

Standard Operating Procedure

Biohazardous Materials

Guidelines

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Purpose

This Standard Operating Procedure (SOP) is meant to ensure that specific activities with biohazardous materials are conducted in a safe manner. SOPs are required as a part of the Biological Use Authorization (BUA) for all laboratories at Biosafety Level 2 and above.

Responsibilities

Principal Investigator

Principal Investigator (PI) has the primary responsibility for ensuring that his/her laboratory is safe by conducting an initial risk assessment, developing administrative controls, and ensuring that all work is conducted with the appropriate engineering controls. PI's should refer to the applicable guidelines and regulations (e.g., National Institute of Health, Centers for Disease Control, Cal/OSHA, and USDA).

Laboratory Staff/Students

Laboratory staff and students are responsible for knowing the potential hazards of the biological material contained within their respective work areas, and the appropriate procedures and practices to be used in the laboratory. Laboratory employees must follow approved laboratory procedures and safety guidelines at all times.

Emergency Contact Information

The first page of the SOP should include the following information so that it is quickly and easily accessible:

- Emergency Contact Information for:
 - Principal Investigator: Name and telephone number (24 hour/7 days per week)
 - Lab Supervisor(s): Name and telephone number (24 hour/7 days per week)
 - Biosafety Officer: (951) 827-2648 (during business hours)
 - Environmental Health & Safety (EH&S): (951) 827-5528 (during business hours)
 - Police (UCPD): 911 (after regular business hours)
- Locations of:
 - Fire Alarms
 - Fire extinguishers
 - Eyewashes (Note: eyewashes should be flushed monthly)
 - Emergency Showers (Note: showers should receive maintenance every 6 months)

Principles of Biosafety

According to the Center for Disease Control and Prevention publication, *Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition*, a fundamental objective of biological safety program is the effective management of potentially harmful biological agents through the use of administrative and engineering controls such as containment. Administrative controls are management tools that provide staff with a set of guidelines describing how to safely operate with biological hazard(s) in an environment designed for containment of the hazard. The term "containment" is used in describing safe methods, facilities, and equipment for managing biohazardous materials in the laboratory environment where they are being handled or maintained. The purpose of containment is to reduce or eliminate exposure of laboratory staff, other individuals, and the outside environment to potentially hazardous agent(s). The risk assessment of the work to be done with a specific agent will determine the appropriate combination of these elements. For more information, refer to <http://www.cdc.gov/biosafety/publications/bmb15/BMBL.pdf>.

Risk Assessment

Risk assessment is a process used to identify the hazardous characteristics of a known infectious or potentially infectious agent or material, the activities that can result in a person's exposure to an agent, the likelihood that such exposure will cause a laboratory acquired infection, and the probable consequences of such an infection. The information identified by risk assessment will provide a guide for the selection of appropriate biological safety level(s) and microbiological practice(s), safety equipment, and facility protections that could prevent laboratory acquired infection or environmental escape. The risk assessment will determine the biological safety containment level (BSL) at which the work can be safely conducted. A risk assessment should distinguish the following:

- Origin of material
- Pathogenicity of material: disease incidence and severity
- Route of transmission: airborne, ingestion, or parenteral,
- Concentration of working quantities and infectious organisms per ml of stock solution
- Infectious Dose
- Agent stability; how easily the material could be decontaminated
- Availability of prophylaxis (vaccination)
- Medical surveillance programs and exposure management (post-exposure prophylaxis)
- Staff knowledge and skill level including training

Additional risk assessment that may be needed include:

- Procedures being used that may produce an aerosol
- Procedures being used that may use needles or sharps
- If material has been concentrated or purified from cell cultures
- Use of larger volumes (>10Liters)
- If the research material has been altered, how does that affect the hazards associated with the material?
- Is the infectious material attenuated (to reduce the virulence/infectious nature of the material) ?
- How could an exposure event occur?

Biological Safety Containment Levels

The following is a general understanding of the different biosafety levels and their relevant best practices is recommended.

