

Section 10. Emergency Response in Biosafety Level 4 Areas

“Routine” Emergencies

Biological Spills without Breach of Containment Suit

- Cover the area with paper toweling.
- Gently apply disinfectant to the area, working from the margins to the center and smoothing flow of disinfectant to cover entire area from a margin larger than the spill.
- Let treated area stand for 20 minutes, then collect toweling and excess disinfectant in leak proof containers for same day autoclaving. Mop floor or surface with disinfectant, and then rinse with water.
- If spill contains radioactive materials, modify procedure as directed by RSO, who will test personnel and surfaces for residual radioactivity.
- If spill contains broken glass, do not use hands to pick up glass; always use whiskbroom and dust pan.

Loss of Breathing Air Only

- If breathing air compressors fail, an amber strobe light will flash in each module of the Lab.
- Breathing air will now come from a bank of cylinders located on the "HEPA" floor above the Lab.
- All infectious materials must be secured.
- Personnel shall then leave the Lab through normal exit after taking a chemical shower.
- CYLINDERS HAVE AIR FOR 40 PERSONS TO EXIT NORMALLY

Loss of Lab Negative Pressure Only

- Both air supply and exhaust will be shut down if this occurs despite redundant air handling systems and emergency electrical generation.
- An amber light signals this condition.
- All infectious work is to be immediately secured.
- Personnel shall leave the Lab by normal procedures if the light continues to flash and the chemical shower is functional.

Loss of Chemical Shower Only

- If shower does not function automatically, attempt to run same manually per instructions next to chemical and rinse controls.
- If manual operation is not possible, sponge suit thoroughly from

disinfectant container and then exit shower.

- When either of these emergency modes are invoked, manual operation of the "clean" door will activate an alarm at the work station monitor, bringing outside assistance to persons after exiting.

Personnel Suit or Glove Damage

- If a puncture or tear is discovered in a ventilated suit or glove, but no infectious spill or break in skin has occurred, apply duct tape to the opening or another glove over the damaged one. Upon exit from the lab, clothing should be placed in a separate autoclave bag for steam sterilization. **The incident must be reported to the Biocontainment Specialist.**
- If infectious material has penetrated the suit or glove, duct tape or another glove shall be applied, the Biocontainment Specialist shall be notified, and the worker and a partner shall immediately exit the Lab via normal procedures. Biocontainment personnel will be available in the suit storage room to assist in disinfection, triage, and reporting of the incident to the Biosafety Officer. The Biosafety Officer, in coordination with the Biological Exposure Assessment Program, will assess and direct further management of the occurrence.

Rare but Major Emergencies

Loss of All Systems Including UPS (Uninterrupted Power Supply) and Emergency Generators (This possibility is remote because of the thorough redundancy built into design of the Lab)

- If this happens, a battery operated amber strobe warning light will be activated **at 4 flashes per second**, and sudden and complete loss of primary breathing air also will signal the condition.
- Quickly secure infectious materials.
- The magnetic interlocks on all lab doors will be automatically unlocked permitting manual egress.
- Exit through chemical shower in pairs, and sponge ventilated suits from disinfectant containers located in shower.

Explosion or Fire

- If fire anywhere in the facility threatens the Containment Level 4 Lab, white strobe warning lights will flash at **slow speed** (about every 4 seconds). This alerts personnel to secure infectious materials and to prepare to leave the Lab normally.
- When fire danger to the Lab is imminent, the strobe will flash much faster (about **4 times each second**). This is a signal to immediately leave the Lab, taking a chemical shower if this is possible.

In the event of explosion or fire **inside** the Lab which precludes use of the chemical shower exit, or such conditions exist between the chemical shower and the main entrance to the Lab, **personnel will immediately leave via the Airlock Room**, sponging down the ventilated suits in the Airlock if possible, but in any case divesting them in the Airlock before exiting via corridors. If the intercom system is functional and there is time, directions for exit will be provided by personnel outside the Lab.

Personal Injury, Loss of Consciousness, Cardiac Arrest

First aid kits will be available and kept properly stocked in the Lab. Puncture wounds, animal bites, or lacerations will be treated quickly *inside* the Lab by a work partner, such that both persons can safely exit the Lab by normal procedures. Stanching blood flow, covering the suit breach with duct tape, and application of an extra glove when appropriate, are the main procedures to follow. Notification of the Biocontainment Specialist via intercom is mandatory prior to entry into the chemical shower. Primary management of the accident will be the responsibility of BEAP.

THE OVER RIDING CONSIDERATION MUST ALWAYS BE TO PROVIDE POTENTIALLY LIFE-SAVING CARE TO THE INCAPACITATED PARTNER, RATHER THAN TO WITHHOLD SUCH HELP FOR FEAR OF PERSONAL INFECTION. NO EMPLOYEE WILL BE ALLOWED TO WORK IN THE LAB WITHOUT UNDERSTANDING THIS REQUIREMENT AND ACCEPTING THIS POLICY IN WRITING.

- If a worker vomits inside the suit:
 - Immediately report accident to the Biocontainment Specialist by intercom and check to see whether airway remains clear. If so, proceed with worker immediately to chemical shower; take normal shower or use emergency sponge cleansing of suit depending on whether effected worker is comfortable standing or not.
 - If vomiting results in aspiration and choking immediately open suit and perform the Heimlich maneuver to clear airway. Take person to Airlock for further first aid and suit decontamination with help from Biocontainment staff.
- If a worker is suddenly unable to stand or walk but is clearly conscious:
 - Keep air supply connected, suit closed, and assist person to a comfortable prone position. Do not move subject nor take eyes off the worker.
 - Notify the Biocontainment work station of situation by intercom, and await entry of outside assistance through Airlock.
 - Secure infectious materials only after worker has been safely removed from Lab, retrieve ventilated suit from Airlock, then exit normally through chemical shower, carefully sponging empty but closed suit in that process.

- If a worker suddenly loses consciousness, or is injured such that suit integrity is totally compromised:
 - Suit compromise usually means serious wounding. In that case, disconnect air supply, remove or cut away suit, apply first aid, and call for assistance to the Biocontainment work station. Disinfect and clean area after worker has been taken out via the Airlock and bag all materials including suit remnants for autoclaving.
 - In the event of loss of consciousness, immediately use intercom for emergency assistance, disconnect air supply, get subject into a prone position, move the person into the Airlock, and monitor for pulse and respiration.
 - If breathing stops, work partner should disconnect and open his/her suit and apply mouth-to-mouth ventilation and/or CPR in case of cardiac arrest, until assistance arrives to get patient into the Airlock. If patient can be moved quickly into the Airlock by Lab personnel, this should be done before starting emergency first aid. In most such cases the basic integrity of primary containment in the Lab renders these procedures virtually risk-less for the helping partner. If the emergency arises from explosion or other cause which releases aerosols into the Lab, attempt to move patient into the Airlock before beginning first aid.
 - A battery-driven positive pressure Racal hood with large apron is available in the Lab for use by partner giving mouth-to-mouth ventilation to a worker who stops breathing.

Post-Incident Procedures

The preceding procedures describe actions to be taken within the Biocontainment Level 4 areas in case of specific emergencies. If any emergency situation results in a biological spill or breach of containment within the Biocontainment Level 4 area, the Biocontainment Specialist or the Biosafety Officer will direct NIH Security to electronically restrict access to the area to prevent automated re-entry. The Biosafety Officer, in coordination with the Biological Exposure Assessment Program, will assess and direct further management of the occurrence (see Section 11, "Exposure Reporting and Management").

No one will be allowed to enter the Level 4 area following an incident unless it is deemed safe by the Biosafety Officer.