove them using mechanical devices such as tongs or forceps. Discard of contaminated sharps in an appropriate sharps biohazard container.
5. Obtain a biohazard bag to discard of all material that will be used in the clean-up.
6. Prepare or acquire a decontaminant solution that is appropriate for the biological agent involved in the spill.
7. Flood the inside of the work surface tray of the BSC with the decontaminant solution; and for a Class II BSC, also flood the drain pans and catch basins below the work surface.
8. Allow a minimum of 30 minutes of contact time. Contact time may vary depending on the manufacturer’s instructions for the decontaminant used and the biological agent.
9. To remove the excess decontaminant from the work surface tray, wipe with a sponge or cloth. For Class II BSC, the tray can be drained into the catch basin that is below the work surface.
10. Once the tray has been drained, lift it and take out the removable front intake grille.

11. Wipe the top and underside surfaces of the intake grille with the decontaminant solution.
12. Place the grille and the tray back in position.
13. Drain the decontaminant from the catch basin into an appropriate sized container.
14. Dispose of the decontaminant solution in the regular sewer.
15. Dispose of the contaminated clean-up materials and contaminated PPE in a biohazard bag, according to the laboratory standard operating practices.

7.2.6 Spills Outside a BSC within the Containment Zone

For extensive CL2 contamination, SHS must be notified.

1. Avoid inhaling airborne material, while quickly leaving the room. Immediately notify other individuals in the area that there has been a biohazard spill.
2. Close the door and post a warning sign.
3. Remove contaminated clothing, turning exposed areas inward and place in a biohazard bag.
4. Wash all exposed skin with soap and water.
5. Inform supervisor, and if assistance is needed, consult the BSO.
6. Allow aerosols to disperse for at least 30 minutes before re-entering the laboratory.
7. Attain a spill kit containing the clean-up materials.
8. Put on protective clothing (lab coat, face protection, utility gloves, and booties if necessary).
9. 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.
10. Cover the area with decontaminant-soaked towels, and then carefully pour decontaminant around the spill. Avoid enlarging the contaminated area. Allow at least a 20 minute contact time.
11. If sharps were involved in the spill:
    - Pick up any sharp objects with forceps and discard in a sharps container.
    - Soak up the decontaminant 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.
    - Smaller pieces of glass may be collected with paper towels held with forceps.
12. If no sharps were involved in the spill, discard the materials into a biohazard bag.
13. Wipe surrounding areas and where the spill may have splashed with decontaminant.

14. Spray the area with a decontaminant solution known to be effective against the released microorganism. Allow for an appropriate contact time as per manufacturer's instructions.
15. Wipe down with decontaminant-soaked towels.
16. Place all contaminated paper towels and any contaminated protective clothing into a biohazard bag and autoclave.
17. Wash hands and exposed skin areas with antiseptic soap and water.

7.2.7 Spill Inside a Centrifuge

Should a loss of containment be suspected to have occurred while a centrifuge is running, the operator is to switch off the centrifuge and keep the centrifuge closed for a minimum of 30 minutes to allow any potential aerosols to settle. If the loss of containment is only discovered after the centrifuge lid has been opened, the operator is to immediately close the lid and keep it closed for a minimum of 30 minutes.

1. The operator is to immediately inform their supervisor and the BSO of the loss of containment.
2. Follow the instructions outlined in section 7.2.6.
3. To decontaminate the centrifuge, use a non-corrosive decontaminant known to be effective against the released microorganism. Consult the centrifuge manufacturer's specifications to confirm chemical compatibilities.
4. Using forceps, tweezers or other mechanical device, retrieve broken glass and other sharps debris and dispose of in a sharps container. Forceps, or cotton held in the forceps, should be used to retrieve glass debris.
5. Retrieve buckets, trunnions and rotor and place in a non-corrosive decontaminant, then wash with water and allow to air dry.
6. Any unbroken capped tubes may be placed in decontaminant in a separate container and carried to a BSC to be unloaded and recovered.
7. Using a non-corrosive decontaminant at the appropriate dilution, as per the centrifuge manufacturer's specifications, clean the centrifuge bowl.
8. Repeat step 7, wipe the centrifuge bowl with water, and allow to air dry.
9. All material used in the clean-up should be treated as infectious waste.

7.2.8 Blood and/or Other Body Fluids Spill

For blood and/or other body fluids, or other material with a high organic content and low concentration of infectious microorganisms, cordon off the area and follow the steps outlined in the RRC safe work procedure for the clean-up of blood and/or other body fluids.

7.3 Emergency Procedures for Incidents

7.3.1 Unauthorized Personnel

For incidents that involve unauthorized access to the containment zone, keep calm and report the location of the unauthorized personnel to Security Services.