Biosafety Level 1 (BSL-1)

BSL-1 is suitable for work involving well-characterized agents not known to consistently cause disease in immunosuppressed adult humans, and present minimal potential hazard to laboratory personnel and the environment. BSL-1 laboratories are not necessarily separated from the general traffic patterns in the building. Work is typically conducted on open bench tops using standard microbiological practices. Special containment equipment or facility design is not required, but may be used as determined by appropriate risk assessment. Laboratory personnel must have specific training in the procedures conducted in the laboratory and must be supervised by a scientist with training in microbiology or a related science.

Biosafety Level 2 (BSL-2)

BSL-2 builds upon BSL-1. BSL-2 is suitable for work involving agents that pose moderate hazards to personnel and the environment. It differs from BSL-1 in that 1) laboratory personnel have specific training in handling pathogenic agents and are supervised by scientists competent in handling infectious agents and associated procedures; 2) access to the laboratory is restricted when work is being conducted; and 3) all procedures in which hazardous aerosols or splashes may be created are conducted in biological safety cabinets (BSCs) or other physical containment equipment.

Biosafety Level 3 (BSL-3)

BSL-3 is applicable to facilities where work is performed with indigenous or exotic agents that may cause serious or potentially lethal disease through inhalation route exposure or serious damage to the environment if containment is breached. Laboratory personnel must receive specific training in handling pathogenic and potentially lethal agents, and must be supervised by scientists competent in handling the agents and associated procedures.

For more information, refer to Section IV of the [*Biosafety in Microbiological and Biomedical Laboratories \(BMBL\) 5th Edition*](#).

Spills in the laboratory

Each Principal Investigator/laboratory supervisor must develop specific spill cleanup methods tailored to the biological agent(s), quantities, and procedures being implemented in the lab, and ensure that the appropriate spill response material(s) is immediately accessible. The following recommended procedures may be utilized as a basis for cleaning spills of biological materials.

Minor (small) Biological Spill:

Steps to cleaning-up a biological spill:

1. Post the area where the spill occurred to avoid the potential for cross contamination and unnecessary exposure to others in or near the work area.
2. Since a spill has the potential to generate an aerosol, let the aerosol settle (minimum 30minutes)
3. Wear a laboratory coat and gloves and obtain or prepare fresh disinfectant solution for clean-up the spill (10 % bleach solution or EPA-Approved disinfectant).
4. Place paper towels or other absorbent material on top of the spill zone
5. Starting from the outermost edge of the spill and working in toward the center of the spill, pour disinfectant onto the absorbent material and allow sufficient contact time to destroy any biological contaminants. Contact time is range between 20 to 30 minutes refer to the instruction on the bottle of disinfectant.
6. Properly dispose of waste (including your gloves) in appropriate Biohazard waste containers lined with biohazard bag for final disposal.

Major Biological Spill:

Major Biological Spill is one that requires assistance of EH&S and/or external emergency personnel. Major Biological Spills involve releases of BSL2 or higher materials outside of a biological safety cabinet, or spills of such materials that involve excessive splashing or aerosol formation. Alert personnel in the laboratory of the spill, and prevent entrance of additional personnel by notification or posting of area. If any material has been splashed on you, if you have been exposed to the agent, or if any of your personal protective equipment has been breached, please follow the procedure outlined in the **Exposure Control Plan:**

1. Remove and disinfect any contaminated clothing.
2. Notify your supervisor and EH&S at 951-827-2648 of the incident.
3. If the situation involves an imminent life-threatening injury or a release outside the building; or has other catastrophic potential, call 911 to reach UCPD
4. Have persons knowledgeable of incident and laboratory available to assist EH&S and/or emergency personnel.

Training

Laboratory staff should have both instructional and hands-on training for all biological hazards present in the laboratory and should demonstrate proficiency in techniques before being permitted to perform laboratory procedures independently.

General training

EH&S provides some online training courses, including the following:

- Bloodborne Pathogens (8CCR5193/29CFR1910.1030)
- Biosafety (introduction)
- Personal Protective Equipment (PPE) 8 CCR 3380 / 29 CFR 1910.132
- Laboratory Safety Orientation
- Chemical Hygiene
- Hazardous Waste Management

For more information, refer to <http://ehs.ucr.edu/training>.

