

Chapter 13 Emergency Preparedness

One research nurse recently told a biosafety specialist in Texas: "I'm not going to have an accident with this stuff - I don't see what all the fuss is about."

The biosafety specialist responded: "I don't want to hear that you are not going to have an accident. What I want to hear is - 'if I have an accident - this is what I have planned to make sure no one gets exposed' ".

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Biohazard Spill Cleanup Procedures

Biological spills outside biological safety cabinets will generate aerosols that can be dispersed in the air throughout the laboratory. These spills are very serious if they involve microorganisms that require Biosafety Level (BSL) 3 containment, since most of these agents have the potential for transmitting disease by infectious aerosols. To reduce the risk of inhalation exposure in such an incident, occupants should hold their breath and **leave the laboratory immediately**. The laboratory **should not** be reentered to decontaminate and clean up the spill for at least 30 minutes. During this time the aerosol will be removed from the laboratory by the exhaust air ventilation system. Appropriate protective equipment is particularly important in decontaminating spills involving microorganisms that require BSL 2 or BSL 3 containment. This equipment includes lab coat with long sleeves, back-fastening gown or jumpsuit, disposable gloves, disposable shoe covers, and safety goggles

and mask or full-face shield. Use of this equipment will prevent contact with contaminated surfaces and protect eyes and mucous membranes from exposure to splattered materials.

Each laboratory containing biohazardous materials should have a spill decontamination kit. The kit should contain appropriate inactivating agent(s), absorbent material, biological waste bags, and personnel protective equipment. It is the responsibility of the PI to ensure that these items are readily available and stocked at all times. The following procedures are provided as a guideline to biohazardous spill cleanup. The PI must also develop appropriate containment, inactivation and spill cleanup procedures for the specific biological materials to be used in the laboratory. In laboratories using Class 2 or 3 agents that are infectious by aerosol transmission, laboratory personnel may wish to be fitted with a HEPA filtered respirator. Contact Risk Management and Safety (RM&S) at 621-1790 or http://w3fp.arizona.edu/riskmgmt/respiratory_protection.htm to learn more about respiratory protection. If a spill contains Class 2 or greater material, or if the spill is considered too large or too dangerous for laboratory personnel to safely clean up, secure the area--including the whole lab--and call RM&S 621-1790 immediately for assistance. Check yourself and your clothing for potential contamination. Remove all contaminated clothing and place it in a bag for decontamination. Contaminated body areas must be washed immediately with soap and water, use an emergency shower if available.

Spills Involving a Microorganism Requiring BSL 1 or BSL 2 Containment

- ❑ Alert people in immediate area of spill.
- ❑ Put on proper personnel protective equipment.
- ❑ Cover spill with paper towels or absorbent pads.
- ❑ Carefully pour a freshly prepared 10% (vol./vol.. w/water) dilution of household bleach around the edges of the spill and then into the spill. Avoid splashing.
- ❑ Allow a 15 minute contact period.
- ❑ Use paper towels or absorbent pads to wipe up the spill, working from the edges into the center.
- ❑ Clean spill area with fresh towels soaked in disinfectant.
- ❑ Place towels or absorbent pads in red plastic bag for disposal in the Biohazardous waste container.

Spills Involving a Microorganism Requiring BSL 3 Containment

- ❑ Attend to injured or contaminated persons and remove them from exposure.
- ❑ Alert people in laboratory to evacuate.
- ❑ Close all doors to affected area.
- ❑ Call the Biological Spill Emergency Response number (621-1790).
- ❑ Have person knowledgeable of incident and laboratory assist emergency response personnel.

