I. Introduction

The National Institutes of Health’s Guidelines for Research Involving Recombinant DNA Molecules calls for institutions using recombinant DNA technology to adopt emergency plans for accidental spills and worker contamination. These guidelines are written to meet this responsibility.

II. Purpose

The proper emergency response to a spill or release depends on the hazard of the biological agent and chemical, the volume of the material, and the location of the incident.

Each lab and department must be prepared to contain and decontaminate spills they might generate. Preparedness includes knowledge of procedures and available personal protective equipment, and having spill clean-up materials, and an ample supply of chemical decontaminant.

III. Definitions

A. Biohazard

1. Hazardous biological materials such as infectious agents (substances from or of biological origin) and substances actually or potentially contaminated with them.

2. Human blood, human blood components, and products made from human blood; potentially infectious body fluids and materials including: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental situations, any body fluid with visible blood, and all body fluids where it is difficult or impossible to differentiate between body fluids; any unfixed tissue or organ (other than intact skin) from a human (living or dead); and human sourced cell or tissue cultures, organ cultures, culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with human pathogens.
B. Large Spill

A spill with aerosols generated, a spill of an agent requiring biosafety level 2 containment or greater, and/or a spill of a large volume or of an infectious agent that constitutes a large risk.

IV. Initial Emergency Procedures

A. Render assistance to persons involved and remove them from exposure to further injury if necessary. Do not move an injured person who is not in danger of further harm.

Aerosols will be generated in spills occurring in the operation of centrifuges, sonicators, homogenizers, mixers, etc.

B. Call Risk Management and Safety (766-3277) if:

1. The spill is health threatening.
2. Trained people and/or proper cleanup equipment are not available.
3. You want advice.

C. Large Spill

1. Leave area and close door to allow aerosols to settle for 20-30 minutes.
2. Call 911.
3. Turn off room ventilation and evacuate building if appropriate. Know ahead of time your building’s procedures for turning off ventilation. A call to Physical Plant may be needed or in some buildings simply pull the fire alarm to shut down ventilation.

D. Small Spill

1. Warn workers in adjacent areas of any potential hazards to their safety.
2. Render immediate first aid.
3. In case of fire, call the fire department (911).
4. In medical emergency, summon medical help immediately (911).

V. Spill Clean Up
A. Spill Kit Contents
   1. Disinfectant (e.g. bleach)
   2. Absorbent Materials (e.g. paper towels)
   3. Waste Container (e.g. biohazard bags, sharps containers)
   4. Personal Protective Equipment (e.g. lab coat, gloves, eye and face protection)
   5. Mechanical Tools (e.g. autoclavable forceps, dustpan and broom)

B. Spill Clean Up Guidelines for Biological Agents

1. Biohazardous Spill Outside a Biological Safety Cabinet
   a. Ensure biological spill kit is complete before starting the clean up.
   b. Enter room after 20 to 30 minutes to allow aerosols to settle.
   c. Cover spill with paper towels.
   d. Add disinfectant slowly to outer margin of spill and allow it to flow in. Flood the spill with the appropriate disinfectant using care not to spatter. Allow disinfectant to remain on the spill for the recommended contact time (see disinfectant label for instructions).
   e. Remove broken glassware with forceps or broom and dustpan and dispose in sharps container. Do not pick up any contaminated objects with your hands. Place contaminated but reusable equipment into a container for autoclaving or other decontamination method.
   f. Wipe off any residual spilled material and reapply disinfectant before final clean up. Wipe equipment with compatible disinfectant (e.g. non-corrosive). Rinse with water if necessary.
   g. Dispose of paper towels and other disposable clean up materials into a biohazard bag. Dispose of sharp wastes into a sharps biohazard container. Treat as you would treat your lab’s biohazardous waste. If needed call the RMMC (6-3697) for pick-up, treatment and disposal.
   h. Reopen area to general use only after spill clean up and decontamination is complete. Call Physical Plant to return air ventilation to normal settings. Inform all workers and laboratory supervisor about the spill and successful clean up as soon as possible.

2. Biohazardous Spill Inside a Biological Safety Cabinet

Chemical decontamination procedures should be initiated at once while the cabinet
continues to operate to prevent escape of contaminants from the cabinet. Be careful with paper towels, which can be sucked into the blower fan or HEPA filters.

a. The operator should wear gloves, a lab coat and safety glasses during the following procedure. Spray or wipe walls, work surfaces, and equipment with an appropriate disinfectant (e.g., 1:10 dilution of household bleach).

b. Flood the top work surface tray and the drain pan below the work surface (if there is one) with a disinfectant and allow to stand at least 10 minutes or the recommended contact time listed on the label.

c. Remove excess disinfectant from the tray by wiping with a sponge or cloth soaked in a disinfectant. For Class II cabinets, drain the tray into the cabinet drain pan, lift out tray and removable exhaust grillwork, and wipe off top and bottom (underside) surfaces with a sponge or cloth soaked in a disinfectant. Then replace the grillwork and drain disinfectant from the drain pan into an appropriate container and autoclave according to standard procedures. Place gloves, cloth or sponge into an appropriate container for decontamination.

d. Remove protective clothing used during cleanup and place in a biohazard bag for further processing by laundry (arranged by your department). Run cabinet at least 10 minutes after clean up and before resuming work. Inform all users of the cabinet as well as the laboratory supervisor about the spill and successful clean up as soon as possible.

