UNIVERSITY of WISCONSIN
GREEN BAY

# Draft Biosafety Manual

Version 1 (November 2022)

**Table of Contents**

# Section 1 – Introduction

## Purpose

The purpose of this Biosafety Manual is to define policies and procedures pertaining to use of biological materials in research at University of Wisconsin Green Bay (UWGB). These policies and procedures are designed to safeguard personnel and the environment from biologically hazardous materials without unduly limiting academic research. This manual also offers guidelines to comply with federal and state regulatory requirements.

The work practices, procedures, and policies specified in this manual are based on current regulatory requirements and accepted best biosafety practices. Implementation of these measures will reduce the likelihood that an incident involving a biological agent will occur and will fulfill regulatory biosafety expectations. Laboratory microbiological work usually involves potential exposure to biological hazards, as well as to chemical and radiological hazards. Consequently, this manual should be used in conjunction with the UWGB Chemical Hygiene Plan.

**Importantly, this manual should not be the only reference used for guidance on laboratory safety**; additional training and resources including the Centers for Disease Control and Prevention (CDC) Biosafety in Microbiological and Biomedical Laboratories (BMBL), 6th edition and the National Institutes of Health NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines) are the standards for research conduct at UW Green Bay.

## Scope

This manual applies to all individuals engaged in Research at or under the jurisdiction of UW Green Bay.

## Responsibilities

Success of the Biosafety Program, like any other safety program, requires a team effort involving the Institutional Biosafety Committee (IBC), Principal Investigators (PI), laboratory workers, and Safety and Environmental Management office.
The University of Wisconsin-Green Bay requires all faculty, staff, and students engaging in research related to recombinant or synthetic nucleic acids, or other potentially hazardous biologics, to receive appropriate CITI training and IBC committee approval of their proposed projects irrespective of the funding source. Due to the nature of many projects falling under IBC review, researchers may be required to submit projects for simultaneous approval by both the Institutional Review Board (IRB) or the Institutional Animal Care and Use Committee (IACUC) and the IBC. The IBC website provides information on the IBC protocol application process. **Research that will likely require IBC protocol approval is listed in Table 1**

Principal Investigators are responsible for ensuring compliance with this policy as it applies to laboratory areas they may occupy or oversee; and ensuring that laboratory personnel who work under their supervision and occupy their laboratory space are aware of this policy and understand how it applies to their areas.

The UWGB administration, the IBC, and Safety and Environmental Management endorse this manual and encourage active participation in maintaining high standards.

*Table 1: Research likely requiring IBC protocol approval*

| Research Area | Description |
|---|---|
| Recombinant DNA (rDNA) | Recombinant nucleic acid molecules or synthetic nucleic acid molecules, including those that are chemically or otherwise modified but can base pair with naturally occurring nucleic acid molecules, or cells, organisms, and viruses containing such molecules. |
| Biological Toxins | Biological toxins are poisonous substances produced by certain microorganisms, animals, and plants. |
| Microorganisms and Viruses | Agents associated with human disease & pose moderate hazards to personnel & the environment |
| Prions | Prions are abnormal, pathogenic proteins that are transmissible and are able to induce abnormal folding of specific normal cellular proteins called prion proteins that are found most abundantly in the brain. *UWGB is not equipped for research involving Prions. |
| Animal Tissues, Cell Lines, or Blood Products | All cell and organ cultures and materials of animal origin, including those from humans. |
| Genetically modified Live Animals | Any research involving recombinant DNA introduced into live animals. Research involving recombinant DNA introduced into vertebrate animals will require both IBC and IACUC approval. |
| Plants and Soils | Any research involving recombinant DNA introduced into plants. The IBC also oversees research involving soil, seed, plants, plant pathogens or other materials as regulated by state or federal policy or law. |
| Nanotechnology | Nanotechnology is the understanding and control of matter at dimensions between approximately 1 and 100 nanometers, where unique phenomena enable novel applications. |
| Dual Use Research | Dual Use Research of Concern (DURC) is life sciences research that, based on current understanding, can be reasonably anticipated to provide knowledge, information, products, or technologies that could be directly misapplied to pose a significant threat with broad potential consequences to public health and safety, agricultural crops and other plants, animals, the environment, materiel, or national security. |

## Contact Information and Campus Resources

For information about specific biological safety programs for operations not covered in this manual, contact the Safety and Environmental Management office or the Institutional Biosafety Committee (IBC).

### Safety and Environmental Management:

- Website: https://www.uwgb.edu/safety-environmental-management/
- University Safety Manager: Scott Piontek
- Phone: 920-465-2273
- Email: Pionteks@uwgb.edu

### Institutional Biosafety Committee (IBC):

- IBC Website: https://www.uwgb.edu/institutional-biosafety-committee/
- Chair: Georgette Heyrman
- Phone: 920-465-2275
- Email: IBC@uwgb.edu

## Section 2 - Biosafety Fundamentals and Definitions

### Biohazards

Biohazards are biological substances that pose a threat to the health of living organisms and/or the environment. Biohazards include:

- Bacteria, mycoplasma, viruses, parasites, fungi, algae, and human or non-human primate blood, cells, body fluids and tissues.
- Biological toxins and substances derived or excreted from organisms that are toxic or harmful to humans, animals, plants or the environment.
- Recombinant and synthetic nucleic acids, genetically modified micro-organisms, animals and plants which are not known to occur naturally or that express potentially harmful nucleic acids, such as DNA derived from pathogenic organisms or human oncogenes.

