Larner College of Medicine
Ultra Low Freezer Tips, Guidelines, & Procedures

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This document outlines recommended practices, guidance, and procedures for the management of −80 °C freezers in Larner College of Medicine (LCOM) laboratories. Proper management of these freezers is essential to safeguard valuable research materials, maintain laboratory continuity, and ensure rapid, coordinated response in the event of equipment failure. The guidance focuses on three key areas:

1) Routine maintenance and organizational practices

2) Contingency planning for freezer malfunctions and power disruptions

3) Designated backup freezers: identification, access, and use during emergencies

Collectively, these measures are intended to help LCOM laboratories minimize sample loss, reduce downtime, and maintain effective preparedness for freezer-related incidents.

Routine Maintenance and Organizational Practices

−80 °C freezers store valuable and, in many cases, irreplaceable materials that are critical to the research mission of laboratory groups. Mechanical failures, power interruptions, and poor maintenance can lead to freezer malfunction, resulting in the loss of precious biological samples, reagents, and potentially thousands of dollars' worth of drugs and research materials. Laboratories should therefore implement routine maintenance and organizational practices to minimize the risk of freezer failure and to facilitate rapid response if a problem occurs.

Recommended practices include:

1. Perform regular freezer maintenance.
    - Freezers should be routinely inspected to ensure excessive ice accumulation does not occur, as heavy frost buildup can impair performance and airflow.
    - Filters should also be checked and replaced on a regular schedule according to manufacturer guidance.
    - Back-up batteries should be replaced when low to ensure audible alarms can be heard during a power failure.
    - Additional maintenance guidance is available through the UVM Risk Management & Safety laboratory freezer resource page: https://www.uvm.edu/safety/laboratory-freezers.

2. Maintain organized freezer contents.
    - Samples should be stored in labeled boxes and racks whenever possible.
    - A well-organized freezer enables rapid identification and removal of materials during maintenance, defrosting, or emergency relocation, reducing the time samples are exposed to warming temperatures.

Contingency Planning for Freezer Malfunctions or Power Disruptions

Laboratories should establish contingency plans to ensure a rapid and coordinated response in the event of freezer malfunction, temperature excursions, or power interruptions. Advance preparation is essential to minimize sample loss, protect valuable research materials, and maintain research continuity.

Recommended practices include:

1. Install and Maintain Freezer Alarm Systems. All −80 °C freezers should be equipped with functional alarm systems that alert laboratory personnel when temperatures rise above acceptable thresholds. Alarm systems provide an early warning of mechanical failure, door seal problems, or power loss, enabling prompt intervention and reducing the likelihood of sample loss. Freezers should utilize both localized and remote alarm capabilities whenever possible:

- Localized (on-unit) alarms. Most −80 °C freezers include a built-in audible and/or visual alarm that activates when temperature limits are exceeded or when power is interrupted. This localized alarm serves as an important first-line alert for personnel working in the laboratory. Laboratory staff are responsible for ensuring that these alarms are enabled and functioning properly. As such, battery backup maintenance is necessary. The internal alarm system typically relies on a backup battery to remain operational during power outages. Freezer owners are responsible for routinely checking the condition of this battery and replacing it according to the manufacturer's recommended schedule or when low-battery indicators are present. Regular battery checks help ensure that the alarm will function during a power interruption.

- Remote notification systems. Where feasible, −80 °C freezers should be connected to remote monitoring platforms that send alerts via phone, text message, or email when temperature deviations occur, enabling rapid response during evenings, weekends, or other unattended periods. At the University of Vermont, remote freezer monitoring uses Sensaphone technology. Freezer owners play a key role in establishing and maintaining this monitoring capability. Setup begins with submission of a work order request to the UVM Physical Plant Department, after which laboratory personnel work with the Physical Plant Controls Team to configure the system. Owners are responsible for identifying the personnel who should receive alarm notifications, providing accurate contact information for primary and backup responders, and keeping this contact list current to ensure alarms reach individuals who can respond promptly. To learn more about this process and/or to review existing set up, please email Elayna Mellas-Hulett (Elayna.mellas@uvm.edu).

Additional information and recommendations for freezer monitoring systems are available through the UVM Risk Management & Safety laboratory freezer resource page: http://www.uvm.edu/safety/laboratory-freezers.

Designated Backup Freezers: Identification, Access, and Use During Emergencies

To support laboratories during freezer malfunctions or failures, LCOM maintains three −80 °C backup freezers for temporary emergency use. These freezers are intended to provide short-term storage (generally up to seven days)while a malfunctioning freezer is being repaired, serviced, or replaced. After this period, laboratories are responsible for relocating their materials to permanent storage. Investigators are strongly encouraged to maintain limited contingency space within their own freezers and to coordinate with neighboring laboratories when temporary storage is required. Backup freezers are available for self-service emergency use in accordance with the protocols outlined below.

Backup Freezer Locations

Given Building

- One upright −80 °C backup freezer is located in the Given Loading Dock area.
- This unit remains plugged in and ready for use at all times.

Jeffords Building

- Two −80 °C chest backup freezers are located in Room 013 (basement).
- One freezer is positioned on the left (north) wall upon entering the room.
- The second freezer is located on the back (east) wall, in front of the door.
- Both units are clearly labeled as backup freezers.

Jeffords Building Access

- During normal business hours, access to the Jeffords backup freezer room can be coordinated through the LCOM Dean's Office. Because entry to the room is controlled by UVM's swipe access system, laboratories are strongly encouraged to proactively designate personnel who should be granted swipe access to ensure timely entry in the event of a freezer emergency. Research personnel should work with their Department Administrator to submit an access request to Sue Williams for LCOM Dean's Office approval.
- During evenings, nights, or weekends, access can be obtained by contacting:
    - UVM Physical Plant (802-656-2560), or
    - UVM Police Services (802-656-FIRE).

Note: Backup freezers must remain in their designated locations and may not be relocated. Samples must be transported safely to the freezer location.

Usage Protocol

If emergency use of a backup freezer is required, laboratories must follow these procedures:

1. Freezer access - backup freezers are typically kept unlocked for emergency use.
2. Sample labeling All materials stored in the freezer must be properly labeled in accordance with UVM Risk Management & Safety requirements.

3. Notification
    - Laboratories must notify Sue Williams (susan.l.williams@med.uvm.edu) and Elayna Mellas-Hulett (Elayna.mellas@uvm.edu) when a backup freezer is placed into use.
    - The notification should include:
        - The freezer location being used
        - Laboratory or department name
        - A primary contact name and mobile phone number

4. Freezer identification label
    - A temporary label must be placed on the freezer indicating:
        - Department or laboratory name
        - Contact information
        - Date of use
    - If BSL-2 materials are stored, flip the biohazard sign attached to the freezer to indicate biohazard use.

5. Freezer security
    - A key is located in the freezer lock.
    - If BSL-2 materials are stored in the Given Loading Dock freezer, the freezer must be locked while samples are inside.
    - For the Jeffords freezers, locking is optional at the discretion of the laboratory.
    - The key must not be removed.

6. After Use. When emergency use is complete, laboratories must:
    - Remove all materials from the freezer.
    - Clean and decontaminate any surfaces affected by spills. If freezer shutdown is required for decontamination, ensure the freezer is turned back on afterward.
    - Return the key to the freezer lock.
    - Notify Sue Williams and Elayna Mellas-Hulett that the freezer is available for future emergency use.

Following these procedures ensures backup freezers remain available, safe, and ready to support the LCOM research community during freezer emergencies.