BI Safety Program

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1. Introduction

The purpose of the Biointerfaces Institute (BI) Safety Program is
- to educate users on safety references that influence BI policies and procedures
- to define health and safety responsibilities and accountabilities within the BI
- to outline BI specific policies and procedures

1.1. Disclaimer

The BI safety manual, policies and standard operating procedures are intended to provide basic rules for safe work practices in the BI facility. These guidelines may be supplemented with McMaster University policy, risk management, and the lab safety handbook, in addition to the Occupational Health and Safety Act. Individuals frequenting the BI are encouraged to consult relevant McMaster University safety committees (e.g. EOHSS and the Biosafety Office), handbooks, Standard Operating Procedures, policies and the Risk Management Manual, in addition to governmental safety programs.

BI policies are by no means all-encompassing and any omission is not an excuse for unsafe practices. Furthermore, BI safety procedures and policies do not replace the user's supervisor responsibility for having experiment-specific safe work practices and SOPs, and the use of such proper procedures to eliminate unnecessary hazards.

Any concerns, questions and conflicts between BI policies and other safety governing bodies and/or user specific procedures should be brought to the attention of BI staff.

2. Acronyms

Acronym	Definition
BI	Biointerfaces Institute
BSC	Biological Safety Cabinet
BSL	Biosafety Level
BUP	Biohazard Utilization Protocol
CBSG	Canadian Biosafety Standards and Guidelines
CFIA	Canadian Food Inspection Agency
CJHSC	Central Joint Health and Safety Committee
EOHSS	Environmental & Occupational Health Support Services
JHSC	Joint Health and Safety Committee
HC	Health Canada
HEPA	High Efficiency Particulate Air
HSC	Health Sciences Centre
HPIR	Human Pathogens Importation Regulations
HPTA	Human Pathogens and Toxins Act

MILO	McMaster Industry Liaison Office
MSDS	Material Safety Data Sheet
OHSA	Occupational Health and Safety Act
OML	Ontario Ministry of Labour
PBAC	Presidential Biosafety Advisory Committee
PI	Principal Investigator
PHAC	Public Health Agency of Canada
PSDS	Pathogen Safety Data Sheet
PPE	Personal Protective Equipment
RMM	Risk Management Manual
SOP	Standard Operating Procedure
TDG	Transfer of Dangerous Goods
UN	United Nations

3. Safety Terms & Definitions

Audit	A systematic check to determine quality in the operation of some function or the performance of some activity.
BI Associate Director	The secondary supervisory BI staff member who is responsible for the BI facility.
BI Director	The primary supervisory BI staff member who is responsible for the BI facility.
BI Research Technician	A hired employee of the BI that reports to the BI Director and/or BI Associate Director responsible for the BI laboratory space.
BI Staff	All employees of the BI, encompassing administration, business, and research.
Biohazard	A biohazard is any biological materials that could cause health hazards to humans or animals, including infectious or potentially infectious agents. Such agents could include bacteria, tissues, cell lines, fungi, microorganism toxins, viruses and prions.
Biohazard Risk Groups or Levels	Risk groups are used to categorize relative hazards or infective organisms, based on pathogenicity, infectious dose, mode of transmission, host range, effective preventive measures and effective treatment methods.
Biohazard Risk Group 1	Biohazard agents unlikely to cause disease in healthy workers or animals.
Biohazard Risk Group 2	Biohazard agents that could cause disease following exposure, but under normal circumstances is unlikely to be a serious hazard to workers, animals, community, and the environment.