7.3.2 Non-Medical Emergencies

Following an incident or exposure involving infectious material and it is not a medical emergency, affected personnel should proceed to Health Services at the Notre Dame Campus during regular work hours. If the incident or exposure occurs after hours or on weekends, personnel should go to the nearest hospital emergency department. Seeking medical attention soon after a potential incident or exposure can be critical to the timeliness of medical recommendations and implementation of testing.

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 individual who sustains a known or potential exposure incident must remove gloves and treat the affected area immediately by following the appropriate first aid response as presented below. Examples of injuries and illnesses include:

- Cuts and abrasions
- Sprains and strains (back, wrist, knee, etc.)
- Repetitive stress injury
- Bloodborne pathogen exposure such as a needle stick injury or blood splash
- Animal scratches or bites
- Chemical exposure

7.3.2.1 For needle stick, sharps injury, puncture wound, or animal scratch or bite

- Wash exposed area thoroughly for 15 minutes with warm water and antibacterial soap.

7.3.2.2 For eye exposure

- Flush the eye for a minimum of 15 minutes at a plumbed-in eye wash station while holding the eye open.

7.3.2.3 For skin exposure

- Wash the affected area for a minimum of 15 minutes.
- If the exposure is to the body, use the nearest emergency shower, remove contaminated clothing and stay under the shower for a minimum of 15 minutes. Use a privacy shower curtain, clean lab coat or spare clothing to cover.

7.3.2.4 For inhalation

- Move out of the contaminated area. Report to Health Services or get medical help.

7.3.2.5 For chemical exposure

- During regular business hours, report to Health Services. Provide information about the exposure including the hazardous product name, the time of exposure, the route of exposure, the dose, and the Safety Data Sheet.
- Outside of regular business hours, call 911 and follow the instructions given.
- Notify Security Services and your supervisor as soon as reasonably possible, within 24 hours of the incident.

7.3.3 Medical Emergencies

For incidents involving a medical emergency, call or delegate the nearest individual to call

Security Services. If the situation is life-threatening:

- Call 911 or 9-911, and then
- Inform Security Services so that they can direct emergency personnel to the scene of the incident.

7.4 Incident Reporting and Investigation

Incident involving pathogens, toxins or other regulated infectious material, including failure of containment systems must be reported immediately to the BSO. Depending on the incident, the BSO may be obligated to report the incident to the PHAC under the conditions of the License. Incidents may also need to be reported to agencies such as local law enforcement, Regional Health Authority, Provincial Health, or Manitoba Workplace Safety and Health division, as required.

Biosecurity-related incidents such as missing pathogens or toxins, unauthorized entry or access to the containment zone, and loss of keys/access cards/alarm codes must be reported to the BSO and where applicable, to Security Services, so that they can be appropriately documented, investigated and reported as necessary. RRC is required under the conditions of the License to conduct and document incident investigation for any incident involving pathogens, toxins or other regulated infectious material, or failure of containment systems in order to determine root cause(s) and prevent re-occurrence.

It is the responsibility of all RRC personnel to report any incidents, exposures or unauthorized use of biohazardous agents to the BSO. Reporting must be done at the earliest time possible and within 24 hours of the incident or exposure. If the incident occurred outside of regular business hours, report it to Security Services.

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 SHS. Evaluation of near misses can lead to alternative work practices and implementation of engineering controls to minimize future incidents.

7.4.1 Reporting to PHAC

Following an exposure to a human pathogen or toxin, or recognition of a disease that has or may have been caused by an exposure to a human pathogen or toxin, RRC is required to inform the PHAC without delay by submitting an exposure notification report. An exposure follow-up report which documents the completed investigation is required to be submitted to PHAC within 15 days of the submission of an exposure notification report that involves a security sensitive biological agent (SSBA) or within 30 days of the submission of an exposure notification report that involves a human pathogen or toxin other than an SSBA.

7.4.2 Incident Investigation and Follow-up

SHS in cooperation with the area supervisor and their staff will conduct the necessary investigation of an 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. SHS 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, Workplace Safety and Health committee, senior management, etc.).

7.5 Emergency Procedures in Case of a Fire

If you detect fire or smoke, follow the directions in the RRC Emergency Response Plan.

Close cooperation among RRC Safety and Health Officers, the Emergency Preparedness Coordinator, and the local fire prevention officers is essential, as apart from chemical hazards, the effects of fire on the possible dissemination of infectious material must be considered. This may determine whether it is best to extinguish or contain the fire.

The BSO and the Emergency Preparedness Coordinator will consult with the local first responder organizations, including police, fire department and paramedics, to develop emergency preparedness plans. Fire and other services will be made aware in advance which rooms contain potentially infectious materials and be acquainted with the laboratories layout and contents. Responsible owners are trained on the proper use of fire extinguishers.

