



BASIC BIOSAFETY

BIOSAFETY OFFICE FOR MARYLAND DEPARTMENT OF HEALTH LABS
ADMINISTRATION

COURSE OUTLINE

1. Introduction
2. Biosafety Levels
3. PPE requirements
4. Biological Waste Management at the MDH Labs
5. Emergency Response Procedures





WHAT IS BIOSAFETY?

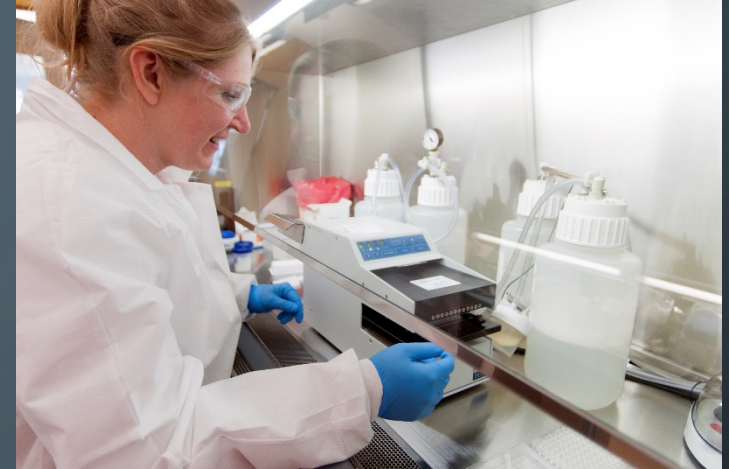
According to the WHO (World Health Organization), biosafety is the use of containment principles, technologies, and best practices to prevent unintentional exposure to pathogens and toxins, or their accidental release

Biosafety is a **PRACTICE**: Biosafety practices are used in the proper handling of biohazardous organisms. Human, animal and plant materials may harbor biohazardous organisms or agents and such materials must be handled accordingly

Biohazardous organisms are microorganisms with an infectious potential for man, animals, and plants in the environment. These microorganisms include prokaryotic and eukaryotic microbes, viruses, sub-viral infectious agents and recombinant organisms with any potential for survival in the environment or in living materials and can cause a health risk

WHAT IS THE PURPOSE OF THIS COURSE?