Biohazard Containment Level	Containment levels describe biological, physical and operational containment methods to minimize exposure and aerosol production.
Biohazard Containment Level 1	Requires no special design beyond a research laboratory. Biological safety cabinets are not required, and containment is achieved through good microbial laboratory practices.
Biohazard Containment Level 2	Exposure hazards include ingestion, inoculation and mucous membrane transmission, with a possibility of aerosol production leading to airborne exposure. Containment is typically regulated by the use of BSC and sealed containment when outside a BSC, in addition to personal protective equipment. Good hygiene practices, such as frequent hand-washing, and decontamination procedures are advised.
Biohazard Risk Assessment	Detailed risk assessments will determine the risk group and containment level for a biohazard agent/material. In addition to those criteria, other factors should be considered, including aerosol production, quantity, concentration, agent stability, type of work, and the use of recombinant organisms.
Buddy System	A system of organizing work so that the worker can be seen or heard by another worker located in close proximity to the workstation.
Contaminant	Any solid, liquid or gas, odour, heat, sound, vibration or radiation resulting from human activities that may cause adverse effect on people, property, or the natural environment.
Critical injury	An injury of a serious nature that, places life in jeopardy; produces unconsciousness; results in substantial loss of blood; involves the fracture of a leg or arm, but not a finger or toe; an amputation of a leg, arm, hand or foot but not a finger or a toe; consists of burns to a major portion of the body; or causes the loss of sight in a eye.
Due Diligence	A general duty to take every precaution reasonable in the circumstances to protect health and safety.
Environment	Surroundings in which an organization operates including air, water, land, natural resources, flora, fauna, humans, and their interaction. Surroundings extend from within the organization to the global system.
Hazard	A situation or incident that may results in injury or a “near miss”.
Inspection	An examination of the workplace physical condition to identify deficiencies that may case injury, illness or property damage.
Safety Orientation	A process of education to ensure person(s) are aware of the

	hazards prior to commencing the activity and practice the procedures to prevent injury, adverse health exposure and/or property damage.
Standard Operating Procedure (SOP)	Written and communicate procedures that define the techniques, processes and best practices required to prevent injury and/or occupational illness or damage to BI equipment or the environment.
Spill	A discharge of a pollutant into the natural environment, which is the land, air or water of Ontario, from out of a structure, vehicle or other container, that is abnormally in quality or quantity in light of all the circumstance of the discharge.
Supervisor	Person who has authority or control over a worker.
Unsafe work	A situation or incident that the user has reason to believe may endanger the health or safety or themselves or other users.
User	Person who is authorized to perform work within the BI.
Visitor	Person who does not work within the BI but wishes to enter the BI facility.
Workplace	Any land, premises, location or thing at, upon, in or near which a worker works.
Principal Investigator	Researcher who has authority or control over a worker.

4. Safety References

Safety within the BI is influenced by various government agencies, safety acts and policies, and McMaster University.

4.1. Ontario Ministry of Labour

The Ontario Ministry of Labour (OML) develops and enforces labour legislation to create, communicate and maintain safe, reasonable and agreeable workplace practices. Also, it strives to prevent and reduce workplace injuries and illnesses and may set health and safety training standards.

OML issues guidance documentation to assist with the application and interpretation of the Ontario Occupational Health and Safety Act (OHSA).

Reference: https://www.labour.gov.on.ca/english/

4.1.1. Ontario Occupational Health and Safety Act (OHSA)

The Ontario Occupational Health and Safety Act:

- defines the rights and duties of all people in the workplace
- defines procedures for handling workplace hazards

- provides legal enforcement where compliance has not been achieved voluntarily by people in the workplace
- implies that all people in the workplace have the responsibility of promoting health and safety
- facilitates the Internal Responsibility System, which outlines workplace parties duties to ensure a safety and health workplace
- emphasizes workers “right to know”, “right to participate” and “right to refuse”
- defines the requirements for creating and selecting Joint Health and Safety Committees (JHSCs), along with JHSC powers, rights and obligations

Reference: https://www.labour.gov.on.ca/english/hs/pubs/ohsa/

4.2. Public Health Agency of Canada (PHAC)

The mission of the Public Health Agency of Canada (PHAC) is to promote and protect the health of Canadians. It is the national authority on biosafety and biosecurity for human pathogens and toxins.

The agency through Canada’s Pathogen Regulation Directorate enforces biosafety via “Human Pathogen Importation Regulations”, “Laboratory Biosafety Guidelines”, and the “Human Pathogens and Toxins Act”. It also houses many “Pathogen Safety Data Sheets” (PSDS).

Importation or transferring of biohazard materials may require the approval of PHAC.

Reference: http://www.phac-aspc.gc.ca/lab-bio/index-eng.php

4.3. Canadian Food Inspection Agency (CFIA)

Canadian Food Inspection Agency (CFIA) defines the biocontainment levels, procedures and protocols for safely working with animal and zoonotic pathogens, and chemical hazards and plant pests to protect laboratory personnel, the public and the environment.

Importation or transferring of biohazard materials may require the approval of CFIA.

