Carnegie Mellon University Environmental Health & Safety FIRE | LAB | WORK	Environmental Health and Safety Recombinant and Synthetic Nucleic Acid Materials Spills - Guideline
Date of Issuance: April 2013	Revision Date: 4/11/2025
Revision Number: 2	Prepared by: EHS

1. Background

In accordance with Section IV-B-2-b-(6) of the *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acids* (*NIH Guidelines*), IBC-approved emergency plans covering accidental spills and personnel contamination resulting from research subject to the *Guidelines*, must be developed. This policy addresses those requirements and provides the information necessary to determine appropriate spill management and reporting requirements according to the *Guidelines*. For more information on the *Guidelines*, please see the NIH Guidelines.

2. Scope

This policy applies to any individual including a Principal Investigator, researcher, instructor laboratory manager, student or other personnel who work in a laboratory utilizing recombinant and synthetic nucleic acid molecules. These procedures address minor spills involving small quantities (< 1L) of recombinant and synthetic nucleic acid molecules. Immediately notify the Biological Safety Officer at (412)268-8182 in the event of a spill involving:

a. Large quantities (> 1L) of recombinant and synthetic nucleic acids
b. Agents requiring BSL-2 containment or higher
c. Personnel contamination

3. Introduction

Spills of recombinant and synthetic nucleic acid molecules may constitute a significant health hazard if not handled in an appropriate manner. All personnel working with recombinant and synthetic nucleic acid molecules materials must be made aware of, understand and follow the procedures outlined in this policy.

4. Definitions

Recombinant and synthetic nucleic acid molecules are defined in the context of the *NIH Guidelines as* follows*:*

a. Molecules that:
    i. are constructed by joining nucleic acid molecules and
    ii. that can replicate in a living cell, i.e., recombinant nucleic acids;
b. Nucleic acid molecules that are chemically or by other means synthesized or amplified, including those that are chemically or otherwise modified but can base pair with naturally occurring nucleic acid molecules, i.e., synthetic nucleic acids, or

c. Molecules that result from the replication of those described in (i) or (ii) above

5. Responsibilities

a. Institutional Biosafety Committee (IBC)
   The responsibilities of the IBC include, but are not limited to:
   i. Establishment of the Policies and Procedures for Recombinant and Synthetic Nucleic Acid Materials Spills
   ii. Suspension or termination of research in violation of this document

b. Dean/Department Head
   The responsibilities of a Dean or Department Head include, but are not limited to:
   i. Understand this document
   ii. Ensure compliance with this document in their schools or departments and take prompt, effective action when necessary

c. Principal Investigator
   The responsibilities of a Principal Investigator include, but are not limited to:
   i. Understand this document
   ii. Ensuring all personnel understand and follow the procedures outlined in this document
   iii. Tailoring this document to meet the needs of their laboratory or area
   iv. Immediately notifying the Biological Safety Officer at (412)268-8182 in the event of a spill involving:
      a. Large quantities (> 1L) of recombinant and synthetic nucleic acids
      b. Agents requiring BSL-2 containment or higher
      c. Personnel contamination
      d. Maintaining an adequate supply of spill response materials

d. Biological Safety Officer
   The responsibilities of the Biological Safety Officer include, but are not limited to:
   i. Monitoring compliance with this document
   ii. Providing technical guidance on spill response procedures
   iii. Assisting laboratories with spills involving:
      a. Large quantities (> 1L) of recombinant and synthetic nucleic acids
      b. Agents requiring BSL-2/ABSL-2 containment or higher
      c. Personnel contamination.
   iv. Notifying the Director of Environmental Health and Safety, the Institutional Biosafety Committee, the Dean/Department Head and the Provost of Research of events as needed
   v. Collaborating with the Principal Investigator to complete the Template for Reporting Incidents Subject to the *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acids* if the spill involved:
      a. Overt personnel exposure to agents requiring BSL-2/ABSL-2 containment or higher
      b. A violation of the NIH Guidelines containment or biosafety practices, or significant problems leading to a breach of containment (including improper disposal or escape of transgenic animals)
      c. A significant research-related accident or illness.

e. Submitting the Template for Reporting Incidents Subject to the *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acids* to the National Institutes of Health (NIH) Office of Biotechnology Activities (OBA) within 30 days.

A biological spill shall be followed by prompt action to contain and clean up the spill. When a spill occurs, warn everyone in the area and call for assistance. The degree of risk involved in a spill depends on the volume of the material spilled, the creation of infectious aerosols, the concentration of the organisms in the material spilled, the hazard of the organisms involved, the route of infection of the organisms, and the disease caused by the organisms.

Spills of biological agents can contaminate areas and lead to infection of laboratory workers. Exposure prevention is the primary goal in spill containment and cleanup.