Inside the Biosafety Cabinet (BSC)

- Wait at least five minutes to allow the BSC to contain aerosols.
- Wear lab coat, safety glasses and gloves during cleanup.
- Allow cabinet to run during cleanup.
- Apply 70% ethanol or effective disinfectant and allow a minimum of 20 minutes contact time. (See List of Disinfectants in Appendix 8.)
- Wipe up spillage with disposable disinfectant-soaked paper towel.
- Wipe the walls, work surface and any equipment in the cabinet with a disinfectant-soaked paper towel.
- Discard contaminated disposable materials using appropriate biohazardous waste disposal procedures (e.g., autoclave).
- Place contaminated reusable items in biohazard bags, autoclavable pans with lids or wrap in newspaper before autoclaving and cleanup.
- Expose non-autoclavable materials to disinfectant (20 minute contact time) before removal from the BSC.
- Remove protective clothing used during cleanup and place in a biohazard bag for autoclaving.
- Run cabinet 10 minutes after cleanup before resuming work or turning cabinet off.

For more information about the selection, installation and use of biological safety cabinets, use <http://www.cdc.gov/od/ohs/biosfty/bsc/bsc.htm>.

Spills In the Lab, but Outside the BSC

Clear area of all personnel. Wait at least 15 minutes for aerosol to settle before entering spill area.

- During the 15 minute wait call RM&S at 621-1790 if the material requires BL-2 or greater containment.

- Remove any contaminated clothing and place it in an orange biohazard bag to be autoclaved.
- Put on a disposable gown, safety glasses and gloves. You may want to wear two pairs of gloves. The spill may also require the use of a respirator. If this is the case do not attempt to initiate the clean-up. Contact RM&S for assistance in the spill clean-up.
- Initiate cleanup with disinfectant as follows:
 1. Place dry paper towel on spill (to absorb liquids); then layer a second set of disinfectant soaked paper towels over the spill.
 2. Encircle the spill with additional disinfectant being careful to minimize aerosolization while assuring adequate contact.
 3. Decontaminate all items within spill the area.
 4. Allow a minimum of 20 minutes contact time to ensure germicidal action of disinfectant. Note that a long contact time may be necessary for some agents.
 5. Wipe equipment with appropriate disinfectant.
 6. Discard contaminated disposable materials using appropriate biohazardous waste disposal procedures (e.g., autoclave).
 7. Disinfect reusable items.

Inside a Centrifuge

- Clear area of all personnel.
- Wait 30 minutes for aerosol to settle before attempting to clean up spill.
- Wear a lab coat, safety glasses and gloves during cleanup. [The spill may also require the use of a respirator.](#)
- Remove rotors and buckets to nearest biological safety cabinet for cleanup.
- Thoroughly disinfect inside of centrifuge.
- Discard contaminated disposable materials using appropriate biohazardous waste disposal procedures (e.g., autoclave).

Outside the Lab, In Transit

Transport labeled biohazardous material in an unbreakable, well-sealed primary container placed inside a second unbreakable, lidded container (cooler, plastic pan or pail) labeled with the biohazard symbol.

- Should a spill occur in a public area, do not attempt to clean it up without appropriate personal protective equipment.
- Secure the area, keeping all people [away from the spill](#).
- Call RM&S at 621-1790 to assist in cleanup.
- Standby during spill response and cleanup activity and provide assistance only as requested or as necessary.

Medical Emergencies

- [Render first aid within the limits of your knowledge and formal training. Call 911 and report:](#)
 - [Location](#)

- Condition of Victim
- Your Name

Injury Reporting

Your supervisor must fill out THE UNIVERSITY OF ARIZONA SUPERVISOR'S REPORT OF EMPLOYEE INJURY/ILLNESS with the department within 7 calendar days. Supervisor may fax the report 621- 3706 and then mail original to Risk Management and Safety, P.O. Box 210460, campus mail. Hand deliver to 220 West 6th Street/4th Floor South, or U.S. Mail, P.O. Box 210300, Tucson, AZ 85721-0300. This form is available on-line at

http://w3fp.arizona.edu/riskmgmt/insurance_forms_on.htm

You may go to Campus Health. If closed, you may go to, any hospital, or urgent care. Call **1-800-837-8583** to report the injury.

A WORKER'S PHYSICIAN'S REPORT OF INJURY must be filled out at the location where you receive treatment for medical care (102 form, pink, four page carbon copies).

- You fill out the top of this form.
- Your physician fills out the bottom.