7.6 Emergency Procedures in Case of a Natural Disaster

A natural disaster is defined as a natural event such as a flood or earthquake, or a severe weather condition such as a tornado, with catastrophic consequences. The RRC Emergency Response Plan gives general instructions in the event of a natural disaster. All biohazardous materials should be stored in a manner to minimize the risk of damage or spill due to a natural disaster.

After a natural disaster, RRC will warn local or national emergency services of the potential hazards within and/or near laboratory buildings. In the recovery phase, all biohazardous materials must be accounted for. An inventory of all biohazardous materials must be maintained for reference. Infectious materials should be collected in leak-proof boxes. Salvage or final disposal will be determined by the BSO, in consultation with biosafety staff, in accordance with local ordinances.

Prior to resuming laboratory work after a natural disaster, all critical equipment and infrastructure should be inspected and certified prior to use. Critical equipment and infrastructure include, but is not limited to, BSCs, freezers, refrigerators, incubators, gas and vacuum lines, ventilation system, gas and vacuum lines.

7.7 Loss of Containment Due to Power Failure

All equipment that is critical to maintaining containment of infectious materials must be identified and placed on emergency power to avoid loss of containment or damage during a power interruption. During a power interruption, cease all work with biohazardous materials as required safety equipment may not be functional during this time.

7.7.1 Power Failure while Working in a BSC

In case of a power failure while working in a BSC, proceed as follows:

1. Close/cover all containers and cap cultures.
2. Surface decontaminate all materials prior to removing them from the BSC.
3. Return the material to the incubator, refrigerator, etc.
4. Close the sash where possible and turn off the blower motor switch.
5. When the power returns, BSC start-up procedures must be performed again.

7.7.2 Loss of Primary Containment Devices, such as BSC

If it is determined that the BSC failure is due to equipment malfunction, proceed as follows:

1. Close/cover all containers and cap cultures.
2. Surface decontaminate all materials prior to removing them from the BSC.
3. Place waste in a biohazard bag for autoclaving.
4. Decontaminate cabinet surfaces, and turn off the blower motor switch.
5. Place a warning sign on the BSC (for example, “Out of Order, DO NOT Use.”).
6. Report the BSC malfunction to the area supervisor and to the BSO.
7. Transport closed containers to a functional BSC to continue work in accordance with the standard operating procedure for the transport of infectious materials (0). Alternatively, return the material to the incubator, refrigerator, etc.

The BSC must be certified by a service contractor prior to putting it back in service.

8 REFERENCES

1. Public Health Agency of Canada. Canadian Biosafety Standard. Second Edition.
2. Public Health Agency of Canada. Laboratory Biosafety and Biosecurity.
3. Public Health Agency of Canada e-Learning Portal. Laboratory Biosafety and Biosecurity. Principles of Laboratory Biosafety.
4. Government of Canada. Department of Justice. Laws. Acts. Human Pathogens and Toxins Act.
5. World Health Organization. Laboratory Biosafety Manual. Third Edition.

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
0	Original Document	2015-October-28	Soha Baddour
1	Revised in response to the PHAC inspection in June 2018	2019-01-15	Soha Baddour
1	Revised in response to the PHAC inspection in June 2018	2019-09-09	Jennifer Brydon

APPENDIX I: PLAN FOR ADMINISTRATIVE OVERSIGHT FOR PATHOGENS AND TOXINS

RED RIVER COLLEGE
OF APPLIED ARTS, SCIENCE AND TECHNOLOGY

Plan for Administrative Oversight for Pathogens and Toxins

Author:

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

Reviewed and Approved:

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

RED RIVER COLLEGE Plan for Administrative Oversight for Pathogens and Toxins

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

RED RIVER COLLEGE OF APPLIED ARTS, SCIENCE AND TECHNOLOGY **Plan for Administrative Oversight for Pathogens and Toxins**

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, Academics 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 the Senior Leadership Team 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 quarterly 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) director, 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 (**Error! Reference source not found.**) 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.
- The JWSHC serve as a monitor of the College's Internal Responsibility System, to which all workplace parties contribute by carrying out their legislated duties per the Manitoba Workplace Safety and Health Act. The members of the JWSHCs shall carry out the *Duties of the Safety and Health Committee* per the Manitoba Workplace Safety and Health Act W210, Section 40(10). The JWSHCs report deficiencies, recommendations, and action to be taken via the JWSHC minutes to the Senior Leadership Team, to Manitoba Growth, Enterprise and Trade, and to staff and students of RRC by posting the minutes on the JWSHC bulletin boards.
- 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, as applicable.
- The Risk Control Committee considers any matters relating to the identification, assessment, monitoring and management of risks associated with the operation of the College that it determines to be appropriate in its sole discretion. The duties of the Risk Control Committee shall include:
    1. Identification and evaluation of exposures and hazards;
    2. Development and implementation of internal policies, procedures, compliance and control systems to manage risk;
    3. Assessment and monitoring of the effectiveness of existing control measures;
    4. Reporting the College's risk profile and making recommendations with respect to the College's Risk Management Strategy;
    5. Selecting insurance advisors (a broker or agent) as deemed prudent to assist in negotiating insurance arrangements;
    6. Communicating the risk management plan and loss control procedures to affected parties, including employees, volunteers, the board of governors, clients and the public;
    7. Overseeing loss prevention activities.
- IBC instructors and EAs report to the chairs of their respective department who are also members of the IBC. Both chairs on the IBC (Chair of Life Sciences and Chair of Allied Health Sciences) report to the Dean of the