6. Procedures

a. Spill Kits in the Laboratory
   Each laboratory using recombinant and synthetic nucleic acid molecules must have appropriate equipment and supplies on hand for managing spills and Permanent equipment should include a safety shower, eyewash and a hand-washing sink with soap and paper towels. A spill kit should also be kept on hand. The supplies available in spill kit should include, but are not limited to:
   i. Copy of the Spill Cleanup Protocol
   ii. Nitrile disposable gloves (min 8 mil thickness)
   iii. Lab coat(s)
   iv. Safety goggles
   v. Disposable shoe covers (booties)
   vi. Absorbent material, such as absorbent paper towels, granular absorbent material, etc.
   vii. All-purpose disinfectant, such as normal household bleach (freshly diluted, 1:10)
   viii. Bucket or bottle for diluting disinfectant (this can be used to store the kit contents when not in use)
   ix. Tongs and/or forceps, and/ or dustpan and hand broom or squeegee, etc. (for picking up broken glass or other contaminated sharps)
   x. Sharps waste container(s)
   xi. Biohazard waste bags
   xii. Biohazardous spill warning signs and stickers
b. Small Spills
   A spill is generally considered to be small if it meets all of the following criteria:
   i. Is easily contained,
   ii. Has not generated aerosols,
   iii. Is less than 1 L and
   iv. Has not resulted in personnel contamination
c. Small Spills in the Laboratory
   For small spills in the laboratory, the following actions should be taken:
   i. Stop activities, notify others and isolate the area
   ii. Put on appropriate PPE (lab coat, gloves, eye and face protection)

iii. Remove glass/lumps with forceps or scoop if applicable and place into a rigid, puncture resistant container
iv. Absorb spill with an appropriate spill kit material or disposable inert absorbent material, such as, paper towels or gauze
v. Place paper towels soaked in a 1:10 dilution of bleach with water directly on the spill and let soak for 20 minutes
vi. Wipe up area and discard towels in biohazard waste container
vii. Continue wiping area with paper towels soaked in a 1:10 dilution of bleach with water until the spill area is completely cleaned
viii. Discard all materials in biohazard waste container
ix. Remove gloves
x. Wash hands thoroughly
xi. Report the incident to principal investigator

d. Small Spills Outside of the Laboratory

Spills outside the laboratory are preventable during transport by ensuring that recombinant and synthetic nucleic acid molecules are placed in a rigid, securely sealed, and watertight primary container, that is subsequently contained in a second rigid, leak proof sealed container possessing absorbent in sufficient quantity to take up all contents in the event of a leakage from the primary container. The outer container must be labeled with the universal biohazard symbol if the material requires BSL-2/ABSL-2 containment or higher. However, if a spill occurs outside of the laboratory the following actions should be taken:

i. Stop activities, notify others and isolate the area
ii. Put on appropriate PPE (lab coat, gloves, eye and face protection)
iii. Remove glass/lumps with forceps or scoop if applicable and place into a rigid, puncture resistant container
iv. Absorb spill with an appropriate spill kit material or disposable inert absorbent material, such as, paper towels or gauze
v. Place paper towels soaked in a 1:10 dilution of bleach with water directly on the spill and let soak for 20 minutes
vi. Wipe up area and discard towels in biohazard waste container
vii. Continue wiping area with paper towels soaked in a 1:10 dilution of bleach with water until the spill area is completely cleaned
viii. Discard all materials in biohazard waste container
ix. Remove gloves
x. Wash hands thoroughly
xi. Report the incident to principal investigator

e. Small Spills Inside a Biological Safety Cabinet (BSC)

A spill that occurs within a biological safety cabinet presents little to no danger to personnel in the area. If a small spill occurs in a BSC, the following actions should be taken:

i. Stop activities, notify others and isolate the area
ii. Put on appropriate PPE (lab coat, gloves, eye and face protection)
iii. Continue to run the BSC during cleanup to contain aerosols and HEPA-filter exhaust air

iv. Wipe walls, work surfaces and equipment with paper towels soaked with an appropriate disinfectant
v. Add sufficient disinfectant to the catch basin below the work surface if the spill entered the front air intake grill
vi. Continue wiping area with paper towels soaked with an appropriate disinfectant Until the spill area is completely cleaned
vii. Discard all materials in biohazard waste container
viii. Remove gloves
ix. Wash hands thoroughly
x. Report the incident to principal investigator

f. Spills in a Centrifuge or Other Equipment

A spill in a centrifuge has the potential for producing large volumes of aerosols and for multiple infections from a single centrifuge accident is great. Aerosols are created when fluid escapes from the rotor or cup while the centrifuge is operating at high speed. In the event of a spill inside a centrifuge, the following actions should be taken:

i. If a centrifuge tube breaks while the centrifuge is running, immediately turn off motor and notify others in the laboratory, and evacuate. Note the time of the incident and do not attempt to reenter the laboratory. Contact Environmental Health and Safety at (412)268-8182
ii. If breakage is discovered after the machine has stopped, re-close the lid immediately, notify others in the laboratory, and evacuate. Note the time of the incident and do not attempt to reenter the laboratory. Contact Environmental Health and Safety at (412)268-8182.

On becoming aware that a spill may have occurred in other types of equipment, the following actions should be taken:

i. Turn off the equipment, notify others and evacuate the area
ii. Contact Environmental Health and Safety at (412)268-8182

g. Large Spills

A spill is generally considered to be large if it the spill meets any of the following criteria:

i. Is easily contained,
ii. Has generated aerosols,
iii. Is greater than 1 L,
iv. Has resulted in personnel contamination.

The following actions should be taken in spills that meet this definition:

i. Stop activities, notify others and isolate the area
ii. Evacuate all personnel to adjacent area
iii. Wash affected areas of exposure and remove contaminated clothing into biological waste bag
iv. Contact Environmental Health and Safety at (412)268-8182. Remain safely in the area to inform responders of:
    a. Number and extent of injured people
    b. Name(s) of agent(s) involved and volume
    c. Hazards associated with the material(s)

7. Revisions

Date	Documented Changes	Initials
2/18/2021	Updated Format and Accessibility Update	MAS
1/19/1024	Reviewed – no revisions necessary	AJL
4/11/2025	Updated NIH Links	MAS