

DECONTAMINATION OF LABORATORY EQUIPMENT

Scope

This SOP describes decontamination of laboratory equipment that has been used with biological agents. The surface decontamination methods described in this document are appropriate and required for laboratory equipment used with or exposed to biological materials prior to the equipment's relocation, decommissioning/disposal, or transport for authorized repair. All equipment used with radioactive material (RAM) **MUST** be officially decommissioned by EHS Radiation Safety staff prior to relocation, repair or disposal and shall occur after final biological decontamination.

The disinfection method(s) selected for any equipment exposed to pathogenic microorganisms (including prions) or other potentially infectious materials (e.g., human fluids, cells or tissues) **MUST** be based on a risk assessment. Please contact EHS for more information or assistance with a risk assessment.

References

The content of this SOP is based on the following:

- **Biosafety in Microbiological and Biomedical Laboratories (BMBL)**, 5th ed. U.S. Dept. of Health and Human Services (CDC and NIH), 2009.
- **NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules**. U.S. Dept. of Health and Human Services (NIH), 2013.

Supplemental EHS SOPs

The following EHS SOPs provide additional guidance relative to certain aspects of this SOP:

- Disinfectants for Biohazardous Materials
- Biosafety Cabinets
- Autoclave Operation and Performance Testing
- Personal Protective Equipment for Chemical Exposures

Means of Decontamination

Use of UV light as a sole means of equipment decontamination is **NOT** sufficient or acceptable. Decontamination must be achieved with an appropriate chemical disinfectant that is known to be effective against the agent(s) in use. When using chlorine-based disinfectants, follow disinfectant treatment with a wipe down of stainless

steel surfaces with water to remove chlorine residues, followed by either a 70% ethanol or 70% isopropanol solution.

In addition to standard laboratory attire, proper PPE to be used when decontaminating laboratory equipment are: *chemical resistant gloves, eye protection, and lab coat.*

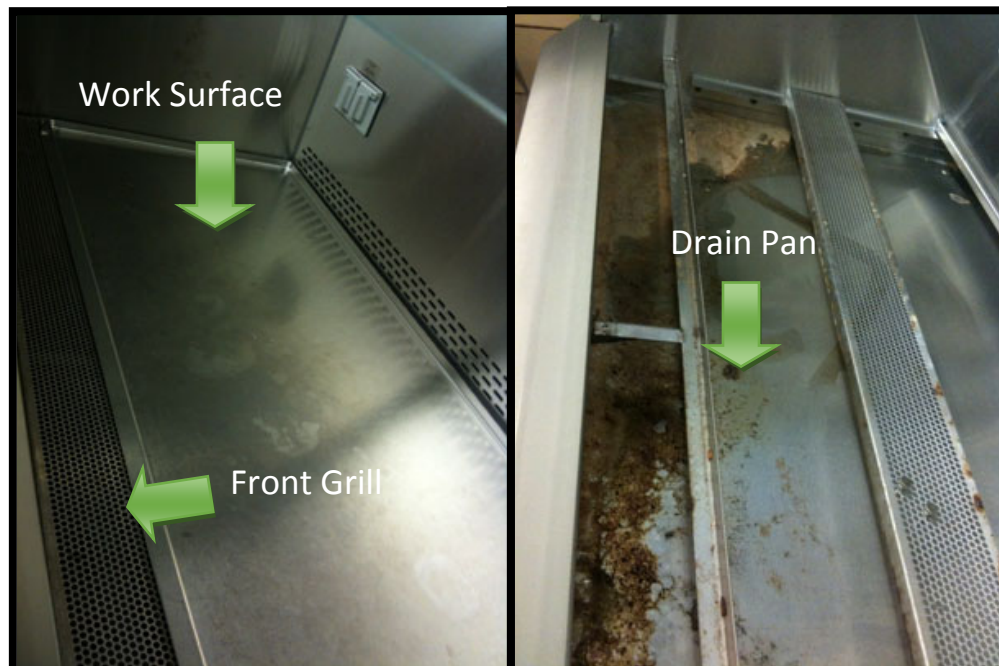
Specific Laboratory Equipment Decontamination