School of Health Sciences and Community Services. The Dean reports to the Executive Director of Academics who in turn, reports to the VP academics who's also the licence holder. The biosafety officer reports to the director of Environmental Health and Safety, who also reports to the Executive Director of Academics.

- IBC instructors and EAs have a science background, with varying level of expertise, from medical laboratory science to pharmaceutical manufacturing expertise. The BSO has a science background and expertise in both sciences and occupational health and safety. The Risk Control Committee is composed of legal counsel, directors and VPs including VP academics who's also the licence holder, VP finance and administration and VP Strategic Development, each with extensive expertise in their respective areas.
- JWSHC Membership: In accordance with The Manitoba Workplace Safety and Health Act Section 40.8, JWSHCs will be comprised of a maximum of twelve members, with half of the members selected by Management, and half elected per the MGEU Collective Agreement.
    1. The NDC JWSHC shall have no less than twelve members to ensure adequate representation of the various departments. The management co-chair for the NDC JWSHC is the Director of Facilities. This is a permanent role.
    2. The EDC JWSHC shall have representation from Paterson GlobalFoods Institute (PGI) and the Language Training Centre (LTC).
    3. The term of office for members is two years
    4. Members continue to hold office, and will attend regularly scheduled meetings until they have been replaced to ensure that quorum may be met in the interim.
- Risk Control Committee Membership: The co-chairs of the committee are the Corporate Counsel and the Insurance Claims Specialist. The co-chairs appoint a Recording Secretary to record minutes of each meeting. The Recording Secretary may or may not be a member of the Committee. The Committee is comprised of:
    1. The Corporate Counsel;
    2. The Insurance Claims Specialist;
    3. Vice President, Finance and Administration;
    4. Vice President, Academic
    5. Vice President, Strategic Development;
    6. Director, Facility Management
    7. Director, Information Technology Solutions;

8. Emergency Preparedness Coordinator.

- To manage potential conflict of interest that may arise from the BSO reporting to the VP academics, the College's policy on Conflict of Interest will be followed. Also, The College complies with the Manitoba Workplace Safety and Health Act where the worker cannot be discriminated against for giving information about workplace conditions affecting the safety, health or welfare of any worker nor for taking reasonable action at the workplace to protect the safety or health of another person.

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 Executive Director, Academics who represents health and safety and biosafety and biosecurity matters to senior management and the Board of Governors. The Executive Director, Academics at RRC is Arnold William Boldt, O.C. Arnold can be reached at his desk phone at 204-632-2194, on his cell at 204-806-6018 or by email at awboldt@rrc.ca.

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.

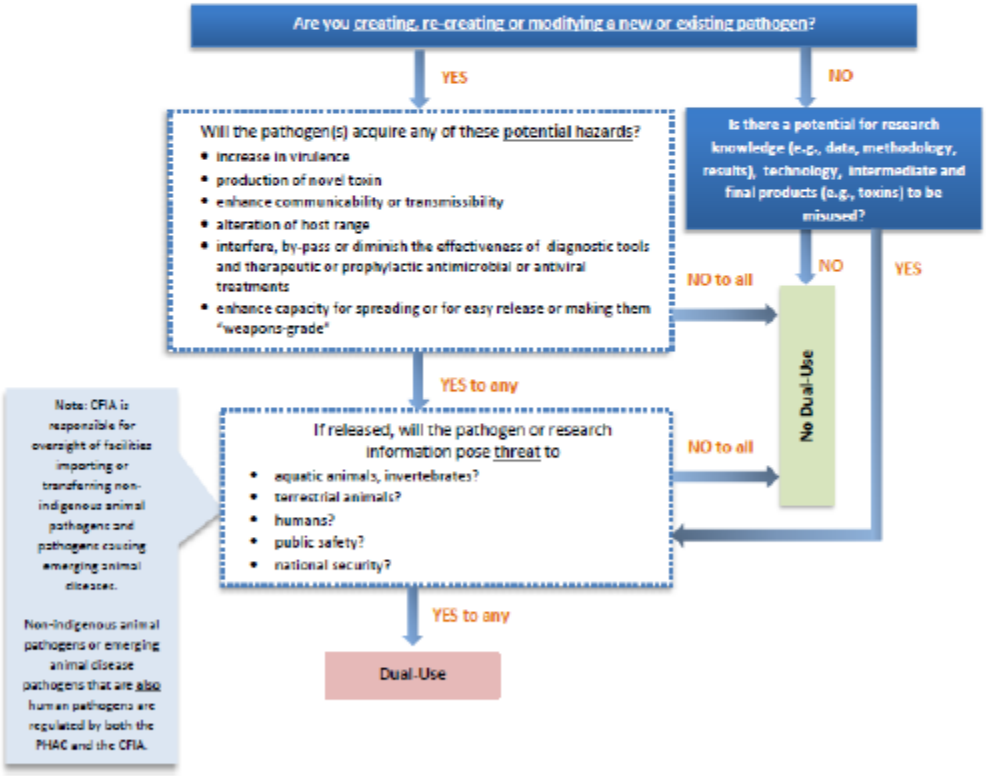
2.4.2 The Advisory Curriculum Committee must bring any new learning involving biosafety to the IBC for review prior to being approved as part of the College's curriculum.