In Case of Fire

If you discover fire, smoke, or hear the fire alarm:

- Leave the building immediately via the stairs. **DO NOT USE THE ELEVATORS.**
- As you leave close all doors, including those propped open.
- On your way out, you will pass a fire alarm pull station. If the alarm is not already ringing, **PULL IT.**
- Once outside, get away from the building.
- Building Monitor should call the University Police Department (Tucson Fire Department (9-1-1) for off-campus locations) and report the details of the fire: **UAPD: 621-8273 or 9-1-1**
- Remain outside the building until the **"ALL CLEAR"** is given by the Tucson Fire Department or UAPD. Silencing of the alarms does not constitute an "ALL CLEAR."

For mobility impaired persons: If a person with a mobility impairment is able to exit the building without use of the elevator, then evacuation should follow the appropriate route out of the building. If exit from the building is only possible by use of the elevator, follow the procedures

outlined below:

- The mobility-impaired person should proceed to the nearest enclosed stairwell or "area of safe refuge" and remain there. In case of a fire, enclosed building stairwells are "safe refuge areas," and have a higher fire resistive rating. If possible a co-worker, supervisor, instructor, or building monitor should be notified.
- Make sure the door to the stairwell is closed. Open doors will violate the "safe refuge area" and will allow smoke, and possibly fire, into the stairwell.
- Once outside, the co-worker, supervisor, instructor, or building monitor should inform the Tucson Fire Department (TFD) Incident Command Center that there is a mobility-impaired person in a stairwell, which floor the person is on and location of the stairwell or refuge area. When stairwell evacuations are necessitated, such decisions and evacuations will be made by TFD. **UNIVERSITY PERSONNEL SHOULD NEVER ATTEMPT TO CARRY ANYONE DOWN THE STAIRS.**
- After the "**ALL CLEAR**" has been given by TFD or University Police (UAPD), the co-worker, supervisor, instructor, or building monitor should immediately go to the stairwell or refuge area and inform the person that it is safe to re-occupy the building.

Links:

UAPD <http://www.uapd.arizona.edu/uapd1.html>

Tucson Fire Department <http://www.ci.tucson.az.us/fire/tfdhp.htm>

Fire Safety 101 <http://www.usfa.fema.gov/safety/101.htm>

Burntalk <http://www.burntalk.com/>

Laboratory Security

Traditional laboratory biosafety guidelines have emphasized the use of good work practices, appropriate containment equipment, well designed facilities, and administrative controls to minimize risks of accidental infection or injury for laboratory workers and to prevent contamination of the environment outside the laboratory.

Although clinical and research microbiology laboratories may contain a variety of dangerous biological, chemical, and radioactive materials, there are few reports to date of any of those materials being used intentionally to injure laboratory workers or others.⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁶⁾

However, there is growing concern about the possible use of biological, chemical, and radioactive materials as agents for terrorism.⁽⁷⁾⁽⁸⁾ In response to these concerns, the following guidelines address laboratory security issues (e.g., preventing unauthorized entry to laboratory areas and preventing unauthorized removal of dangerous biological agents from the laboratory).

The following are offered as guidelines for laboratories **using biological agents or toxins capable of causing serious or fatal illness to humans or animals**. Most of these laboratories would be working under the BSL-3 or -4 conditions described in Sections II and III. However, research, clinical, and production laboratories working with newly identified human pathogens, high-level animal pathogens, and/or toxins not covered by BSL-3 or -4 recommendations, should also follow these

guidelines to minimize opportunities for accidental or intentional removal of these agents from the laboratory.

1. Recognize that laboratory security is related to but different than laboratory safety.

- Involve both safety and security experts in evaluation and development of recommendations for a given facility or laboratory.
- Review safety policies and procedures regularly. Management should review policies to ensure that they are adequate for current conditions and consistent with other facility-wide policies and procedures. Laboratory supervisors should ensure that all laboratory workers and visitors understand security requirements and are trained and equipped to follow established procedures.
- Review safety policies and procedures whenever an incident occurs or a new threat is identified.