### Biosafety Levels

Table 2 provides basic descriptions of containment based on biosafety levels. Additional information can be found in the BMBL. UW Green Bay can only accommodate BSL-1 and BSL-2 conditions at this time. Practices for research with BSL-1 and BSL-2 are described in Section 4. UW Green Bay is not equipped to conduct research at BSL-3 and BSL-4 levels.

*Table 2: Biosafety Levels available at UW Green Bay*

| Biosafety Level | BSL-1 | BSL-2 |
|---|---|---|
| Description | No containment<br>Defined organisms<br>Unlikely to cause disease | Containment<br>Moderate risk<br>Disease of varying severity |
| Sample Organisms | E. Coli | Influenza, HIV, Human derived cell lines |
| Pathogen Type | Agents that present minimal potential hazard to personnel & the environment. | Agents associated with human disease & pose moderate hazards to personnel & the environment |

### Risk Assessment

Risk Assessment is the process of identifying the potential for harm associated with laboratory research or work. The principal investigator (PI) or designated representative is responsible for performing the first risk assessment for biohazards handled in the laboratory.

## Risk Groups

Risk Groups are classifications that describe the relative hazard posed by infectious agents or toxins in the laboratory. The risk group to which an infectious agent or toxin is assigned is the primary, but not only, consideration used in a biological risk assessment to determine the appropriate biosafety level in which a worker can handle the infectious agent or toxin. Other considerations used in a biological risk assessment include the ability of an infectious agent or toxin to cause disease, the way in which the infectious agent or toxin causes disease, the activities performed in the laboratory, the safety equipment and design elements present in the laboratory, and the health and training of the laboratory worker. Risk group levels do not always correspond to biosafety levels. For example, a specific research project's biological risk assessment for the use of human immunodeficiency virus (HIV), a Risk Group 3 agent, may correctly determine that HIV can be handled under Biosafety Level 2 conditions. Risk groups are designated from 1 (the lowest risk) to 4 (the highest risk) and are defined in Table 3.

*Table 3: Risk Groups defined by NIH Guidelines*

| | |
|---|---|
| Risk Group 1 (RG1) | Agents that are not associated with disease in healthy adult humans. This group includes a list of animal viral etiologic agents in common use. These agents represent no or little risk to an individual and no or little risk to the community. |
| Risk Group 2 (RG2) | Agents that are associated with human disease which is rarely serious and for which preventive or therapeutic interventions are often available. These agents represent a moderate risk to an individual but a low risk to the community. |
| Risk Group 3 (RG3) | Agents that are associated with serious or lethal human disease for which preventive or therapeutic interventions may be available. These agents represent a high risk to an individual but a low risk to the community. |
| Risk Group 4 (RG4) | Agents that are likely to cause serious or lethal human disease for which preventive or therapeutic interventions are not usually available. These agents represent a high risk to the individual and a high risk to the community. |

## Bloodborne Pathogens

Bloodborne pathogens are infectious microorganisms in human blood and other cells that can cause disease in humans. These pathogens include but are not limited to hepatitis B (HBV), hepatitis C (HCV) and human immunodeficiency virus (HIV).

## Recombinant and Synthetic Nucleic Acid Molecules

In the context of the NIH Guidelines, recombinant and synthetic nucleic acids are defined as:(i) molecules that a) are constructed by joining nucleic acid molecules and b) that can replicate in a living cell, i.e., recombinant nucleic acids; (ii) nucleic acid molecules that are chemically or by other means synthesized or amplified, including those that are chemically or otherwise modified but can base pair with naturally occurring nucleic acid molecules, i.e., synthetic nucleic acids, or (iii)molecules that result from the replication of those described in (i) or (ii) above.

## Shipping of Biohazardous materials

There are two types of transport of biohazardous materials: Intra-campus transport (from room to room or from building to building) and off-campus transport, which includes transport to the alternative locations or to another University. The categories of infectious substances are listed below. Only Category B and Exempt specimens may be shipped through UW Green Bay and information can be found in Section 6.

### *Category A infectious substance*

Category A Infectious Substances are infectious substances in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals.

### *Category B infectious substance*

An infectious substance not in a form generally capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs.

### *Exempt Human or Animal Specimens*

Exempt human or animal samples (such as secreta, excreta, blood and its components, tissue and tissue fluids, and body parts) include those being transported for routine testing not related to the diagnosis of an infectious disease (such as drug/alcohol testing, cholesterol testing, blood glucose level testing, prostate specific antibody testing, testing to monitor kidney or liver function, or pregnancy testing) and testing for diagnosis of non-infectious diseases (such as cancer biopsies), and for which there is low probability the sample is infectious. Exempt specimens are not considered infectious substances or dangerous goods and are not assigned a UN identification number. They have a low potential for harm.

## Universal Precautions

Prudent practices often overlap with a wealth of practices known as “universal precautions.” The overarching universal precautions espoused by the Bloodborne Pathogens (BBP) Standard should be adopted by all laboratory personnel.

# Section 3 - Biohazard Risk Assessment

## Introduction

Risk Management is a process intended to identify, assess, control and monitor risks in the workplace associated with the biohazardous agent. PIs should perform risk assessments on each potential biohazard to outline how and where the agent will be used in order to protect the health of workers, the public, and natural or managed environments.