3. Mixed Chemical and Biohazard Spill

a. Confine spill to a small area while avoiding airborne release to the extent possible.

b. Neutralize or flush with water and follow with cleanup or mopping up.

c. Appropriately decontaminate residue and clean up equipment before disposing as required.

4. Solid Biohazard Spill

a. If low toxicity, carefully slide or sweep the spilled solid into a dustpan.

b. Place in appropriate container for decontamination and dispose of appropriately.

c. Highly hazardous biological solids should be cleaned up with a vacuum cleaner with a HEPA filter. The RMMC can assist cleanup using their HEPA
filtered vacuum for hazardous spills. Call 6-3697.

5. Radioactive Biohazardous Spill Outside a Biological Safety Cabinet

The spills of radioactive material are handled in a similar way to spills of infectious agents, except that there is additional concern for the radiation hazard.

a. If the spills created aerosols all persons must leave the room immediately and close the door. Restrict activity to prevent spread of contamination.

b. Take care of medical emergencies first. If health or life-threatening conditions exist, call 911. Decontamination can occur when the victim is in stable condition.

c. Check for contamination of individuals. If contamination is found or suspected, decontaminate as quickly as possible taking into account the amount of contamination, type of radiation and the possibility of internal contamination.

d. Take steps to prevent the spread of contamination including:

i. Evacuate the building if there is a possibility of air-borne contamination of a highly hazardous compound (e.g. I\textsubscript{125}). Call Physical Plant to turn off room ventilation.

ii. Prevent entry into the contaminated area by any unnecessary persons.

iii. Keep contamination localized.

e. Notify supervisor, post a temporary warning sign, and warn others not to enter the contaminated area.

f. Do not let potentially contaminated persons leave without passing a personal survey for radioactive contamination. Remove and put contaminated garments into a container for decontamination and thoroughly wash hands and face.

g. Notify RMSO and the principal user responsible for the workplace as soon as possible. Telephone numbers for work and after-hours are listed on the radiation placard for the workplace. The University Police (911) have an after-hours call list for RMSO personnel if the RSO cannot be reached.

h. Wait thirty minutes to allow dissipation of spill-created aerosols by the room ventilation air changes.

i. Before clean-up procedures begin, survey the spill for external radiation hazard to determine the relative degree that the exposure levels are within
acceptable limits.

j. Put on a long-sleeve gown with tight fitting cuffs, appropriate respiratory protection, rubber boots or shoe covers, and rubber gloves before reentering the room.

k. Pour an appropriate disinfectant solution (the disinfecting agent should be selected carefully: for example, hypochlorite will volatilize radioactive iodine) around the spill and allow it to flow into the spill. Paper towels soaked with the disinfectant may be used to cover the area. To minimize aerosolization, avoid pouring the disinfectant solution directly onto the spill.

l. Let stand at least 10 minutes, depending on the disinfectant, to allow adequate disinfectant contact time.

m. If the spill involves low energy emitters such as 14C or 3H, there is no external hazard except if deposited on the skin. If more energetic beta or gamma emitters such as 32P are involved, care must be taken to also prevent hand and body radiation exposure.

   i. Use an autoclavable dustpan and squeegee and forceps for sharp materials to transfer all contaminated materials (paper towels, glass, liquid, gloves, etc.) into a biohazard bag lined deep pan.

   ii. As a general rule, autoclaving should be avoided. If the Radiation Safety Officer determines that radioactive vapors may be released and thereby contaminate the autoclave, the material must not be autoclaved. In that case, add sufficient disinfectant solution to immerse the contents of the waste container. The cover should be sealed with waterproof tape, stored and handled for disposal as radioactive waste. Radioactive warning symbols shall be affixed to the waste container. After disinfecting is complete and the hazard of the biological agent is removed, all biohazardous labels must be defaced.

n. If autoclaving has been approved, the dustpan, squeegee, and forceps should be placed in an autoclave bag and autoclaved according to standard directions. Contact of reusable items with plastic bags should be avoided -- separation of the plastic after autoclaving can be very difficult.

o. Finally, a final radioactive survey shall be made of the spill area, dustpan, squeegee, and forceps with an appropriate radiation measurement technique.