2. Control access to areas where biologic agents or toxins are used and stored.

- Laboratories and animal care areas should be separate from the public areas of the buildings in which they are located.
- Laboratory and animal care areas should be locked at all times
- Card-keys or similar devices should be used to permit entry to laboratory and animal care areas.
- All entries (including entries by visitors, maintenance workers, repairmen and others needing one-time or occasional entry) should be recorded, either by the card-key device (preferable) or by signature in a log book.
- Only workers required to perform a job should be allowed in laboratory areas, and workers should be allowed only in areas and at hours required to perform their particular job.
 - a. Access for students, visiting scientists, etc., should be limited to hours when regular employees are present.
 - b. Access for routine cleaning, maintenance, and repairs should be limited to hours when regular employees are present.
- Freezers, refrigerators, cabinets, and other containers where stocks of biological agents, hazardous chemicals, or radioactive materials are stored should be locked when they are not in direct view of workers (e.g., when located in unattended storage areas).

3. Know who is in the laboratory area.

- All workers should be known to facility administrators and laboratory directors. Depending on the biological agents involved and the type of work being done, a background check and/or security clearance may be appropriate before new employees are assigned to the laboratory area.
- All workers (including students, visiting scientists, and other short-term workers) should wear visible identification badges. Identification badges should include, at a minimum, a photograph, the wearer's name, and an expiration date. It may be useful to use colored

markers or other easily recognizable design symbols on the identification badges to indicate clearance to enter restricted areas (e.g., BSL-3 or -4 laboratories, animal care areas).

- Guests should be issued identification badges, and escorted or cleared for entry using the same procedures as for regular workers.

4. Know what materials are being brought into the laboratory area.

- All packages should be screened (visual and/or x-ray) before being brought into the laboratory area.
- Packages containing specimens, bacterial or virus isolates, or toxins should be opened in a safety cabinet or other appropriate containment device.

5. Know what materials are being removed from the laboratory area.

- Biological materials/toxins for shipment to other laboratories should be packaged and labeled in conformance with all applicable local, federal, and international shipping regulations.⁽⁹⁾

a. Required permits (e.g., PHS, DOT, DOC, USDA) should be in hand before materials are prepared for shipment.

b. The recipient (preferably) or receiving facility should be known to the sender, and the sender should make an effort to ensure that materials are shipped to a facility equipped to handle those materials safely.

- Hand-carrying of microbiological materials and toxins to other facilities is rarely appropriate. If biological materials or toxins are to be hand carried on common carriers, all applicable regulations must be followed.
- Contaminated or possibly contaminated materials should be decontaminated before they leave the laboratory area. Chemicals and radioactive materials should be disposed of in accordance with local, state, and federal regulations.

6. Have an emergency plan.

- Control of access to laboratory areas can make an emergency response more difficult. This must be considered when emergency plans are developed.

a. An evaluation of the laboratory area by appropriate facility personnel, with outside experts if necessary, to identify both safety and security concerns should be conducted before an emergency plan is developed.

b. Facility administrators, laboratory directors, principal investigators, laboratory workers, the facility safety office, and facility security officials should be involved in emergency planning.

c. Police, fire, and other emergency responders should be informed as to the types of biological materials in use in the laboratory areas, and assisted in planning their responses to emergencies in the laboratory areas.

d. Plans should include provision for immediate notification of (and response by) laboratory directors, laboratory workers, safety office personnel, or other knowledgeable individuals when

an emergency occurs, so they can deal with biosafety issues if they occur.

- Laboratory emergency planning should be coordinated with facility-wide plans. Such factors as bomb threats, severe weather (hurricanes, floods), earthquakes, power outages, and other natural (or unnatural) disasters should be considered when developing laboratory emergency plans.

7. Have a protocol for reporting incidents.

- Laboratory directors, in co-operation with facility safety and security officials, should have policies and procedures in place for reporting and investigation of incidents or possible incidents (e.g., undocumented visitors, missing chemicals, unusual or threatening phone calls).