Risk management includes a combination of the following controls:

- Safe work practices
- Administrative policies
- Safety equipment
- Proper facilities

## Risk Assessments

The PI/laboratory director is responsible for identifying the hazards associated with the agent and/or procedures, applying the appropriate risk management controls, and advising the staff of both the risks and controls.

When performing a Risk Assessment, the following questions should be considered:

- What are the hazardous materials in the laboratory?
- What procedures are hazardous or increase the hazardous nature of the materials?
- What might happen if there was a problem?
- Who/What may be exposed and how?
- How serious are the consequences?
- How likely is it to happen?
- How can this be minimized?
- Pre-existing diseases, medications, compromised immunity, pregnancy, or breast-feeding are some of the conditions that may increase the risk of an individual acquiring a laboratory acquired infection. Consultation with an occupational physician knowledgeable in infectious diseases is advisable in these circumstances.

The primary factors to consider in risk assessment and selection of precautions fall into the following two categories:

### *Laboratory-specific hazards*

- Amount of biohazardous material to be used or stored.
- Concentration of the material.
- Use of equipment or procedures that impart energy to the material resulting in dissemination, aerosolization, splash, or splatter.
- Use of equipment or procedures that can cut, scratch, or puncture skin.
- Proximity of susceptible hosts or environment.
- Animal experiments.

### *Agent-specific hazards*

- Capability to infect/cause disease in a susceptible human, animal, or plant host.
- Virulence as measured by disease severity.
- Availability of preventive measures and effective treatments for the disease.
- Probable routes of transmission of infection (respiratory, mucous membrane transmission higher risk than parenteral or ingestion routes).
- Infective dose or concentration needed to cause disease.
- Route of transmission
- Stability in the environment, resistance to disinfectants.
- Host range, species affected (e.g., ecotropic, amphotropic, zoonotic).
- Origin or endemic vs. exotic nature:
    - Non-indigenous agents are of special concern because of their potential to introduce risk of transmission, or spread of human, animal, or plant diseases from foreign countries into the United States. The Centers for Disease Control and Prevention and US Department of Agriculture regulate the import of

disease agents, clinical or environmental specimens, and other potentially infectious materials.
- Some agents are also regulated for interstate movement and for export.

Additional important guidance documents for risk assessment include Section VIII of the BMBL and Appendix B of the NIH Guidelines.

# Section 4 - Safe Work Practices and Administrative Policies

## Introduction

Practice and good techniques are of primary importance in laboratory safety. Both are based on sound technical knowledge, experience, common sense, and an attitude of courtesy and consideration for others.

Techniques and practices are spelled out in detail as "Standard Microbiological Practices" in the BMBL and the NIH's Guidelines , as well in the National Research Council's Biosafety in the Laboratory-Prudent Practices of the Handling and Disposal of Infectious Materials (National Academy Press, Washington, D.C., 1989). Many laboratories safety texts and reference books also contain good information. **All personnel working with biohazards should complete the appropriate CITI training commensurate with the level of biosafety.**

Each laboratory should develop an operational manual identifying specific hazards that will or may be encountered and specifying practices and procedures designed to minimize or eliminate risks. Personnel should be advised of special hazards and should be required to read and to follow the required practices and procedures. A scientist trained and knowledgeable in appropriate laboratory techniques, safety procedures, and hazards associated with the handling of infectious agents must direct laboratory activities. Although each individual is responsible for their own safety, the PI has ultimate responsibility for ensuring that persons working in the laboratory are adequately trained and that they follow the prescribed safety measures.

## Recommended biosafety laboratory practices

At a minimum, the seven basic rules of biosafety, based on the National Research Council's Prudent Practices document, should be the basis of any personal laboratory work ethic. They are noted below in Table 4.

*Table 4: Biosafety practices and blocked routes exposure*

| Biosafety Practice | Routes of Exposure Blocked |
|---|---|
| 1. Do not mouth pipette. | Inhalation, ingestion, skin, and mucous membrane contact |
| 2. Manipulate infectious fluids carefully to avoid spills and the production of aerosols. | Inhalation, skin, and mucous membrane contact |

| | |
|---|---|
| 3. Restrict use of needles, syringes, and other sharps to those procedures for which there are no alternatives; dispose of sharps in leak- and puncture-proof containers. | Percutaneous, inhalation |
| 4. Use lab coats, gloves, safety eyewear, and other personal protective equipment. | Skin and mucous membrane contact |
| 5. Wash hands after all laboratory activities, following the removal of gloves, and immediately following contact with infectious agents. | Skin and mucous membrane contact |
| 6. Decontaminate work surfaces before and after use, and immediately after spills. | Skin and mucous membrane contact |
| 7. Do not eat, drink, store food, apply cosmetics, or smoke in the laboratory. | Ingestion, skin, and mucous membrane contact |

The most important element of containment is strict adherence to standard microbiological practices and techniques.

Persons working with infectious agents or infected materials must be aware of potential hazards and be trained and proficient in the practices and techniques required for handling such material safely. The PI is responsible for ensuring that laboratory personnel are properly trained; the PI may delegate the provision of training to the laboratory supervisor or a designee, but the responsibility remains with the PI. All personnel must complete the appropriate CITI training prior to performing experiments in the laboratory.

When standard laboratory practices (Table 4) are not sufficient to control the hazard associated with a particular agent or laboratory procedure, additional measures may be needed. The PI is responsible for selecting additional safety practices, which must be in keeping with the hazard associated with the agent or procedure.