A) Biosafety Cabinet (BSC):

Following chemical surface disinfection, biological safety cabinets used with human pathogens must undergo gaseous disinfection prior to relocation, decommissioning/disposal, or repair. Surface decontamination alone is sufficient for BSCs that have been used with biological agents that are not human pathogens. Gaseous decontamination is required for cabinets in which human pathogenic agents and other human materials have been manipulated. Gaseous decontamination must be performed by an authorized BSC technician and shall not be attempted by laboratory workers.

Recommended decontamination procedure

1. With the cabinet blower on, remove all materials, reagents, and waste containers from the cabinet and either store or discard properly.
2. Clean up any spills which may have resulted from removal of materials from the BSC and discard properly.
3. Make sure the plenum drain valve (located underneath the front of the cabinet) is closed, and spray disinfectant into the front grill of the cabinet. Liberally apply disinfectant to the work surface, side walls, back wall, and



- inside of sash. Allow disinfectant to remain on the surfaces for at least 10 minutes or as recommended on disinfectant label.
4. Raise the workspace grill and work surface (it should lift up in some manner) and liberally apply the disinfectant to the underside and all surfaces beneath. You may need something or someone to hold the work surface up while you spray disinfectant. Allow disinfectant to sit for at least 10 minutes or as recommended on disinfectant label.
 5. If using a chlorine-based disinfectant, after sufficient contact time has elapsed, using a hand mop or paper towels, wipe down **all** surfaces (including **underneath** the workspace and grill) with water, followed by 70% ethanol or 70% isopropanol (v/v, diluted in water) to remove any residue left by the disinfectant. This will help prevent subsequent corrosion of the cabinet surfaces.
 6. After decontaminated surfaces have dried, replace the workplace grill, close the sash, and turn off the blower.
 7. For relocation, repair or decommissioning, also wipe down all external surfaces of the biosafety cabinet with an appropriate disinfectant, allowing sufficient contact time.
 8. **Important:** If being sent for repair or being decommissioned/discarded, be sure to remove any biohazard stickers after decontamination.
 9. **DO NOT** use the BSC once it has been decontaminated for relocation, repair, or decommissioning. Place a sign on the BSC indicating date of decontamination. (See Appendix A for a sample sign)
 10. If gaseous decontamination is indicated based on use of the biosafety cabinet, contact BSM to schedule decontamination.
 11. When the BSC is moved to the new laboratory, it **MAY NOT** be used until recertified by an authorized BSC technician.

B) Incubator

1. Remove all materials from the incubator and either store or discard appropriately.
2. Turn off incubator power supply and unplug from the source outlet.
3. Clean up any spills which may have resulted from material removal and discard appropriately.
4. Remove any modular shelving and liberally apply disinfectant to top, bottom, and sides of shelves. Allow disinfectant to remain on the surfaces for at least 10 minutes or as recommended on disinfectant label.
5. Liberally apply disinfectant to all surfaces inside the incubator, including the inside of the door and gaskets. Allow sufficient contact time for disinfectant (at least 10 minutes or as recommended on disinfectant label).
6. If using a chlorine-based disinfectant, after wait time, wipe down metal surfaces (including shelving) with water, then 70% ethanol or 70% isopropanol (v/v, diluted in water) to remove any residue left by the disinfectant. This will help prevent subsequent corrosion of the surfaces.
7. **Important:** If being sent for repair or being decommissioned/discarded, be sure to remove any biohazard stickers after decontamination.

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8. **DO NOT** use the incubator once it has been decontaminated for relocation, repair, or decommissioning. Place a sign on the incubator indicating date of decontamination. (See Appendix A for a sample sign)
9. If necessary, tape the door shut to prevent opening during transport.