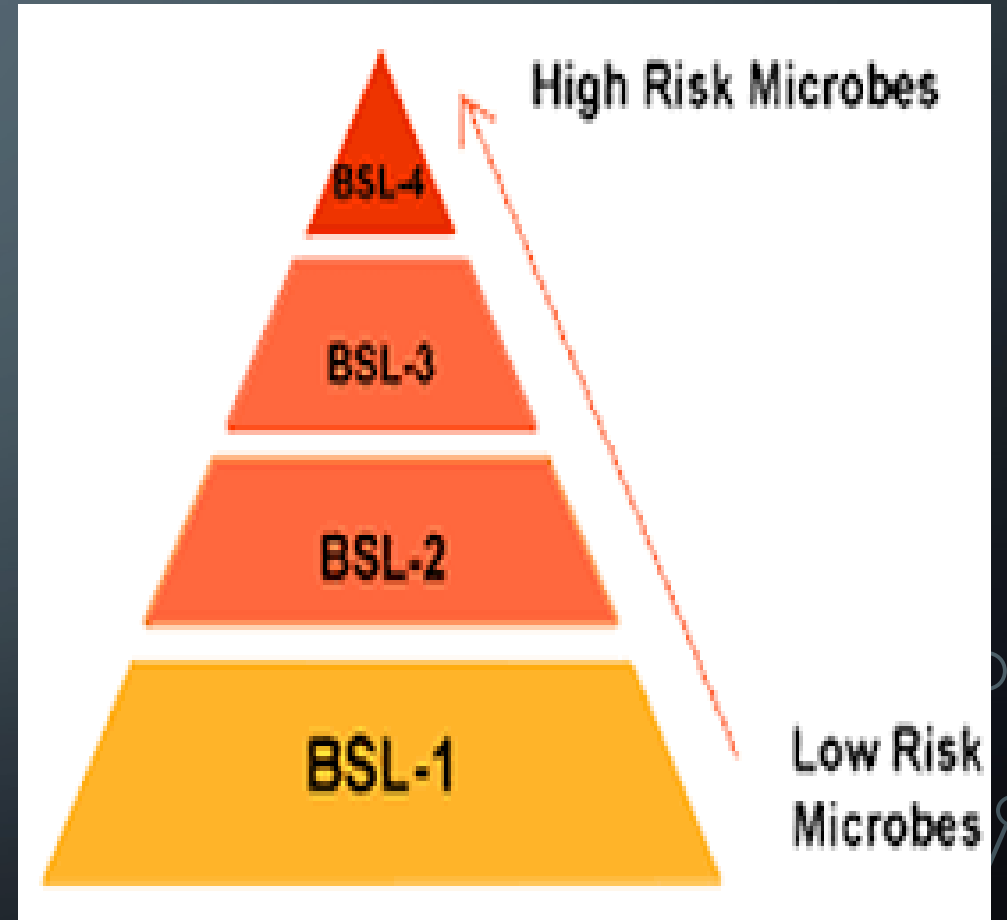
- To provide a basis for the implementation of a BIOSAFETY CULTURE at the MDH Laboratories Administration
- To ensure awareness of proper PPE, best practices, and MDH guidelines for Laboratories Administration workers
- To provide new employees with a basic knowledge of biosafety and provide refresher training for current employees



BIOSAFETY LEVELS

BSL-1: Organisms that typically do not cause disease in healthy adults and pose minimal risk outside the laboratory environment (e.g. *Saccharomyces cerevisiae*, non-disease causing *E. coli*) – can be handled at BSL-1 laboratories

- Access limited to necessary personnel, no eating/drinking, etc. inside laboratory, manipulations of organisms can occur safely on benchtop



BIOSAFETY LEVELS (CONT.)

BSL-2: Organisms that pose a moderate risk to employees, may cause mild disease in healthy adults – must be handled at BSL-2 laboratories

- Manipulations of organisms may be performed on bench top, but any procedure likely to cause aerosols (e.g. vortex, pipette, culture plates, etc.) should be performed inside a BSC
- Additional access controls, medical surveillance for staff, are advised for BSL-2 Labs
- Personal Protective Equipment (PPE) requirements are lab coat or gown, safety goggles and or face mask, and disposable gloves

Note: Most of the work done at MDH Labs is performed within the BSL-2 laboratory. Consult with supervisor or Division Chief for specific requirements.

BIOSAFETY LEVELS (CONT.)

BSL-3: Organisms known to cause serious or fatal disease in humans and pose a severe risk to the environment – must be handled in BSL-3 laboratories. These organisms can be transmitted via inhalation and are not readily treatable or preventable with vaccination

- Manipulation of organisms must be performed in a secure BSL-3 laboratory and in a Biosafety Cabinet (BSC). Additional PPE is required for all work inside a BSL-3 Lab
- MDH Labs provides separate training for BSL-3. Access to BSL-3 labs at MDH is restricted to those who have completed proper training



Note: Highest level is BSL-4 but this level is not in use at MDH Labs

PPE REQUIREMENTS

Universal Precautions

- States that: All biological material is to be treated as infectious material
- Blood and Other Potentially Infectious Materials (OPIM)
 - Includes: blood, urine, sera, CSF, etc.
- Details are covered as a part of Bloodborne Pathogen training
- PPE signage is posted on all lab entry and exit doors

PPE REQUIREMENTS

BSL-2: Minimum requirements in open and closed labs are lab coats and eye protection