Laboratory personnel safety practices and techniques must be supplemented by appropriate facility design and engineering features, safety equipment, and management practices.

## Laboratory Housekeeping

Personal safety is greatly enhanced by keeping workspace areas neat, clean, and orderly. Injuries and exposure are more likely to occur in poorly maintained, disorderly areas.

If workspace is shared, the importance of maintaining a neat, clean area increases significantly. Coworkers must rely on one another to maximize efficiency and safety. Personal materials should be properly labeled, waste discarded, and the shared space disinfected or cleaned prior to leaving it for the next user.

The following guidelines should be observed in the laboratory:

- Routine housekeeping ensures work areas are free of significant sources of contamination and hazards.
- Housekeeping procedures should be based on the highest degree of risk to which personnel and experimental integrity may be subjected.
- Laboratory personnel are responsible for cleaning laboratory benches, equipment, and areas that require specialized technical knowledge.
- Access to exits, sinks, eyewashes, emergency showers, and fire extinguishers must not be blocked.
- The workplace should be free of physical hazards.
- Unnecessary items on floors, under benches, or in corners should be removed.
- All compressed gas cylinders should be properly secured.
- Electrical safety is a priority, especially as it relates to the use of extension cords.
- Equipment should be properly grounded. Overloaded electrical circuits and the creation of electrical hazards in wet areas are to be avoided.
- Surfaces should be clean and free of infrequently used chemicals, glassware, and equipment.

## Personal Hygiene

Personal hygiene, including proper handwashing techniques, is also a means by which to enhance personal protection in the laboratory. Scrubbing immediately after de-gloving ensures that contamination of the hand by glove micro puncture or prior exposure is neutralized before being spread.

The laboratory is also an inappropriate place to perform personal cosmetic tasks, such as applying makeup, cleaning or trimming fingernails, or brushing hair. These activities provide new opportunities for exposure and contribute to retrograde contamination of the laboratory environment.

## Administrative Controls

Administrative controls are policies and procedures designed to assist with the safe handling of potentially hazardous biological materials. They include training, medical surveillance, vaccinations, access control, etc. The University requires all personnel complete the appropriate CITI trainings relevant to their work.

### Biological Hazard Information

Laboratory workers must be knowledgeable about the hazards associated with the biological agents present in the laboratory and have hazard information available to them. The following are sources of hazard information for biological agents.

#### *Microbial Agents*

The BMBL has descriptions of biosafety levels and recommended biosafety practices for specific biological agents. The Canadian Laboratory Centre for Disease Control maintains Safety Data Sheets for microbial agents.

### *Toxins*

Isolated biological toxins are chemical hazards, although many such toxins produce adverse effects at doses significantly below that of "traditional" laboratory chemicals. Safety Data Sheets (SDS's) must be maintained and available. SDSs for a specific toxin should be obtained from vendor upon receipt of the toxin. The IBC also requires laboratories to register these toxins with their office regardless of amount.

### *Bloodborne Pathogens*

Anyone working with potential sources of bloodborne pathogens (human and non-human blood and other derived materials (cells, tissues, etc.) must complete the Bloodborne Pathogens Training module on CITI Training annually and submit the certificates with the Protocol Application and Annual Review Forms.

Universal precautions require that all human blood and tissues be handled as though they are infectious. Adopting and applying universal precautions to all laboratory reagents clearly creates a heightened awareness of potential risk and adds another level of caution to activities involving reagents.

### Immunization

Participation in activities including research involving human and non-human primate blood and other derived materials (cells, tissues, etc.) increases an individual's risk of acquiring potentially infectious diseases including Hepatitis B or HIV. A vaccine can prevent Hepatitis B, but there is no cure if you have it.

The university strongly recommends that individuals working with potential sources of bloodborne pathogens receive the Hepatitis B vaccine. All individuals working with the potential to be exposed to bloodborne pathogens must sign the acknowledgement form and submit it to the IBC with the protocol application.

## BSL1 practices

BSL-1 labs are used to study infectious agents or toxins not known to consistently cause disease in healthy adult humans or animals. Workers follow basic safety procedures, called standard microbial practices, and require no special equipment or design features. Standard engineering controls in BSL-1 laboratories include easily cleaned surfaces that are able to withstand the basic chemicals used in the laboratory.

Specific considerations for a BSL-1 laboratory include the following:

*Table 5: BSL1 Lab practices*

| | |
|---|---|
| Laboratory Practice | • Standard microbiological practices are followed.<br>• Work can be performed on an open lab bench or table. |
| Personal Protective Equipment | • Lab coats, Gloves, Eye protection |
| Facility Construction | • A sink must be available for hand washing.<br>• The lab should have doors to separate the working space with the rest of the facility.<br>• An autoclave or an alternative method of decontamination is available |

### BSL2 practices

BSL-2 laboratories are used to study moderate-risk infectious agents or toxins that pose a moderate danger if accidentally inhaled, swallowed, or exposed to the skin. Design requirements for BSL-2 laboratories include hand washing sinks, eye washing stations, and doors that close and lock automatically. BSL-2 laboratories must also have access to equipment that can decontaminate laboratory waste, including an incinerator, an autoclave, and/or another method of decontamination, depending on the biological risk assessment.