C) Growth Chamber

1. Remove all materials from the growth chamber and either store or discard properly.
2. Turn off power supply and unplug from source outlet.
3. Clean up any spills or residual organic material with soap and water and discard properly.
4. Remove any modular shelving and liberally apply disinfectant to top, bottom, and sides of shelves. Allow disinfectant to remain on the surfaces for at least 10 minutes or as recommended on disinfectant label.
5. Liberally apply disinfectant to all surfaces inside the incubator, including the inside of the door and gaskets.
6. If using a chlorine-based disinfectant, after wait time, wipe down all metal surfaces (including shelving) with water, then 70% ethanol or 70% isopropanol (v/v, diluted in water) to remove any residue left by the disinfectant. This will help prevent subsequent corrosion of the surfaces.
7. Replace the shelving inside the unit, and close the door.
8. **Important:** If being sent for repair or being decommissioned/discarded, be sure to remove any biohazard stickers after decontamination.
9. **DO NOT** use the growth chamber once it has been decontaminated for relocation, repair, or decommissioning. Place a sign on the equipment indicating date of decontamination. (See Appendix A for a sample sign)
10. If light bulbs are broken in the chamber after relocation, please call EHS for proper disposal assistance.

D) Refrigerators/Freezers

For relocation of refrigerators/freezers, you have two options related to decontamination. If the refrigerator or freezer is being sent for repair or decommissioned/discarded, or sent to UNL inventory, you must use Option 2.

Option 1: Relocate the equipment without removing samples and defrosting the refrigerator/freezer. Follow these steps if you choose this option:

1. Clean and decontaminate all external surfaces with an appropriate disinfectant, allowing for sufficient contact time (generally 10 minutes).
2. Once decontaminated, place signage on the equipment indicating that it is to be considered out of service. (See Appendix A for a sample sign)
3. Seal the refrigerator/freezer using shrink wrap, tape, etc. so it cannot be opened.
4. Just prior to relocating the equipment, power off (if necessary) and unplug the equipment from the wall.

5. Once relocated to its new location, plug the refrigerator/freezer in to the wall and power it on.
6. Remove wrap or tape and sign when the equipment reaches its operating temperature.

Option 2: Remove samples from the refrigerator/freezer and defrost entirely prior to relocation. This option requires internal as well as external surface decontamination. Follow these steps if you choose this option:

Plan for 2 days of freezer downtime during this process. Before thawing, identify hazardous materials stored in the freezer.

1. Remove all materials from the refrigerator or freezer and either store or discard properly.
2. Turn off power supply and unplug from source outlet. Unplug the freezer in the morning. This allows you to monitor runoff throughout the day.
 - i. Never use sharp objects to chip at the ice. Freezer walls are easily punctured by sharp objects, allowing coolant to escape and resulting in expensive repairs or replacement costs.
 - ii. Never allow liquid to run directly onto floors creating a slip hazard, or down any outside drain.
3. Establish a wick and reservoir system to manage the melting ice:
 - i. Place a piece of bench paper (paper side down, plastic side up) inside the freezer, on the lower level and lead it into a large autoclave pan.
 - ii. Surround the freezer and autoclave pan with paper towels or bench paper.
 - iii. Manage contaminated ice and liquid by collecting it and add 1 part bleach to 9 parts melted ice and liquids.
 - iv. Allow 20 minutes of contact time before pouring the melted ice down the drain.
4. Clean up any spills or residual organic material with soap and water and discard properly.
5. Remove any modular shelving and liberally apply disinfectant to top, bottom, and sides of shelves. Allow disinfectant to remain on the surfaces for at least 10 minutes or as recommended on disinfectant label.
6. Liberally apply disinfectant to all surfaces inside the refrigerator/freezer, including the inside of the door and gaskets.
7. If using a chlorine-based disinfectant, after wait time, wipe down all metal surfaces (including shelving) with water, then 70% ethanol or 70% isopropanol (v/v, diluted in water) to remove any residue left by the disinfectant. This will help prevent subsequent corrosion of the surfaces.
8. Replace the shelving inside the unit, and close the door.
9. **Important:** If being sent for repair or being decommissioned/discarded, be sure to remove any biohazard stickers after decontamination.
10. **DO NOT** use the refrigerator/freezer once it has been decontaminated for relocation, repair, or decommissioning. Place a sign on the equipment indicating date of decontamination. (See Appendix A for a sample sign)

E) Bioreactors/Fermenters

This specialized equipment is designed for complete disassembly for cleaning after use and is sterilized by autoclaving. Please consult the equipment user's manual for disassembly instructions.