- Gloves are required for specific tasks and testing based on unit SOPs
- Other requirements can include the use of a respirator, sleeves and double-gloves while working with specific materials/samples
- Full-face shields may also be used for specific tasks



BSL-3: Respiratory protection (N-95 respirator or PAPR), Tyvek suit (including shoe protection), apron, sleeves and double gloves, and safety goggles and hair cover (if using N-95)



ADDITIONAL INFORMATION FOR MDH LABS

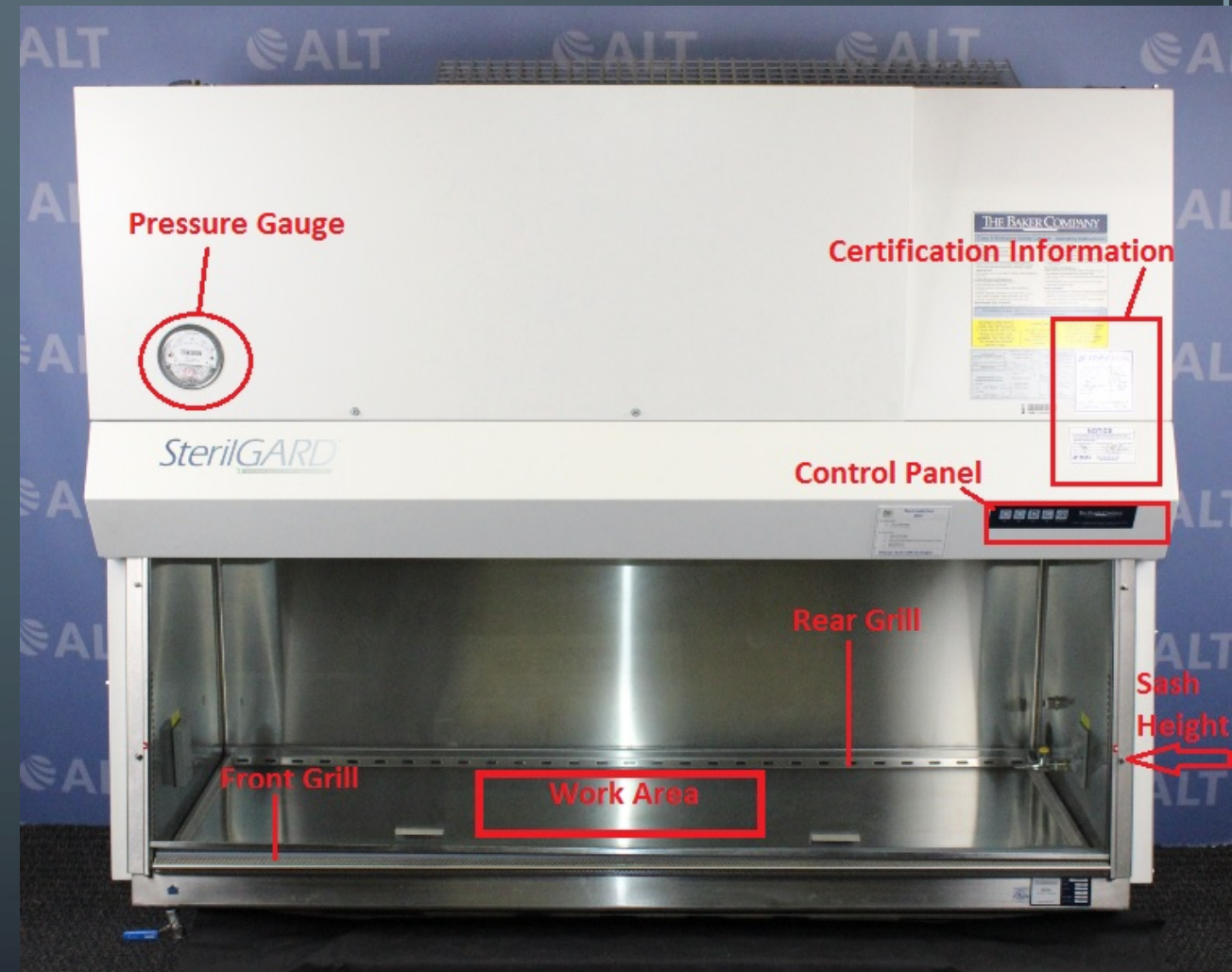
All lab coats are to be kept inside the laboratory or lab corridor