Specific training

Laboratory-specific training should be provided by the PI, or senior scientist who has several years of experience working with the biological materials and can direct staff in safe handling of the materials to avoid any accidental exposures. All training sessions should be documented with the: training session topic(s), instructor, date, and attendees. Depending on the significance of the hazards involved, curriculum training and proficiency testing may be warranted.

Medical Surveillance

Depending on the biological materials manipulated in the laboratory, vaccinations and/or other medical surveillance programs may be warranted for employees. For more information on work-related injuries, you may review the "Injuries and Medical Treatment" flipchart located in each laboratory, which is also available online at <http://ehs.ucr.edu>.

Personal Protective Equipment (PPE)

In addition to the required standard PPE in a BSL2 laboratory, other PPE may be required to safely manipulate the agent. In particular, you should consider additional PPE if you are manipulating animals and include this in your SOP.

The following is a list of common PPE found in the laboratory:

- Gloves
- Safety Glasses/Goggles
- Gowns/Aprons
- Laboratory Coat
- Respiratory protection (fit test and medical clearance required)
- Surgical Mask
- Shoe Covers
- Bonnets
- Face Shields

Warning Signs and Postings

Each laboratory must clearly display a sign that provides safety information to visitors and service personnel. For more information, contact the EH&S Biosafety Officer (951) 827-5528.

Bio-containment and Biological Safety Cabinets (BSCs)

The selection and use of BSCs are the primary means of containment developed for working safely with hazardous microorganisms. For more information, refer to Appendix A of

the [Biosafety in Microbiological and Biomedical Laboratories \(BMBL\) 5th Edition](#).

Waste Disposal

Information on biological material disposal, including medical waste and autoclaves, can be found online at <http://ehs.ucr.edu/waste>. All recombinant material is considered hazardous and must be disposed of as biological waste.

Housekeeping

Special practices include: decontaminating work surfaces after completing the work with the infectious materials, keeping non-research animals out of the laboratory, and reporting all spills and accidents.

Autoclaves

EH&S monitors autoclave effectiveness and performance on a recurring basis with *B.Stearothermophilus* indicators. To participate in the autoclave monitoring program, contact the EH&S Biosafety Officer (951) 827-2648. For more information about the effective use of autoclaves, refer to the Fast Facts available online at <http://ehs.ucr.edu> under "Resources" (Fast Facts for [Effective Use of Autoclaves](#)).

Needles and Sharps Precautions

- Substitute plastic ware, when possible
- DO NOT bend, shear, break, recap or remove needle from syringe
- Use sharps containers (don't fill more than ¾ full), which must be located as close to work area as possible.
- Non-disposable sharps should be placed in a rigid container for transport to appropriate area for decontamination, such as by autoclaving
- Only needle-locking syringes or disposable syringe-needle units (needle is integral to the syringe) should be used
- Syringes that re-sheath the needle, needleless systems, and other safety devices may also be used
- Do not handle broken glass directly by hand. Use a mechanical device such as forceps or protective gloves to pick up and dispose of glass in a glass box or sharps container

For more information, refer to <http://ehs.ucr.edu/biosafety>

Transportation of biological materials outside of the laboratory

Transportation of biological material(s) from one location to another (e.g. from one lab to another, between buildings, through common hallways) should be done in a primary container, with a secondary sealed and leak-proof container capable of containing the entire contents. Make sure to place a label on the primary container to identify the contents in the event the container is misplaced or dropped and spills.

Standard Operating Procedure

INSTRUCTIONS: Use this template to develop a Standard Operating Procedure for your laboratory to address biological safety risks.

OVERVIEW	PRINCIPLE INVESTIGATOR (PI) NAME: HOWARD JUDELSON	PHONE: 8274199
	LOCATION: (Building, Room #)	
	PROJECT TITLE: MOLECULAR GENETICS OF PHYTOPHTHORA INFESTANS AND RELATED OOMYCETES	BUA #: 2013-0039
	AGENTS (ORGANISM(S) OR ANIMAL TISSUE(S), ETC.): PHYTOPHTHORA INFESTANS AND RELATED SPECIES (P. CAPSICI, P. PHASEOLI, P. SOJAE, P. CINNAMOMI). E. COLI K (NONPATHOGENIC) STRAINS, SACCHAROMYCES CEREVISIAE.	