Reference: http://www.inspection.gc.ca/eng/1297964599443/1297965645317

4.4. Canadian Biosafety Standards and Guidelines (CBSG)

Biosafety within Canada is currently regulated by the Canadian Biosafety Standards and Guidelines (CBSG), which was developed in 2013 by the Public Health Agency of Canada (PHAC) and Canadian Food Inspection Agency (CFIA).

The CBSG pertains to human and terrestrial animal pathogens and toxins possessed, handled, stored or used by laboratory researchers and workers in their respective facilities.

Reference: http://canadianbiosafetystandards.collaboration.gc.ca/

5. McMaster University Safety References

5.1. Central Joint Health and Safety Committee (CJHSC)

The Central Health and Safety Committee reviews the Ontario Health and Safety Act (OHSA) and manages McMaster Workplace Environment Health and Safety Policy, Programs and Procedures.

Reference: http://www.workingatmcmaster.ca/med/document/RMM-104-Central-Joint-Health-and-Safety-Committee-1-36.pdf

5.2. Joint Health and Safety Committee (JHSC)

The Joint Health and Safety Committee (JHSC) is an advisory group of management and labour representatives that meet regularly to discuss McMaster University Health and Safety issues. They conduct workplace inspections, safety audits, incident/injury review, and training, to identify safety-related issues, for the recommendation of the identification and control of hazards to Senior Management.

Reference: http://www.workingatmcmaster.ca/eohss/prevention/jhsc/index.php

Reference: http://www.workingatmcmaster.ca/med/document/RMM-105-McMaster-University-Joint-Health-and-Safety-Committees-1-36.pdf

5.3. Environment & Occupational Health Support Services (EOHSS)

Safety within McMaster University is facilitated by the Environmental and Occupational Health Support Services (EOHSS), which is comprised of a team of health, safety and risk management specialists. EOHSS offers information in injury/loss prevention, training and development, risk management and campus insurance and lab safety.

Environmental and occupational health, safety, loss prevention and mitigation standards assist in the development and maintenance of an Internal Responsibility System. The Internal Responsibility System states that McMaster University and all its employees are jointly responsible for the implementation and maintenance in the promotion of health and safety, preventing incidents involving occupational injuries and illnesses or adverse effects upon the natural environment.

Reference: http://www.workingatmcmaster.ca/eohss/

5.4. Risk Management System & Support Group

The Risk Management System is comprised of policies and programs to manage the risks related to environmental and occupational health and safety, public safety, fire

safety and the protection of McMaster University's physical and financial assets, through Loss Prevention and Loss Mitigation programs.

The Risk Management System is supported and implemented via the McMaster Risk Management Manual (RMM), which outlines specific policies and programs as approved by the McMaster University Board of Governors.

Risk Management Support Group may be comprised of EOHSS, Faculty of Health Sciences Safety Office, Employee Health Services, Senior Health Physicist, Director, Workplace Health and Benefits and Parking and Security Services. It facilitates the development, implementation and auditing of the Health and Safety Program, via the application of a risk management system and best practices for the management of occupational, environmental, public health and safety related risks.

Reference: http://www.workingatmcmaster.ca/rmm/index.php

5.5. Laboratory Safety Handbook

The McMaster Laboratory Safety Handbook's purpose is to:

- define health & safety responsibilities and accountabilities within McMaster
- outline specific procedures and programs, where applicable
- explain basic emergency procedures
- provide information and standards in the form of established Safety Guidelines in laboratories

Reference: http://www.workingatmcmaster.ca/med/document/Lab-Safety-Handbook-1-36.pdf

5.6. Emergency Procedures Guidebook

The McMaster Emergency Procedures Guidebook hopes to provide McMaster faculty and staff with clear, concise, and up-to-date safety resources and guide them in how to prepare for and deal with emergencies.

Reference: http://security.mcmaster.ca/campus_emergencies_guide.html

5.7. Presidential Biosafety Advisory Committee (PBAC)

The McMaster Presidential Biosafety Advisory Committee (PBAC):

- develops, communicates and enforces policies and procedures to meet or exceed CBSG requirements to principle investigators and researchers
- facilitate educational and training programs where applicable
- reviews, provides recommendations, and authorizes the use, storage and disposal of biological agents
- reports to the President of McMaster University

Reference: https://biosafety.mcmaster.ca/biosafety_pbac.htm

5.8. Biosafety Office

The McMaster Biosafety Office governs the McMaster Biosafety Program, which is in accordance with governmental biosafety standards from PHAC and CFIA and McMaster's PBAC.