- Observe all signs for where lab coats are allowed to be worn (e.g. No lab coats in the carpeted areas in the offices, etc.)
- Launder lab coats as needed
- Additional disposable lab coats are available in every unit as needed

Wash hands prior to exiting lab. Sinks are located near each exit door for ease of access

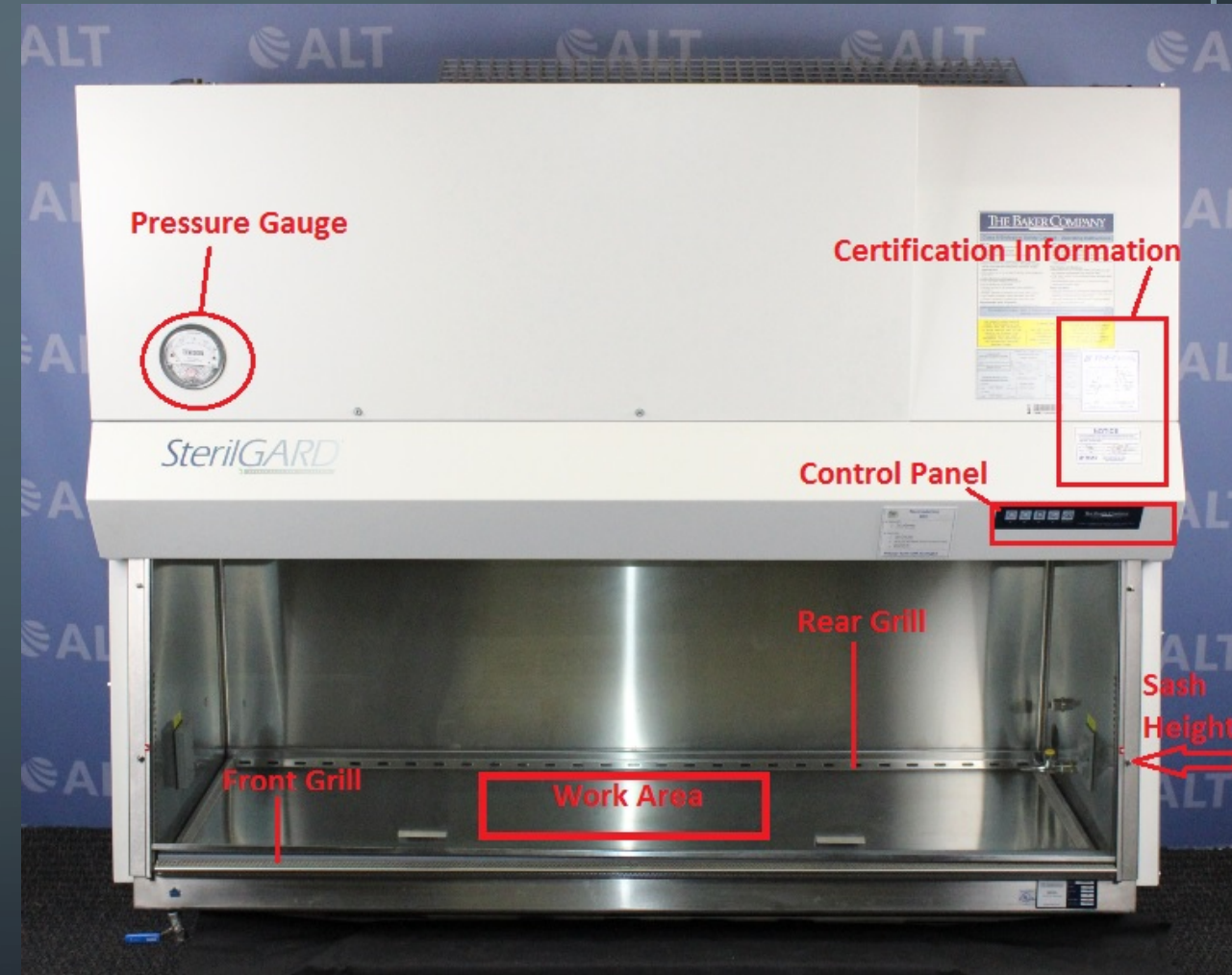
PREPARING TO USE A BIOSAFETY CABINET (BSC)