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



2.4.4 Risk Assessment

1. Overarching Risk Assessment (ORA)

- A broad risk assessment of the activities being conducted at the College was performed during the initial development of the Biological Safety Program. A top-down ORA is also performed upon the review of the Plan, every three years.
- The ORA is conducted and documented to identify the hazards, potential routes of exposure, and appropriate mitigation strategies.
- The ORA includes, but is not limited to, biosecurity risk assessment (RA), emergency response plan RA, medical surveillance RA, and communication plan RA.

1. Biosecurity RA
   - Biosecurity is implemented to prevent theft, misuse or intentional release of pathogens.
   - Biosecurity RA includes physical security, personnel security, material control, transport security, information security and program management.
2. Emergency Response Plan RA
   - The emergency response risk assessment involves possible scenarios of exposure such as splashes or cuts, spills, loss of power affecting pathogens storage and ventilation.
   - The College emergency preparedness coordinator is responsible for the emergency response plan.
3. Medical Surveillance RA
   - The medical surveillance risk assessment identifies and assesses the potential of biological agents to cause infection or disease.
   - It involves the assessment of the consequences of infection, vaccine availability, treatment availability, pre-placement worker evaluation and medical surveillance of employees.
4. Communication Plan RA
   - The communication plan assessment includes the notification of staff and faculty of their responsibilities and duties under the Biosafety program, training requirements and notification of regulators, medical staff and the public in case of exposure to or accidental release of biological agents.

2. Pathogen Risk Assessment

- A pathogen RA is used to assess the risks posed to employees who work with the biological agents. It's the responsibility of the RO to conduct the pathogen RA based on the pathogen safety data sheet (PSDS). PSDSs are readily available to all personnel working with biological agents.

- Pathogen RA is included with the documentation for local risk assessment.

3. Local Risk Assessment (LRA)

- LRAs are site and activity specific RAs that help to support the ORA. They are a step-by-step RA of specific experimental protocols and standard operating procedures.
- LRAs are performed by ROs and involve the identification of tasks and/or procedures, the breakdown of tasks into steps, the identification of potential exposure risk for each step, and the determination of the appropriate mitigation strategy.
- The step-by-step description includes parameters such as manipulation of pathogen, location of the work (BSC, open bench, etc.), risk potential (quantity, aerosol generation, etc.) and precautionary measures.
- The consequences of exposure are assessed by identifying the pathogenicity of the biological agent, the infectious dose, route of infection and mode of transmission.
- LRA is performed by ROs as part of the biosafety certificate application (internal process) and presented to IBC for review prior to the Biosafety Certificate being granted to the RO. The RO can involve the BSO in this process.

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

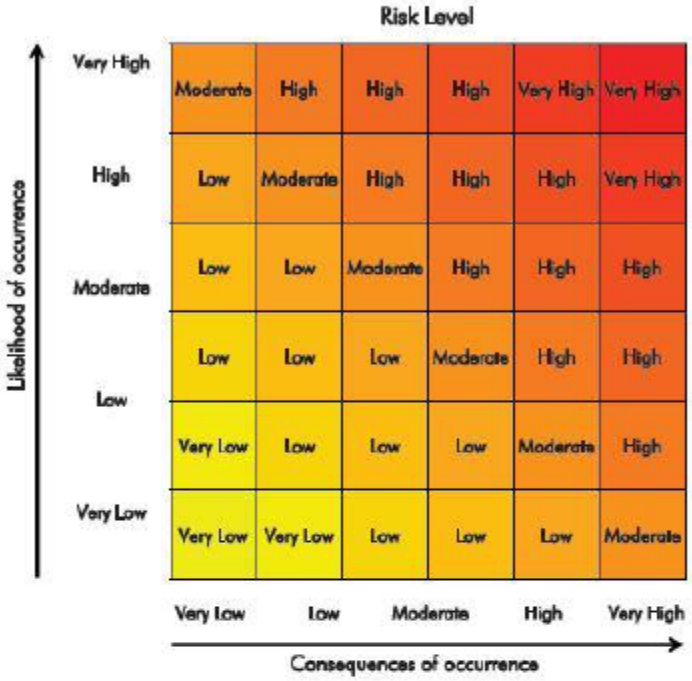
1. In order to assess biosafety and biosecurity risks, the following measures are implemented at RRC:

