

Dear Allison,

Welcome to the June newsletter of BioCoR. This newsletter will feature a mini-tutorial from an expert on a specific topic of interest to the preservation community. Our first mini-tutorial will be provided by Ian Pope, an expert in facilities design and operation. Welcome, Ian. We look forward to his regular contributions. Subsequent newsletters will feature mini-tutorials from other experts covering a wide range of topics.

As always, your comments are very important to us. We expect to see you at www.biocor.net.

BioCoR is a national resource focused on advancing the science, technology and practice of biospecimen preservation. We are dedicated to developing biopreservation protocols, improving preservation and storage technologies, establishing standards and guidelines and training individuals and institutions in the science and technology of biopreservation.

More information can be found on the **BioCoR** website www.biocor.net. Or you may contact us now at biocor@me.umn.edu

Basics

Safety and Quality: It is key that any negative event is anticipated, and the appropriate procedures are followed to ensure the safety of the removal team, and the long-term value of the stored product.

Unit integrity: Cryogenic storage units are manufactured with one key design feature - to limit energy uptake from the outside of the unit to the storage area. Achieving this design goal typically involves creation of a double-walled construction (outer and inner walls with a vacuum space between). This design reduces the heat transfer into the unit and therefore keeps the inside to the unit (where the biospecimens are stored) cold. During relocation of the unit, a single weld that joins the inner and outer walls all carries all the forces associated with the movement of the unit.

Preparations

Reducing liquid levels: All manufacturers specify that, when planning to move in-service cryogenic freezers, the liquid level of cryogen should be as low as reasonably achievable. Tanks should not be filled until after the move but the storage units should be monitored to ensure that at no point does the level in any freezer fall below 4 inches of cryogen (to prevent the samples from warming to an unacceptable temperature level). In an ideal world, in addition to ceasing replenishment of cryogen, it is desirable to remove excess cryogen prior to

moving the units. Unfortunately, the units to be moved are often at capacity, removing nitrogen manually is therefore not possible and attempts to do so only increases the potential for undesired and uncontrolled liquid nitrogen spills.

Back-up: It is vital that a spare, empty, fully cooled unit of equal (or greater) capacity to that being relocated is available at both the embarkation and receiving locations.

Monitoring: According to the requirements of FHACT, cGTP and AABB the status of all material must be recorded at a minimum interval of 240 minutes. This requirement implies that the unit must be monitored during relocation using an independent monitoring device. Please note that internal temperature measurement devices will not be accurate and it will be important to have a separate device.

Removal Process

Prior to the move (at the embarkation point), all units should be inspected. Any frost identified on the outer wall of the unit below 2 inches from the top of the inner/ outer weld point indicates a possible vacuum failure and the samples contained in the freezer exhibiting this issue must be relocated to a spare unit. Contact the unit manufacturer at a later date for instructions for return for repair.

The path needs to be cleared in a manner that prevents any sharp transitions. All transitions - corridors, elevator entrance, egress etc. must be made smooth with no step grade changes. It is not uncommon for units to be moved between floors. If the route involves use of an elevator, the slight gap between the floor of the elevator and the building floor must be covered so that the unit can move smoothly. The unit alone will travel in the elevator between floors. Operators will be stationed at both the embarkation and destination floors and intermediate floors will be blocked from use so individuals cannot enter the elevator.

Portable oxygen monitors should be placed with the unit to be transported such that operators at the destination point will be alerted should oxygen levels drop to unsafe levels. On removing the freezer from the elevator (again ensuring no sharp transition) the freezer is to be placed in an observation zone for a period of 90 minutes. Once again the observer is to ensure that there is no frosting on any unit as described above during 90-minute observation period. As described above, if any frost is observed, the samples within the unit must be immediately transferred to the spare unit on hand.

Assuming no adverse observation from above, freezers may be loaded onto an air ride transport truck for relocation, Freezers should be very securely strapped to prevent movement in transit. It would also be prudent to carry a single portable liquid nitrogen storage unit that is full of liquid nitrogen on the truck in the unlikely event of significant delay in transit. Portable oxygen deficiency monitors should be deployed in the truck cargo space. As described previously, all units should be inspected once again upon arrival.

It is critical that the freezers moved be monitored constantly for 24 hours after arrival. Physical (dip) level measurements should be made every hour in addition to visual inspection and any abnormal increase in LN2 usage or frosting at any point in the freezer must be reported immediately.

The most serious failure is a breach of the inner vessel below the nitrogen liquid level (another reason why minimizing the nitrogen level is key). Racks stored in the unit may shifting during transport and puncture the inner wall. Above the liquid line, such a breach will cause a slow failure of the vacuum and below the liquid line the breach will cause liquid nitrogen to be drawn into the vacuum space. When the nitrogen enters the vacuum space it will immediately vaporize, expanding 700 times in volume. This expansion will cause the inner vessel to effectively implode, crushing the racks and making them very difficult to remove. In this event, keep samples cold manually by adding nitrogen, a vacuum pump will be required to pull the inner back so that the samples may be removed.

These instructions refer to a move, which can be completed within a few hours. Moves involving transit time in excess of 12 hours should be completed with the aid of specialist transport companies with trucks providing power in the cargo space, more complex monitoring facilities and the ability to have significant nitrogen supply on board.

Ian M Pope
Ian.pope@corecryolab.com

This year's Preservation Short Course was very successful. Participants came from all over the world attended both in person and over the web.

Still interested in taking the short course?? The course is also available starting July 1, 2010. Individuals taking the course on demand will receive the course binder containing lecture material , supplementary material (protocols, best practice resources, etc), and a CD with the lecture slides. Individuals will have

10 days to watch the lectures. Cost: \$1,495 for industrial/for profit organization and \$895 for academic/non profit organizations.

Please contact us at biocor@me.umn.edu if you are interested in taking the short course on demand.

BioCoR's short course has been endorsed by the International Society for Biological and Environmental Repositories (www.isber.org).

A wonderful article on biospecimens and their importance in medical research was recently published in Wired Magazine [Article](#).

The article presents a clear overview of the current state of biobanking and the importance of improving preservation of biospecimens. We feel honored that BioCoR and its role in advancing preservation was mentioned in the article.

Short Course Savings

Group discounts are still available for organizations interested in taking the preservation short course on demand. Contact us at biocor@me.umn.edu for more information.