- Ensure that the BSC is within its **certification period**
- Lift **sash** to height denoted on the side of the cabinet and turn on the blower
- Allow blower to re-circulate air and equilibrate for 4-5 min
- Check the air flow on the **pressure gauge** (minimum is **0.25 psi**) and fill out daily maintenance log
- Disinfect all surfaces inside BSC with appropriate disinfectant (e.g. 10% bleach or Alcohol) prior to use, if needed



WORKING INSIDE A BSC

- Do not clutter the **work area**. Too many materials will inhibit the air flow
- Do not block the **front grill** or the **rear grill** to allow for proper circulation
- Place whatever supplies are needed into the BSC prior to beginning work. Minimize movement in and out of the hood as it disrupts the air flow
- When moving in or out of the BSC, move slowly and perpendicular to the cabinet
- Try to work towards the center of the **work area**



FINISHING WORK IN THE BSC

- Place all waste materials inside biohazard container
- Upon completion of work, decontaminate materials to be removed from cabinet, if necessary, using appropriate disinfectant
- Empty biohazard waste container, if necessary
- Wipe down ALL internal surfaces with appropriate disinfectant
- Close sash and turn off blower
- Turn on UV light and fill out the daily maintenance log for BSC

In the event of an emergency or power failure, secure the specimen/sample, then close the sash prior to leaving the area.

WASTE MANAGEMENT

Biohazard Waste

- All infectious materials must be disposed of in biohazard container
- It is recommended that biohazard bags are double bagged and sprayed down with appropriate disinfectant. All waste is to be collected in designated area
- Sharps are to be collected in designated sharps containers. When 2/3rd full, please close the lid and dispose in a biohazard bags

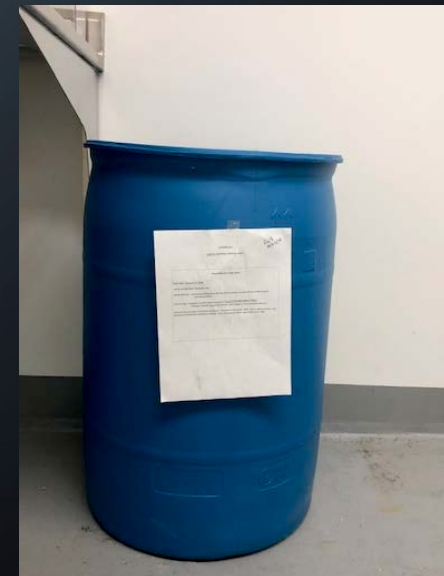


WASTE MANAGEMENT

Chemical Waste

- No hazardous chemicals may be discarded down the drain at the MDH Laboratory Administration building
- All hazardous chemical waste generated as part of routine laboratory testing must be collected in suitable, properly labeled containers, including the date of generation
- Once containers are 2/3rd full, waste pick-up must be arranged through the Safety and Security Officer (SSO)
- Any outdated and expired chemicals must also be disposed of and arranged through the SSO