- 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.
- Responsible owners at RRC working with biological materials are responsible for ensuring that these materials are managed in a way that minimizes risk of laboratory acquired infections or exposure to personnel. The RO is responsible for performing a risk assessment prior to the start of any work with a new agent of a new procedure and for submitting their completed risk assessments to the IBC for review and approval. The IBC and the BSO are available to assist with the risk assessments.

2. Once the dual-use RA, ORA, LRA and Pathogen RA have been identified as indicated in Element 4 (Section 2.4), they are used to assess the level of risk. To determine the level of risk, the individual performing the RA must answer the following questions: how likely is it to happen? (Occurrence likelihood) and what are the consequences of the event? (Occurrence).
3. To determine the likelihood and consequences of occurrence, three factors will be considered: the biological agent infection and disease potential, assessment of the host, and assessment of the work activities and laboratory environment.
    - The biological properties of the biological agent that would cause an infection must be considered along with the routes of infection, the natural environment and the infectious dose. These are important to assess the risk to human and/or animal community within the laboratory and outside of the laboratory and in assessing the potential for secondary transmission. Also, an assessment of the disease or consequences of the disease caused by the biological agent must be considered including treatment options and mortality rates.
    - The assessment of the medical condition of individuals working with biological agents is necessary, especially if the individual is susceptible to infection due to a weakened immune system. The potential consequences of disease to these individuals must be assessed.
    - The assessment of the work activities and laboratory environment should identify any potential areas where an exposure to the biological agent is likely to occur. Mitigation measures must then be implemented to control those risks.

In order to characterize the overall level of risk, the overall likelihood of occurrence along with the consequences of occurrence for each of the three factors are combined to determine the level of risk and provide a guide for the selection of appropriate biosafety levels, microbiological practices, safety

equipment and facility safeguards to prevent laboratory acquired infections and exposure to personnel. The risk level is determined according to Figure 2:2.Figure 2:2 Risk Assessment Matrix



4. The IBC may form a risk assessment sub-committee that meets more frequently than the IBC to review and assess biosafety and biosecurity risks on an-ongoing basis at the College. In addition, the risk control committee meets at least five times per calendar year to identify risk from a College-wide perspective and to provide advice to various College departments and stakeholders with respect to risk management. Any biosafety and biosecurity risks that are identified to affect the College community are brought forth to the risk control committee for consideration and for risk mitigation.
5. Review of the biosafety and biosecurity risks assessments are triggered by:
   - a change to the approved CL2 work activities
   - introduction of a new program or new work activities into the CL2 zones
   - a change to the current biological agents inventory
   - hiring a new RO or a change of RO and consequent assessment of their work
   - a renovation or alteration to the CL2 zones
   - an incident involving a Risk Group 2 microorganism
   - Non-compliance with biosafety and biosecurity measures

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.
- Senior management at the College is responsible for determining the acceptable levels of risk as well as the resources available to mitigate the risks.
- Biosecurity risk is mitigated using:
    1. Physical security measures whereby access to the CL2 zones is controlled using individualized alarm codes and access to general chemical storage areas is regulated through card swipe for a limited number of users.
    2. Enhanced screening for personnel: Security officers, who have access to all College areas, undergo a background check prior to hiring.
    3. A clear accountability framework for pathogens and toxins: ROs are responsible for the biological agents that they work with and must account for all vials to the IBC on a yearly basis.
- The BSO is the common link between all committees involved in the control and management of biosafety and biosecurity risks. The BSO is a member of the IBC and of the JWSHC. Also, in case where a biosafety and/or biosecurity risk is identified where

the risk control committee needs to be involved to mitigate the risk to the College and to the community, the BSO then attends the risk control committee as a guest and brings those risks forward.

- The VP academics has the authority to stop work if necessary. If there is an imminent risk related to compliance, a security officer has the authority to remove the individual from the containment zone. Any RO who has been approved by the IBC but does not follow biosafety and biosecurity requirements as per the Biosafety manual will have their biosafety certificate reviewed and potentially suspended by the IBC. If the potential for dual-use was identified from the assessment as outlined in Figure 2:1, the IBC will request the RO to change their procedure such that there is no dual-use potential.