The McMaster Biosafety Office:

- communicates McMaster Biosafety Program information and requirements to researchers
- provides biosafety training
- facilitates the required biosafety documentation necessary for by certain funding agencies
- ensures legislative compliance within biosafety laboratories through audits
- ensures biohazard agent inventories are maintained
- facilitates the importation of biohazards at McMaster University
- corresponds with the McMaster PBAC

Reference: http://www.mcmaster.ca/biosafety/

6. The Biointerfaces Institute (BI) Safety Program

The Biointerfaces Institute (BI) Safety Program ensures BI staff and users:

- have the appropriate safety training from McMaster, prior to working
- are familiar with relevant BI policies and SOPs
- are working within a safe, healthy and respectful environment

The BI facility is routinely audited by the McMaster University JHSC the McMaster University Biosafety Office for biosafety.

Within the BI safety concerns or issues may be communicated through a variety of pathways to inform related parties.

6.1. BI Facilities

The BI is located on the 4th floor of the Engineering Technology Building (ETB) on McMaster Main Campus, in Hamilton ON, Canada. BI facilities include:

Administration and Offices	ETB 412, 413, 414, 415, 416, and 416A
Laboratories	ETB 417, 418, 419, 420, 420A, 421, 423, 424, 433 and 435
Waste Disposal Room	ETB 430

6.2. BI Safety Hierarchy

BI staff is comprised of a director, associate director, administration and business staff, and research technicians located within laboratory and office settings. See Figure 1 for the BI hierarchy.

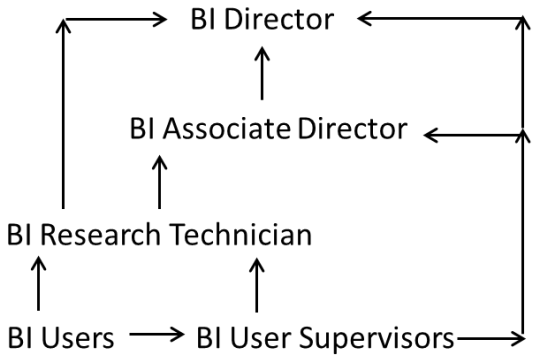

Figure 1. BI Hierarchy.

6.3. BI Safety Responsibilities

6.3.1. BI Director Responsibilities

The BI Director is responsible for:

- having up-to-date relevant McMaster safety training
- approving and following the BI Safety Manual, Policies and SOPs
- ensuring staff under his/her supervision adhere to McMaster and BI Safety Manual, Policies and SOPs
- advising BI staff on safety action items
- ensuring that BI facilities are properly inspected, and any infractions are remedied
- enforcing that BI users adhere to BI Policies and SOPs

6.3.2. BI Associate Director Responsibilities

The BI Associate Director is responsible for:

- having up-to-date relevant McMaster safety training
- following the BI Safety Manual, Policies and SOPs
- performing BI Director responsibilities should the BI Director be unavailable

6.3.3. BI Staff Responsibilities

BI Staff is responsible for:

- having up-to-date relevant McMaster safety training
- following the BI Safety Manual, Policies and SOPs

6.3.4. BI Research Technicians Responsibilities

BI Research Technicians are responsible for:

- having up-to-date relevant McMaster safety training
- writing, reviewing, amending and following the BI Safety Manual, Policies and SOPs regularly, at minimum annually or as new information is available
- enforcing BI policies and SOPs
- training BI users on BI laboratories, BI equipment, and policies, as required

- inspecting BI facilities regularly, and resolving any non-compliance issues or infractions
- maintaining BI facilities, equipment, documentation and inventories
- update the BI Safety Board as required

6.3.5. BI Users and user's supervisor(s) or Principal Investigator(s) (PIs) Responsibilities

BI Users and their PI's are responsible for:

- following the BI Safety Manual, Policies and SOPs
- having their own experiment-specific safety procedures and SOPs
- ensuring required McMaster safety training is completed and up-to-date, as needed
- ensuring their inventory is well documented
- reporting any noncompliance to the BI staff
- reporting any facility maintenance or equipment issues to BI Technicians

7. BI Policies & Forms

BI polices and forms are outlined as separate documents; refer to Appendix I for a complete Policy List.