In addition to BSL-1 considerations, BSL-2 laboratories have additional containment requirements:

*Table 6: BSL2 Lab Practices*

| | |
|---|---|
| Laboratory Practice | • Access to the laboratory is restricted when work is being conducted<br>• Biohazard safety sign posted on door when using biohazards |
| Safety Equipment | • All procedures that can cause infection from aerosols or splashes are performed in a biological safety cabinet (BSC) |
| Facility Construction | • A sink and eyewash are readily available |

### BSL3 and 4

Facilities for BSL3 and BSL4 are not currently supported at UW Green Bay.

## Section 5 - Laboratory Facilities and Safety Equipment

### Introduction

Working safely with biohazardous material includes mechanisms in place that will minimize risks of exposure. PIs should consider all aspects of facility design, engineering controls, and PPE that are required prior to initiating work with a biohazardous material. IBC and Safety and Environmental Management is available for consultation.

## Facility Design & Construction

The design and construction of the facility contributes to laboratory worker protection, provides a barrier to protect persons outside the laboratory, and protects persons, animals, or plants in the community from the accidental release of biohazardous agents from the laboratory. PIs, Department and University administration will collaborate in providing facilities commensurate with the laboratory's function and the recommended biosafety level for the agents being manipulated. The recommended secondary barrier(s) will depend on the risk of transmission of specific agents. In the typical biological laboratory, agents are transmitted or disseminated by direct or inadvertent contact with infectious items in the work environment. Secondary barriers in these laboratories may include separation of the laboratory work area from public access, cleanable surfaces, availability of a decontamination method (e.g., autoclave), and hand washing facilities.

When the risk of infection by exposure to an infectious aerosol is present, higher levels of primary containment and multiple secondary barriers may become necessary to prevent infectious agents from escaping into the environment. Such design features include specialized ventilation systems to ensure directional air flow, air treatment systems to decontaminate or remove agents from exhaust air, controlled access zones, airlocks as laboratory entrances, or separate buildings or modules to isolate the laboratory.

## Engineering Controls

Engineering controls are devices used to contain or remove biohazards, monitor critical physical parameters or provide specific service.
These include, but are not limited to:

- biological safety cabinets (BSCs)
- enclosed transport containers
- directional airflow indicators,
- safety centrifuge cups
- micro-isolator tops on animal cages
- self-sheathing needles
- sharps containers
- spill kit

## Personal Protective Equipment

Under OSHA's primary Personal Protective Equipment (PPE) standards, PPE refers to "garments and devices designed to protect employees from serious workplace injuries or illnesses resulting from contact with various workplace hazards". Descriptions of PPE are listed in Table 6.

OSHA mandates that employers:

- Determine the workplace hazards that require PPE.
- Provide workers with appropriate PPE.
- Ensure proper use and maintenance of PPE.
- Train employees to use PPE correctly, to know when and where PPE is necessary, understand its limitations, and to don and doff PPE correctly.

*Table 6: Biosafety Practices for Personal Protective Equipment*

| PPE TYPE | BIOSAFETY PRACTICE |
|---|---|
| Coveralls/Lab Coats | • Protective laboratory coats, gowns, or uniforms are recommended under BSL-1 guidelines and are required when working with hazardous material under BSL-2.<br>• PPE clothing should be removed before leaving the laboratory.<br>• If contaminated, non-disposable laboratory coats should be decontaminated with bleach prior to being removed from the lab. Contaminated disposable laboratory coats should be discarded in biohazardous waste. |
| Footwear | • Shoes must cover the entire foot; no sandals or open-toed shoes in laboratories. |
| Gloves | • Properly fitting gloves should be worn to protect hands from hazardous materials.<br>• Gloves should not be worn outside the laboratory in public areas (e.g., in elevators or cafeteria), or when opening door handles.<br>• Do not re-use or wash disposable gloves.<br>• Gloves should be changed immediately if torn or contaminated when work is in progress.<br>• Gloves used to handle infectious or potentially infectious material should be discarded in a biohazard container lined with a red, autoclavable biohazard bag and not in regular trash.<br>Wash hands with soap and water as soon as possible after removing gloves. |
| Eye and Face Protection | • Eye and face protection helps prevent potential mucous membrane exposure in the form of splashes, sprays, or respiratory droplets.<br>• Safety glasses (with side shields) are recommended when working with infectious material to prevent potential splashes entering the eyes.<br>• Safety goggles are recommended when working with harmful chemicals.<br>• Face shields alone do not provide adequate protection against splashes and should always be used along with safety glasses or goggles. |
| Respirators | • N95 or higher filtering respirators provide partial face but not eye protection.<br>• These respirators should fit snugly on the face and require annual 'fit testing' under UF's Respiratory Protection Program.<br>• Powered Air Purifying Respirators (PAPRs) used in some high aerosol generating procedures are full face respirators and provide eye as well as face protection.<br>• Before using a PAPR, medical clearance and training is required, contact the Enviornmental and Safety Management Office.<br>• Eye and face protection devices should be decontaminated after use (e.g., spraying safety glasses with 70% ethanol) or discarded in biohazard container (e.g., surgical masks, N95) |

# Section 6 – Shipping and Transportation of Biological Materials

## Intra-campus transport:

If transporting samples around or within a single UW-Green Bay campus, (from room to room or building to building) samples will be transported in sealed primary and secondary containers, with sufficient absorbent materials placed between the primary and secondary container such that a leak of the primary container can be contained. The secondary container will be clearly labeled with a biohazard label and transported on a wheeled cart. Gloves used to handle samples should not be worn in public hallways.