Radiation Waste is collected and handled by the Radiation Safety Officer



DISINFECTION AND DECONTAMINATION

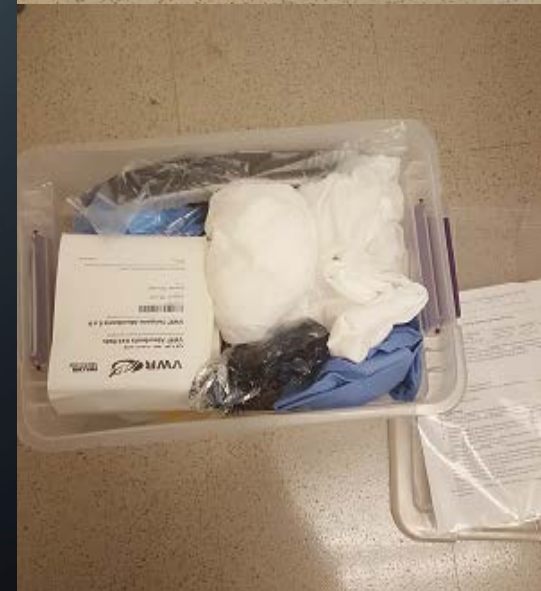
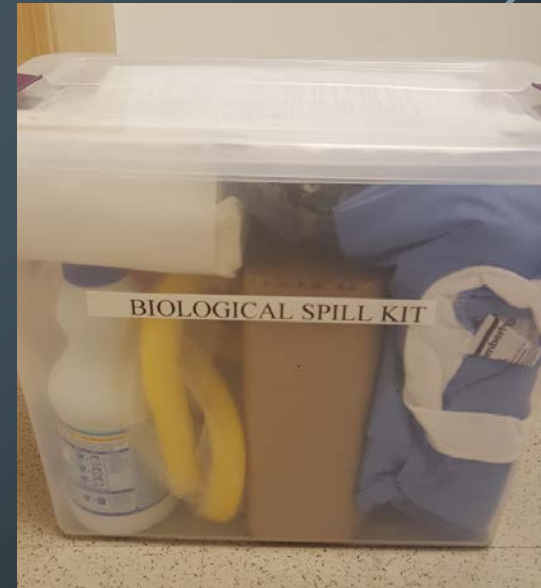
- All work surfaces should be disinfected before work is begun AND after work has been completed for the day
- Common disinfectants are:
 - 10% Bleach-prepared by mixing 1 part household bleach with 9 parts water, or by using a bleach-dilution system (Ex. Activate Bleach system)
 - Lysol-prepared according to manufacturer's instructions
 - Ethanol/Isopropanol
 - Unit-specific disinfectants (e.g. LopHene)
- These chemicals can also be irritants and should be handled using proper PPE (i.e. gloves)



EMERGENCY RESPONSE PROCEDURES

BIOLOGICAL SPILL CLEAN-UP

- Every Division or Unit is equipped with a Biological Spill Kit. All employees should be aware of its location within their specific unit
- The spill-kit contains the SOP and supplies required for spill clean-up. Use the Spill Clean-up SOP for detailed procedures. Hands-on training for Spill Clean-up may be recommended for each individual unit
- Any spill that occurs outside a BSC requires notification to SSO
- After use of spill kit, please replace the contents (contact SSO or BSO, if necessary)



1) Wait 30 min for aerosols to settle. Place sign on door to lab. Obtain spill kit and don new PPE, if needed.



2) Beginning from the outside, cover the spill with absorbent materials.



3) Carefully pour appropriate disinfectant on absorbent materials and wait 30 min (or recommended contact time).



4) Carefully working from edge to center, collect absorbent materials into biohazard waste container.



5) If necessary, place more absorbent materials and disinfectant for another 20 min.



6) Place all materials, including PPE, in biohazard waste bag. Place biohazard waste bag into biohazard container for disposal.



Spill Clean Up In Process



Do NOT Enter

Warning Sign to use to place on door during Spill Clean Up. One sign is available in each spill kit.