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.

When new work areas are to be added where biological agents and/or biological materials will be handled, used, or stored, the relevant academic program must notify the IBC prior to any work commencing. The IBC will then review the scope of the work and assess whether the Plan needs to be reviewed and updated.

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, Academics and to the Executive Director, Academics.
- 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 II: BIOLOGICAL AGENTS INVENTORY LOG

Biological Agents Inventory Log

Revision No.: 00

RED RIVER COLLEGE	Responsible Owner Name:			Preparation Date (YYYY/MMM):	
Biological Agent	**Risk Group**	**Location**			**Quantity**
		Room No.	**Freezer**	**Rack**	**Box**
		A-202			
		A-202			
		A-202			
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Original Date: November 2018

Page **1** of **1**

APPENDIX III: TRANSPORT OF INFECTIOUS MATERIALS AT RED RIVER COLLEGE STANDARD OPERATING PROCEDURE

RED RIVER COLLEGE OF APPLIED ARTS, SCIENCE AND TECHNOLOGY	Standard Operating Procedure Revision No.: 00
Title Transport of Infectious Materials at Red River College	

1 PURPOSE/SCOPE

This Standard Operating Procedure (SOP) describes the measures to be taken for the safe transport of infectious material outside of the containment zone at Red River College (RRC). The purpose of this SOP is to prevent the loss, diversion, or release of infectious material.

2 RESPONSIBILITY

Table 2:1 identifies the personnel and/or departments responsible for the generation, maintenance and review of this standard operating procedure (SOP).

Table 2:1 Responsibilities

Responsibility	Department	Personnel
Generation of SOP	Safety and Health Services	Soha Baddour
Review of SOP	Life Sciences/Allied Health Sciences	Department Designate(s)
Approval of SOP	Safety and Health Services	Jennifer Brydon
	Life Sciences	Curtis Aab
	Allied Health Sciences	Lesley McGuirk

3 REFERENCES

1. Manitoba Workplace Safety and Health Regulations, M.R 217/2006
2. Public Health Agency of Canada (2015, March). Canadian Biosafety Standard, 2nd edition.
3. Public Health Agency of Canada (2016, March). Canadian Biosafety Handbook, 2nd edition.
4. Data on file. Red River College. Personal Protective Equipment Policy E7.

4 MATERIALS

4.1 Documents/Logsheets

1. Biological Agents Inventory Log (Appendix I)

4.2 Equipment/Supplies/Consumables

1. Appropriate primary and secondary containers that are leak-proof and breakage-resistant.
2. Lipped cart on all four sides for transport that is capable of sustaining the load.
3. Biological spill kit.
4. Absorbent material.

RED RIVER COLLEGE OF APPLIED ARTS, SCIENCE AND TECHNOLOGY	Standard Operating Procedure	
Title	**Transport of Infectious Materials at Red River College**	**SOP Revision No.**	**00**

5. Required Personal Protective Equipment (PPE) is presented in Table 4:1.

Table 4:1 Required PPE

☐ Dust Mask	☐ Hearing Protection
☒ Eye Protection	☒ Protective Clothing Type: Laboratory Coat
☐ Face Shield	☐ Respiratory Protection – NIOSH Approved
☐ Fall Protection	☐ Safety Footwear – CSA Approved
☒ Gloves Type: Nitrile or equivalent	☐ Other:

5 DEFINITIONS/ABBREVIATIONS

1. CSA: Canadian Standards Association
2. NIOSH: National Institute of Occupational Safety and Health
3. PPE: Personal Protective Equipment
4. SHS: Safety and Health Services
5. SOP: Standard Operating Procedure
6. TDG: Transportation of Dangerous Goods
7. WHMIS: Workplace Hazardous Materials Information System

6 PROCEDURE

6.1 Prohibited Activities/Items

The activities/items that are prohibited in this procedure are presented in Table 6:1.

Table 6:1 Prohibited Activities/Items

☐ Dangling jewelry	☒ Other: Leaving the transported biological agent unattended for any reason
☐ Jewelry, watches, etc.	☒ Other: Transporting the biological agent in an unsealed container
☐ Loose fitting clothing	☒ Other: Transporting the biological agent without an appropriate spill kit
☐ Long or loose hair	☒ Other: Transporting the biological agent in public transportation or in personal vehicles.

6.2 Training

Table 6:2 lists the training required prior to performing this procedure.