### Off-campus shipping:

All off-campus biohazardous material shipping (including to other UW Green Bay campuses) must be conducted by fully trained and approved personnel. Definitions of biohazard categories can be found in Section 2; shipping of Category A biohazardous material is not allowed at UW Green Bay. Training to ship Category B infectious substances and exempt specimens consists of completion of the CITI training module: *Shipping and Transport of Regulated Biological Materials.* The CITI completion certificate must be submitted to the IBC as part of the protocol application for any lab member that will ship biohazardous materials. Trained personnel on campus can assist with infrequent shipping of biohazardous materials; if no protocol personnel are trained, please contact the IBC for more information. Labs should maintain a log of all biohazardous shipping for submission in the IBC Annual Report.

Training is required because shipping biohazardous materials requires users to follow appropriate guidelines for packaging, labeling and shipping that conform to Federal and International regulations (International Air Transport Association (IATA) Dangerous Goods Regulations). Briefly, the labeled samples are to be triple packaged to withstand leakage of contents, shocks, pressure changes, and other conditions incident to ordinary handling and transportation in a way that contents should not leak to the outside of the shipping container, even if leakage of the primary container occurs.

Importantly, transportation of Category B biohazardous materials must be conducted by a Commercial Courier; not by personal vehicle. FedEx and UPS pickup packages at the Laboratory Science Loading Dock on the Green Bay Campus daily Monday - Friday.

## Section 7 - Biohazard Waste Disposal

Proper handling and disposal of biohazardous waste is necessary to prevent infection of personnel (laboratory workers, custodians, laboratory visitors, etc.) and release to the environment. OSHA regulations require that biohazardous waste be properly labeled, stored, and disposed of. All work surfaces will be cleaned, after use, with a 10% bleach solution or other appropriate disinfectant, and allowed to air dry.

### Labeling Biohazardous Waste

At a minimum, all biohazardous waste must be labeled with the universal biohazard symbol and the word 'Biohazard.' Additional information, such as the type of waste (such as "sharps" or "liquid waste") and origin of the waste, is recommended.

### Handling and Disposal of Biohazardous Waste

#### Sharps

Sharps include all syringes, lancets, scalpels, and other similar medical instruments (whether or not contaminated), as well as contaminated pipettes and broken glass, and other instruments or materials that can cut or puncture personnel.

- Sharps must be collected in rigid containers that are leak-proof and resistant to puncture from the sharps. Sharps containers must be designed so that sharps can be safely introduced into the container but not easily retrieved.

- Containers must be red or orange in color and labeled with the universal biohazard symbol and word “Biohazard.” When the sharps container is approximately ¾ full, personnel should seal the waste container and it will be picked up by the building facilities custodian or appropriate service personnel. Waste will be picked up by a waste management contractor working with Safety and Environmental Management.
- A licensed vendor retrieves the waste from the campus at pre-determined intervals to process the waste with an approved sterilization method.

### Uncontaminated Laboratory Glassware and Broken Glass

Collect uncontaminated laboratory glassware and broken glass in rigid containers (separate from other waste) that will prevent cuts and punctures to personnel. Containers should be labeled “broken glass” and broken glass is to be disposed of as ordinary trash.

### Solid Biohazardous Waste

Solid biohazardous waste includes microbial agents, tissue culture, and contaminated material (such as petri dishes, pipettes, contaminated glass, etc.). These materials are collected in red biohazard bags that are double-lined and placed in cardboard boxes.

- All contaminated solids will be placed in an appropriately labeled biohazard bag or sharps container, as appropriate. Bags/containers will be autoclaved at a minimum of 121°C for 30 minutes. Alternatively, contaminated solid waste can be treated with 10% bleach for 30 minutes contact time prior to disposal in the garbage.

### Liquid Biohazardous Waste

Liquid biohazardous waste includes all blood and liquid waste from humans or animals, and all other liquid biohazardous waste (such as microbial cultures). Collect liquid waste in closeable, rigid, plastic, leak-proof containers labeled with the universal biohazard symbol and the word ‘Biohazard.’

- Either chlorine bleach will be added to all liquids to a final concentration of 10% bleach and left for a minimum of 30 minutes contact time or autoclaved at a minimum of 121°C for 30 minutes. In either case, the treated liquid can be disposed of in the sanitary sewer (sink drain).

### Animal Carcasses, Body Parts, Tissue and Bedding

All animal carcasses and parts, regardless of infection status, are disposed of as pathological waste.

- All waste vertebrate tissue, including animal cells, blood and body fluids, must be autoclaved or chemically disinfected prior to disposal into the sanitary sewer or normal trash. Animal bedding will also require disinfection/inactivation before disposal in the normal trash if animals are treated with hazardous chemicals.
- All non-preserved carcasses should be stored in a freezer or cold storage area prior to disposal. Secure limbs and sharp protrusions so they do not puncture the bag.
- Animal tissues and animal bedding must be disposed of as pathological waste if the source animal was infected with a BSL2 agent or higher.

# Section 8 - Biohazard Spill Response

Even with the most careful planning and implementation of a research project, the possibility of an incident or spill involving biological materials exists. The following procedures are intended to provide a planned response to such rare events and may need to be modified for specific situations. Contact the PI immediately and if necessary, contact Public Safety if the spill outgrows the resources in the laboratory. Spills involving the unintended release of potentially pathogenic biohazardous material outside of containment as well as all biohazardous spills greater than 100 mL must be reported to the University Safety Manager using the Incident report form within 3 days to document the event, evaluate protocols, and work with the University Safety Manager to decrease risk of future spills.