INCIDENT RESPONSE – EXPOSURE TO BIOLOGICAL PATHOGEN

- For accidents, needle sticks, etc.-
 - Remove contaminated PPE
 - Flush the exposed body area with clean water for 15-20 min
- Contact Supervisor/Director/SSO immediately
- Begin “First Report of Injury Form”
- Employee is referred to current State healthcare provider for blood sample collection and prophylaxis as needed
- Retain sample of infectious source material for further testing, as needed

TWELVE VALUABLE RULES OF BIOSAFETY

1. SUPERVISORS MUST PROPERLY TRAIN THEIR EMPLOYEES BEFORE PERMITTING THEM TO CONDUCT BIOHAZARDOUS WORK
2. KNOW AND UNDERSTAND THE BIOLOGY AND INFECTIOUS POTENTIAL OF BIOHAZARDOUS AGENTS YOU HANDLE
3. HANDLE ALL BIOLOGICAL MATERIAL (TISSUES AND BODY FLUIDS) RECOGNIZED TO BE CAPABLE OF POTENTIALLY HARBORING BIOHAZARDOUS ORGANISMS OR AGENTS AS IF THE INFECTIOUS AGENT IS PRESENT
4. ALWAYS USE GOOD STANDARDS OF MICROBIOLOGICAL PRACTICE IN HANDLING BIOHAZARDOUS AGENTS OR MATERIALS OR ANY MICROORGANISM
5. USE THE BIOSAFETY LEVEL CONTAINMENT AND PRACTICES SPECIFIED FOR THE INFECTIOUS AGENT BY THE CENTERS FOR DISEASE CONTROL AND PREVENTION, ATLANTA, GEORGIA
6. DO NOT WORK WITH A MICROORGANISM OR AGENT IF THE REQUIRED LEVEL OF PHYSICAL CONTAINMENT DESIGNATED FOR THE BIOHAZARDOUS MATERIAL BEING USED IS NOT AVAILABLE

TWELVE VALUABLE RULES OF BIOSAFETY

7. EACH WORKER HANDLING BIOHAZARDOUS MATERIAL IS RESPONSIBLE FOR FOLLOWING SAFETY RULES TO PREVENT INJURY TO SELF AND OTHERS
8. VIGILANCE AND MONITORING OF BIOSAFETY PRACTICES ARE ESSENTIAL IN ANY BIOSAFETY PROGRAM
9. ASSUME THAT ACCIDENTS WILL OCCUR AND PLAN FOR SAFELY MANAGING THOSE EVENTS WHEN HANDLING BIOHAZARDOUS MATERIALS AND AGENTS
10. REPORT ALL ACCIDENTS OR INCIDENTS TO YOUR SUPERVISOR IMMEDIATELY
11. USE DISINFECTANTS OR STERILANTS WITH PROVEN EFFICACY AGAINST THE SPECIFIC BIOHAZARDOUS AGENT(S) YOU ARE USING
12. NEVER PERMIT BIOHAZARDOUS MATERIALS TO LEAVE THE LABORATORY UNSTERILIZED UNLESS BEING TRANSPORTED TO ANOTHER LABORATORY FOR ADDITIONAL WORK AND PACKAGED ACCORDING TO APPROPRIATE REGULATIONS

QUIZ

https://www.surveymonkey.com/r/Biosafety_Knowledge_QUIZ

CONTACT INFO

Security and Safety Officer (SSO):

W: 443-681-3792

Biological Safety Office (BSO):

W: 443-681-3870

W: 443-681-5187

REFERENCES

- Biosafety in Microbiological and Biomedical Laboratories, current edition, <https://www.cdc.gov/biosafety/publications/bmbI5/>
- Principles of Biosafety Fact Sheet, Association for Biosafety and Biosecurity
- BSC Training video from National Institutes of Health (NIHOD)