8. BI Safety Reviews and Amendments

The contents of the BI Safety Program and Policies will change along with official changes in McMaster and governmental policies. BI programs and policies will be reviewed by BI staff, at minimum, annually, and amended as required.

Administrative, grammatical and minor amendments, that do not increase safety risks within policies or SOPs will be added to documentation as needed, without formal communication of such amendments. Major amendments that alter the content of policies or SOPs will be added to documentation as needed and communicated to BI members via the BI Safety Board, and captured during training updates.

Refer to Appendix II for version history and revision information.

9. Appendix I: BI Polices (alphabetical)

Policy Name	Policy ID	Policy Forms/Documentation
BI Access Policy	Access	
BI BioELN Policy	BioELN	
BI BioELN Policy – Equipment Usage	BioELNEqp	
BI Biohazardous Work Policy	BioWork	BI Bio. Work Responsibility Form BI Bio. Agent Risk Assessment Form
BI Biohazardous Work Policy – Medical Monitoring	BioMedMon	
BI Biohazardous Work Policy – 425	BioWork425	
BI Biohazardous Work Policy – 420	BioWork420	
BI Biosecurity Policy	Biosecur	BI Biosecurity Incident Form
BI Code of Conduct Policy	Conduct	
BI Documentation Policy	Docu	BI Laboratory Posters (templates)
BI Emergency Procedures Policy	Emerg	McMaster Incident/Injury Report
BI Emergency Procedures Policy – Bio.	EmergBio	
BI Emergency Procedures Policy – Equipment	EmerEqp	
BI Emergency Procedures Policy – Post Emergency	EmerPost	
BI Emergency Procedures Policy – Spill Bio.	EmergSpBio	Biohazard Spill Sign Biohazardous Spill Posters
BI Emergency Procedures Policy – Spill Haz.	EmergSpHaz	
BI Equipment Policy	Equipment	
BI Equipment Policy – Bio.	EqpBio	
BI Housekeeping Policy	HouseKeep	Incident of Vermin and/or Pest Log BSL-2 Mamm. Lab Cleaning Log
BI Infraction Policy	Infract	BI Infraction Form
BI Inspection Policy	Inspect	BI Inspection Form
BI Personal Protective Equipment (PPE) Policy	PPE	PPE Poster
BI Substance Policy	Substs	
BI Substance Policy – Cryogens	Cryogens	BI Liquid Nitrogen Labels
BI Substance Policy – Designated	DegSubst	
BI Substance Policy – Gas	ComprGas	
BI Training Policy	Training	BI Training Matrix BI Safety Training Form BI Policy Training Form
BI Visiting Scholar Policy	Scholar	BI Use of Facilities Agreement Form
BI Visitor Policy	Visitor	BI Visitor Log
BI Laboratory Waste Disposal Policy – Biohazardous	WasteBio	BI Waste Chart – Bio. BI Bio. Waste Storage & Disposal Log
BI Laboratory Waste Disposal Policy – General and Hazardous	Waste	BI Waste Chart – Gen. & Haz.
BI Laboratory Waste Disposal Policy – Liquids Aspiration	WasteAspLiq	
BI Working Alone Policy – After Hours	WrkAlnAft	BI Working Alone – After Hours Form
BI Working Alone Policy – Extended Hours	WrkAlnExtd	BI Working Alone – Extended Hours Form

10. Appendix I: Version History

Safety Program Version	Written By	Comments
BI Biosafety Manual Version: v.2013.1 Year: 2013	Dr. Marta Princz BI Biological Research Technician	First edition of BI Biosafety Policies.
BI Safety Program Version: v.2014.1 Year: 2014	Dr. Marta Princz BI Biological Research Technician	Created BI Safety Program to include general safety and biosafety.
BI Safety Program Version: v.2014.1 Year: 2015	Dr. Marta Princz BI Biological Research Technician	Program and policies reviewed Spring 2015; no major edits. (No major edits in 2016).
BI Policy Safety Version: 2017.1. Year: 2017	Dr. Marta Princz BI Biological Research Technician	Major edits and amendments to safety program and policy documentation; reviewed Fall 2016. Implemented Jan 2017.