When assessing the situation, the following considerations may be useful, but the highest priority is to provide aid to injured personnel and prevent spill area access to others.

- Location (e.g., biohazard cabinet, countertop, floor, equipment).
- Nature (e.g., tip-over, aerosolizing (spray/splash), drop from a height).
- Toxicity/infectivity of spilled material.
- Volatility and viscosity of spilled material.
- Other properties of material (e.g., pH, normality, temperature).
- Nature of affected surfaces (e.g., absorbent, pitted, smooth).
- Complicating materials (e.g., broken glass, clothing, mixing with other materials); and
- Susceptibility of spilled material to neutralization/disinfection

## Spill Cleanup Materials

Each laboratory area should have spill cleanup materials available to respond to the largest spill anticipated for that area. At a minimum, the following spill cleanup materials should be available in the laboratory:

- Disposable gloves (thick, chemical-resistant gloves or double pair of thin, nitrile gloves are recommended).
- Safety goggles and masks or a full-face shield (strongly recommended to avoid splashes to the nose and mouth).
- Lab coat or smock to protect clothing and body.
- Shoe covers.
- Absorbent pads.
- Disinfectant appropriate for the agents used in the laboratory.
- Forceps or other devices to pick up contaminated material (especially sharps).
- Sharps disposal container; and
- Autoclavable biohazard bags

## Spill Response Protocol

The following are general biohazardous spill response and cleanup procedures that are appropriate for most uncontained spill scenarios; however, the appropriate response to any spill is based on an assessment of the risk associated with that particular spill:

- Assess the nature of the spill and determine the appropriate level of action.
- Remove contaminated clothing, turning exposed areas inward and placing in a biohazard bag. Wash all exposed skin with soap and water. See Section 9 if an individual has a biohazard exposure.
- Post warning signs and leave the spill area for at least 30 minutes to disperse aerosols. Keep all others out of the spill area.
- Tend to any injured individuals. Contact University Police if assistance is needed to help injured or prevent traffic to the area.
- Inform supervisor, and if further assistance is needed, contact University Safety Manager or University Police.
- After 30 minutes, trained laboratory personnel should proceed with cleaning the spill.
- Personnel assisting in cleanup should wear appropriate PPE; for example, long-sleeved gown or lab coat (disposable recommended), shoe covers, safety glasses (face shield also recommended), and gloves (appropriate for biological agent and disinfectant).
- Place absorbent pads over the spill (to absorb liquid), then place a second layer of disinfectant-soaked absorbent pads over the spill.
- Pour additional disinfectant around the spill, being careful to minimize aerosolization, and work from the periphery toward the center, ensuring thorough contact between the spill and the disinfectant. Disinfect all items in the spill area.
- Allow a minimum of 15 minutes contact time (or as directed by manufacturer's directions) with the disinfectant.
- Wipe down all equipment, tools, etc., with disinfectant, allow to air dry.
- Place contaminated items in an appropriate container (biohazard waste bag, sharps container, or autoclavable pan with lid for reusable items) for autoclaving. Use tongs or forceps to pickup any sharp objects including broken glass, do not use hands when handling broken glass.
- Spray disinfectant on all surfaces one more time, allow to air dry.
- Remove protective clothing and place all contaminated items in a biohazard waste bag for autoclaving.
- Thoroughly wash hands, forearms, and face with soap and water. It is recommended that cleanup personnel shower as soon as possible.
- The lab should remain closed until the spill has been cleaned.

## Biosafety Cabinet Biohazardous Spill Cleanup Procedures

The following are general biohazardous spill cleanup procedures that are appropriate for spills within a biosafety cabinet; however, the appropriate response to any spill is based on an assessment of the risk associated with that particular spill:

- Leave the biosafety cabinet turned on and begin cleanup immediately.
- Remove any contaminated clothing and wash all exposed skin with soap and water.
- Never put your head in the biosafety cabinet to clean up spill, keep face behind view screen.

- While wearing PPE (gown, gloves and eye protection) cover the spill area with paper towels or disinfectant soaked towels.
- Spray or wipe cabinet walls, work surfaces and inside the front view screen with appropriate disinfectant.
- After 10 minutes of contact time, place all soiled items into a container and autoclave.
- Lift the front exhaust grill and tray and wipe all surfaces. Ensure no paper towels or soiled debris are blown into the area below the grill.
- Wash hands and exposed skin areas with antiseptic soap and water.
- Notify your supervisor.
- If the spill overflows into the interior of the cabinet, contact the University Safety Manager and IBC, more extensive decontamination maybe necessary.

# Section 9: Biohazard Exposure

## Introduction

In the event of a Biohazard exposure, the first priority is to contain and minimize the consequences of the exposure. This immediate response will depend on the type of exposure and the nature of the biohazard. Following containment and medical care if needed, the Office of Safety and Environmental Management must be notified within 3 days. In conjunction with lab personnel, they will evaluate the incident with the goal of preventing future exposures, and provide additional training if warranted.