EMERGENCY CONTACT INFORMATION	LOCATION OF NEAREST EMERGENCY EQUIPMENT:															
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ACCIDENT RESPONSE PROCEDURES	SPILL RESPONSE PROCEDURES															
CONTAIN SPILLS WITH ABSORBANT PAPER (IF APPROPRIATE). DISINFECT AREA AS INDICATED TO THE RIGHT	<p><i>Describe emergency procedures. Describe disinfectant(s) and environmental decontamination procedures.</i></p> <p>spills should be wiped up with paper towels and the area disinfected with 10% bleach or ethanol.</p>															
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RISK ASSESSMENT

HAZARD IDENTIFICATION AND RISK OF EXPOSURE

(Describe the risk of the agent(s). Determine if immunization is needed.)

No risk: agents are not human pathogens (E. coli strains are disarmed, nonpersistent cloning strains).

ROUTES OF EXPOSURE

(Prior to assigning containment requirements, it is essential to identify the routes of transmission, such as inhalation, ingestion, skin, etc.)

Not applicable.

EXPOSURE RISKS

(e.g., sharps, exposure, splash exposure, non-intact skin exposure, other exposure such as inanimate)

Not applicable.

MEDICAL CONSIDERATIONS

MEDICAL SCREENING AND SURVEILLANCE (IF NECESSARY), INCLUDING HEPATITIS B VACCINATION (HBV)

(e.g., All personnel that actively handle human cell culture or human specimens in the laboratory)

If individual declined the HBV, must sign the following HBV Declination form available online at <http://ehs.ucr.edu/forms/hepBdeclination.pdf>

Not applicable.

PROCEDURE METHOD(S) AND MATERIALS

PROCEDURE METHOD(S) AND MATERIAL(S):
(Incorporate each category as it pertains to your work)

STRAINS OF PHYTOPHTHORA NOT ORIGINATING IN CALIFORNIA SHOULD BE HANDLED IN BIOSAFETY CABINET.

SIGNAGE AND LABELING

SIGNAGE AND LABELING
(e.g., restriction, locks)

SIGN ON PHYTOPHTHORA INCUBATORS AND DOOR TO HALL INDICATE THAT ONLY PERSONNEL AUTHORIZED BY HOWARD JUDELSON MAY ENTER.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

PERSONAL PROTECTIVE EQUIPMENT (PPE)
(e.g. Entry and exit procedures, use PPE during work, removal and proper disposal)

NONE REQUIRED SINCE AGENTS ARE NOT HUMAN PATHOGENS

METHODS

METHODS TO MINIMIZE EXPOSURE

(Work practices, use of conveniently located sharps containers, safer needles and sharps, absorbent material on counter)

Not applicable.

METHODS TO PREVENT THE RELEASE OF INFECTIOUS AGENTS

(Equipment, Biological Safety Cabinet (BSC), covered centrifuge cup)

Exotic strains of Phytophthora should be handled only in biosafety cabinet, and stored in double boxes in closed incubators.

TRANSPORTATION

SPECIMEN TRANSPORT AND REMOVAL OF MATERIAL(S) FROM THE LABORATORY

(e.g. transport carriers)

Exotic strains of Phytophthora and transgenic strains should not be removed from the lab. Other strains may be transported in closed containers.

STANDARD MICROBIOLOGICAL METHODS

STANDARD MICROBIOLOGICAL METHODS

(e.g. handwashing, no mouth pipetting, no food or drink in refrigerator(s) where material is stored)

no food or drink allowed in lab, no mouth pipetting, wash hands before exiting lab.

CLEANING AND DISINFECTION

CLEANING AND DISINFECTION

(Describe surface decontamination, cleaning procedures, and types of disinfectant(s) used in cleaning process)

WIPE WORK SURFACES WITH 10% BLEACH OR 95% ETHANOL.

WASTE

WASTE GENERATION AND DISPOSAL METHODS

All biological materials (except for uninoculated plants) must be autoclaved for soaked for a minimum of 30 min in 10% bleach prior to disposal.

Prepared by. *By signing this form the individual certifies that the information provided is true and correct to the best of their knowledge.*

PRINT NAME / SIGNATURE

DATE: 2-15-2014

HOWARD JUDELSON