Table 6:2 Training Required

☒ WHMIS	☒ Other: Transportation of Dangerous Goods as applicable
☐ Competency [a]	☐ Other:

[a] Competency training may include observed, supervised and unsupervised training

RED RIVER COLLEGE OF APPLIED ARTS, SCIENCE AND TECHNOLOGY	Standard Operating Procedure	
Title: Transport of Infectious Materials at Red River College	SOP Revision No.	00

6.3 Transportation

Biohazardous materials may be transported within the containment zone or laboratory, between containment zones on RRC property, and in public spaces off RRC property. Any uncontrolled release of a biological agent must be reported to the lab supervisor and to the RRC Biological Safety Officer.

6.3.1 Transportation within the Containment Zone

6.3.1.1 Place the biohazard in a leak proof container.

6.3.1.2 Primary containers such as petri-dishes, culture tubes, cell culture dishes, cryovials, etc. must be sealed in a manner to prevent the loss of containment and a spill from the primary container. If the primary container does not have an air-tight seal, use materials such as Parafilm.

6.3.1.3 Place the primary container in a tube rack, tray or other container to keep the load secure.

6.3.1.4 If the volume of the biological agent including culture or preservation medium is equal to or exceeds one litre, use a cart that is lipped on all four sides to transport the load.

6.3.2 Transportation between Containment Zones on RRC Property

6.3.2.1 Using a cart lipped on all four sides, place the biohazard in a leak proof primary container, as described in section 6.3.1.

6.3.2.2 Place within a secondary leak proof and breakage resistant container such as a polypropylene Rubbermaid or Sterilite container.

6.3.2.3 Place absorbent material around the primary container inside the secondary container.

6.3.2.4 If a cooling material is required, place this in a tertiary container.

6.3.2.5 Transport a spill kit along with the agent that, at a minimum, contains:

a. absorbent media capable of containing and collecting the total volume of spilled material

b. an effective disinfectant capable of disinfecting the spill site, and

c. appropriate PPE for spill cleanup.

6.3.2.6 If transferring material, update the biological agent inventory log (refer to Appendix I) and ensure an appropriate record is kept on file.

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6.3.3 Transportation in Public Spaces off RRC Property

For the transport of biological agents off of Red River College property, contact the RRC Biological Safety Officer prior to transport.

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, Universal Postal Union 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.

7 REVISION HISTORY

Table 7:1 outlines the revisions that have been made to this document.

Table 7:1 Revision History

Version No.	Revision Description	Date	Author
1	Original Document	November 2018	S. Baddour

APPENDIX IV: BIOSAFETY MANUAL TRAINING LOG

RED RIVER COLLEGE OF APPLIED ARTS, SCIENCE AND TECHNOLOGY

Training Sign-off

Name of Training: Biosafety Manual Training. Personnel will review the RRC Biosafety Manual. Upon review they will complete the training sign-off.

Date (mmddyy)	Print Name	Staff ID #	Signature

APPENDIX V: ENTRY AND EXIT PROCEDURE FOR ROOM A-239

RED RIVER COLLEGE | SAFETY AND HEALTH SERVICES

Entry and Exit Procedure for Room A-239

PURPOSE/SCOPE

Room A-239 is designated as a containment level 2 (CL2) laboratory. Entry requirements are posted at the point(s) of entry, including personal protective equipment (PPE) requirements.

A-239 is designed similarly to a cleanroom, with an entry antechamber and an exit antechamber.

This procedure is aimed at protecting individuals from exposure by preventing cross-contamination to personal clothing and the spread of contamination outside of the containment barrier.

RESPONSIBILITY

All personnel, students and visitors requiring access to the containment zone must follow this procedure.

REFERENCES

1. Public Health Agency of Canada (2015, March). Canadian Biosafety Standard, 2nd edition.
2. Public Health Agency of Canada (2016, May). Canadian Biosafety Handbook, 2nd edition.

ENTRY PROCEDURE

Personal belongings must be stored separately from dedicated PPE, outside the containment barrier. This also avoids the need to subject personal belongings such as outerwear, backpacks, purses, cell phones, etc. to the destructive effects of the decontamination process in the event it becomes contaminated.

Enter A-239 through the antechamber past the entry door.

Dedicated PPE is available upon entering the lab. Don the appropriate PPE.

EXIT PROCEDURE

Dedicated PPE such as laboratory coats and eye protection must be removed inside the containment zone. Gloves are the last PPE that is removed when exiting the containment zone.

After removing gloves, thoroughly wash hands immediately before leaving the containment zone so that hands are not contaminated before exit. Handwashing is one of the most effective ways to protect individuals from potential exposure. A hands-free sink, soap and paper-towel dispensers are available by the exit door.

Use a paper towel to push open the laboratory exit door. The same paper towel used to dry hands can be used for this purpose. Dispose of the paper towel in the garbage bin located in the exit antechamber.

Origin Date: November 2018 Revision No.: 00