A Biohazard exposure is contact of the skin, eye, or mucous membrane (mouth and nasal) with blood or other potentially infectious material. Exposure can occur through many different routes including:

- Cuts, lacerations, or needle pricks from contaminated objects, delivering contaminants directly into the blood stream of the researcher.
- Contact of biohazards with non-intact skin, such as through cuts, rashes, acne, or other areas of abraded or unsealed skin surfaces
- Introduction of biohazards into the body through facial mucous membranes (eyes, nose, mouth) through splashes, splatter, droplets, or accidental self-inoculation from contaminated hands to these areas.
- Accidental ingestion of biohazards from contaminated hands touching food, or eating, drinking, and smoking in laboratories.
- Inhalation of biohazardous aerosols that are created or released outside of primary containment devices.

## Exposure Response Plan

*Exposure through the skin:*

- Immediately wash the affected area with soap and water for 15 minutes

*Exposure Through Facial Mucous Membranes (Eyes, Nose, or Mouth):*

- Immediately flush the affected areas in an eye face wash that provides upward continuous flow of clean tepid water for 15 minutes.

*Inhalation Exposure:*

- Hold breath if possible and immediately evacuate the lab. Ask all others to evacuate the laboratory.

Regardless of exposure type, after taking an immediate action described above:

- Notify supervisor that an exposure incident has occurred.
- Contact the Safety and Environmental Management to discuss next steps.
- If necessary, call the emergency medical healthcare location designated by your campus for instructions on post-exposure follow up if appropriate. Generally, medical response should be provided within one to two hours following the incident.

### Post-Exposure Medical Follow Up

Researchers should have specific knowledge of the signs and symptoms of exposure of the biohazards that they handle within the laboratory and promptly report any related symptoms to the employee health provider. Individuals handling biohazards should have a high index of suspicion of any related symptoms to report for follow up. In the immediate aftermath of the exposure, the emergency response provider will provide researchers with specific actions to take after onsite medical evaluation. The employee health provider will provide a specific list of conditions to report, and may include: high fever, headache, malaise, joint aches, weakness, rashes, redness and swelling at the wound site.

## Reporting a response

Any occurrence of exposure or potential exposure to a biohazard, or uncontrolled release of biohazardous materials, must be reported to the University Safety Manager within 72 hours of the incident, and in some extreme cases, immediately using the Incident Reporting Form. Once reported, the information will be passed along to the IBC which will ensure that proper actions have been taken. **If there is an immediate threat to health or life, call 911.**

Significant incidents involving recombinant DNA material or significant research related accidents and illnesses will also be reported to the NIH Office of Science Policy as required. For more information on the types of incidents reported to the NIH, please see the FAQ page at: https://osp.od.nih.gov/biotechnology/faqs-on-incident-reporting/

# Appendix: Emergency Contacts

Emergency contact information for each campus must be posted in all Laboratory Spaces

Call 911 if emergent need
University Police – Green Bay Campus: (920)-465-2300
Green Bay Police: (920) 448-3200
Manitowoc City Police Department: (920)-686-6500
Marinette Police Department: (715)732-5200
Sheboygan Police Department: (920) 459-3333

University Safety Manager: Scott Piontek
Phone Number: 920-465-2273
Email: pionteks@uwgb.edu
After Hours Contact Information: University police
Institutions 24-hour Response Phone number: 920-465-2300 (University Police number)
Email: publicsafety@uwgb.edu

## Health Care Facility – Green Bay Campus

UW Green Bay Wellness Center
Address and Location: Student Services, Room 1400, 2420 Nicolet Drive, Green Bay, WI
Email: https://www.uwgb.edu/wellness-center/
Phone Number: (920) 465-2380
Working hours:
Monday: 8 a.m. to 4 p.m.
Tuesday: 9:30 a.m. to 5:30 p.m.
Wednesday: 8 a.m. to 4 p.m.
Thursday: 9:30 a.m. to 5:30 p.m.
Friday: 8 a.m. to 4 p.m.
Saturday: 8 a.m. to 12 p.m.

## Health Care Facility – Manitowoc Campus

Prevea Manitowoc Health Center – Urgent Care
Address and Location: 4810 Expo Drive, Manitowoc, WI
Email:
https://www.prevea.com/locations/Manitowoc
Phone Number: (920) 717-0800
Working hours:
Monday – Friday: 8 a.m. to 8 p.m.
Saturday – Sunday: 8 a.m. to 4 p.m.

## Health Care Facility – Marinette Campus

Prevea Manitowoc Health Center – Family Medicine for Urgent Care service
Address and Location: 1409 Cleveland Ave, Marinette, WI 54341
Email:
https://www.prevea.com/locations/Marinette
Phone Number: (715) 732-0832
Working hours:
Monday – Friday: 8:30 a.m. to 5 p.m.

## Health Care Facility – Sheboygan Campus

Prevea Sheboygan Health center – Urgent Care
Address and Location: 1411 N. Taylor Drive, Sheboygan, WI
Email:
https://www.prevea.com/locations/1411-Taylor-Sheboygan
Phone Number: (920) 457-4858
Working hours:
Monday – Friday: 8 a.m. to 8 p.m.
Saturday – Sunday: 8 a.m. to 4 p.m.

Sources:
https://osp.od.nih.gov/biotechnology/nih-guidelines/
https://www.cdc.gov/labs/BMBL.html
https://www.phe.gov/s3/BioriskManagement/biosafety/Pages/Risk-Groups.aspx
https://www.phe.gov/s3/BioriskManagement/biocontainment/Pages/BSL-Requirements.aspx

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