From the BMBL, 4th Ed, Appendix F., Laboratory Security and Emergency Response for Microbiological and Biomedical Laboratories. This is available at:

<http://www.cdc.gov/od/ohs/biosfty/bmbl4/b4af.htm>

Building Emergency Plan

Consult your Building Monitor.

University of Arizona Emergency Plan

The University of Arizona has an Interim Emergency Response Plan. The purpose of the plan is to provide guidance and direction for response in the event of an emergency or crisis situation. It is available at:

<http://www.arizona.edu/emergency.shtml>

Documentation

Laboratories should document emergency phone numbers and procedures in their written Biosafety Manuals. The following is an example of a simple format. In addition, all laboratories

Emergency Phone Numbers and Procedures

A. Emergency Phone Numbers

Fire and Medical Emergencies.....	911
UA Police Department.....	911/ 621-8273
Principal Investigator's Home Phone.....	[xxx-xxxx]
Employee Health.....	626-2416
UMC Hospital Emergency Room.....	694-6046
Risk Management	621-1790
Mark J. Grushka, C.S.P., University Biosafety Officer.....	621-5279

B. Emergency Procedures

In case of fire, leave the building, close all doors behind you and pull the fire alarm button on your way out. Appropriate judgment should be exercised in deciding whether to store or contain any hazardous materials prior to evacuation.

Any injury to a laboratory worker shall be reported immediately to [the Principal Investigator], and timely and appropriate action shall be taken to evacuate such employee from the laboratory and to obtain appropriate medical treatment. Administer first aid outside of the lab if the injured person is ambulatory.

If an accident involves a biohazardous spill, move the injured person away from the spill. Do not attempt to move a non-ambulatory person unless it is absolutely necessary. Inactivate the spill after attending to the injured person.

Remove from the injured person all protective clothing (i.e., lab coat) that may have been contaminated, and rip away the protective clothing only if necessary. Do **NOT** move the injured person to remove the protective clothing. Wash any contaminated skin with disinfectant such as Betadine or Envirocide.

Quiz

1. The most significant health hazard associated with spilling biological material in a laboratory is:
 - Slipping and falling due to liquids.
 - Cuts and punctures due to broken glass.
 - Generation of aerosols which can be inhaled and cause a laboratory acquired infection.
 - Liquids create an electrocution hazard within biological safety cabinets.
2. In the event of a spill of biological material outside of a biological safety cabinet, laboratory personnel should leave the area for at least 30 minutes. This is especially true for agents at the following level (s):
 - Biosafety Level One (BSL-1)
 - Biosafety Level Two (BSL-2)
 - Biosafety Level Three (BSL-3)
 - Biosafety Levels Two and Three (BSL-2/BSL-3)
3. One of the best decontaminating agents to use for most biological spills outside of a biological safety cabinet is:
 - 10% (vol./vol.. w/water) dilution of household bleach
 - alcohol
 - distilled water
 - phenol-based disinfectant
4. If a spill occurs inside of a biological safety cabinet, it is important to immediately shut the cabinet down, to avoid contaminating other parts of the laboratory.
 - True
 - False
5. In the event of a fire, the most important thing to do is put the fire out as quickly as possible.
 - True
 - False
6. If you are injured on the job, you must report it to your supervisor to protect your rights under the Arizona State Workers Compensation System.
 - True
 - False
7. Good laboratory security involves:
 - Controlled access to where biological agents and toxins are stored and used.

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- Periodic review of policies and procedures to ensure they ensure consistent performance.
 - Development and regular review of laboratory emergency plan
 - All of the above.
- 8.** The quickest way to obtain help in situations involving fires, medical emergencies or security issues including bomb threats, is to call:
- 911
 - University Risk Management Department at 621-1790
 - University Biosafety Officer at 621-5279
 - None of the above
- 9.** All laboratories should post The University of Arizona Emergency Response Guide.
- True
 - False
- 10.** Who is ultimately accountable for emergency preparedness for a laboratory?
- Building Monitor
 - Risk Management and Safety
 - University Police Department
 - Principal Investigator