- **Important:** If being sent for repair or being decommissioned/discarded, be sure to remove any biohazard stickers after decontamination.
- **DO NOT** use the bioreactor/fermenter once it has been decontaminated for relocation, repair, or decommissioning. Place a sign on the equipment indicating date of decontamination. (See Appendix A for a sample sign)

F) Portable/tabletop autoclaves

These units are often self-contained, providing steam from a water reservoir within the unit. Prior to transport, verify the water reservoir is completely empty and any residual water or spilled material is removed from the chamber.

G) Centrifuges

1. Turn off power supply and unplug from source outlet.
2. Clean up any spills or residual organic material with soap and water and discard properly.
3. Remove any rotors and baskets/buckets and liberally apply disinfectant all surfaces of the rotor and baskets/buckets. Allow disinfectant to remain on the surfaces for at least 10 minutes or as recommended on disinfectant label. If rotor is non-removable, apply disinfectant in place and be sure to wipe the underside of the rotor if possible.
4. Liberally apply disinfectant to all surfaces inside the centrifuge, including the inside of the lid and gaskets.
5. Wipe down the exterior of the centrifuge with disinfectant and allow sufficient contact time.
6. If using a chlorine-based disinfectant, after wait time, wipe down all metal surfaces (including rotors) with water, then 70% ethanol or 70% isopropanol (v/v, diluted in water) to remove any residue left by the disinfectant. This will help prevent subsequent corrosion of the surfaces.
7. If the centrifuge is equipped with a vacuum pump and HEPA filter, contact EHS for assistance in determining if decontamination of the tubing and pump is necessary.
8. Do not replace the rotor in the centrifuge, but close the lid.
9. **Important:** If being sent for repair or being decommissioned/discarded, be sure to remove any biohazard stickers after decontamination.
10. **DO NOT** use the centrifuge once it has been decontaminated for relocation, repair, or decommissioning. Place a sign on the equipment indicating date of decontamination. (See Appendix A for a sample sign)

H) Misc. equipment (shaker/rocker platforms, vortex mixers, etc.)

Consult the equipment user's manual for proper disassembly as appropriate. Exposed surfaces can be decontaminated similar to the methods above:

1. Unplug the unit from the power supply.
2. Liberally apply appropriate disinfectant to surfaces and allow at least 10 minutes contact time or as recommended on disinfectant label.
3. If using a chlorine-based disinfectant, after appropriate contact time, wipe down all metal surfaces with water, then 70% ethanol or isopropanol to remove any residue.
4. **Important:** If being sent for repair or being decommissioned/discarded, be sure to remove any biohazard stickers after decontamination.
5. **DO NOT** use the equipment once it has been decontaminated for relocation, repair, or decommissioning. Place a sign on the equipment indicating date of decontamination. (See Appendix A for a sample sign)

Signage for Equipment Decontamination

Out of Service

The piece of laboratory equipment listed below has been decontaminated and should not be used until further notice.

Equipment Description: <i>(Include serial or ID numbers if known)</i>		
Location <i>(Bldg., Room #)</i>		
It is scheduled to be:	<input type="checkbox"/>	Relocated
	<input type="checkbox"/>	Repaired
	<input type="checkbox"/>	Decommissioned/Inventory
	<input type="checkbox"/>	Discarded
Biological Agents Used in/with or Stored in Equipment:		
Disinfectant Used:	Date of Decontamination:	Decontamination Completed By:
	Contact Phone #	
Principal Investigator:		
Signature		Date: