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1. **Purpose**

The purpose of this SOP is to describe how research grade ultra-low temperature (ULT) storage facilities will be managed, to ensure safe and efficient storage of biological samples. Also contingency plan for failure in storage.

1. **Scope of Policy**

The scope of this SOP for ULT freezers operation at -80°C. It targets such freezers storing materials designated for research purposes, particular medical and life sciences research.

1. **Introduction**

Ultra-low temperature storage is a constantly growing need in research, particularly in life sciences and medicine. Materials crucial for drug testing, clinical trials and various studies are stored with the expectance of their security. The value of the materials contained in one ultra-low temperature (ULT) freezer can easily exceed £100,000. This SOP aims to ensure that all samples will have adequate and efficient facilities for their secure storage.

1. **Sample Management**

4.1 Samples should be stored in racked provided to aid in event of defrost or emergency removal.

4.2 All samples should be labelled in a manner that reflects estimated storage period (freeze resistant labels, freezer suitable storage containers).

4.3 All samples (and freezers) should be possess labelling that permits any user to identify the owner(s), associated company, contents, date of storage, expiry date, and quantity where applicable in case of defrosting or emergency removal.

1. **Freezer management and maintenance**

5.1 All ULT freezers should have the following easily viewable: ULT freezer number; a current list of owners of both freezer contents and any special instructions for handling of contents in the absence of owners in case of an emergency.

5.2 All ULT freezers will have their filters cleaned monthly by the BioEscalator apprentice laboratory technician. The BioEscalator apprentice laboratory technician will also clean the door frame and seal and sweep the shelves every two weeks (i.e.de-ice regularly) to prevent build of ice.

5.3 All ULT freezers will have a PAT certificate, which is carried out annually by external approved contractors (Janus Ltd).

5.4 All ULT freezers are defrosted as and when required by scraping of the interior by emptying the freezer contents to the spare freezer (particularly in areas which can be compromised seals using the correct tools without damaging the freezer). See risk assessment RA0017 -80°C freezers.

5.5 Facilities ensure running temperatures of all ULT freezers are standardised: ULT freezers should run at -80°C.

5.6 All ULT freezers are alarmed to the T-Scan system, which is managed and maintained by BioEscaltor Laboratory Manager. The T-Scan system provides 24/7

wireless temperature of the ULT freezer and cryogenic storage which monitors, reports and alert in case of freezer breakdown.

5.7 All ULT freezer will alarm on the T-Scan when the ULT freezer temperature warms to -70°C. The emergency key holders are BioEscalator laboratory manager, Business manager and Apprentice lab technician.

5.8 Tenants should open the ULT freezer no more than a few minutes as this will set off the alarm on the T-Scan and increase the build of ice (i.e. minimise door opening). Tenants should work out what they need before opening the freezer by looking at the position of samples on the inventory. See PowerPoint presentation on “Best practice guidance for laboratory freezers”.

5.9 All ULT freezers are on a maintenance service contract organised by the BioEscalator laboratory manager and they are serviced annually.

1. **Freezer Facilities**

6.1 ULT freezers filters, fans, vents, or heat exchange colas are kept clear to maintain ventilation.

6.2 Freezer room storing materials should maintain an ambient temperature of 21°C +/- 2°C.

6.3 Heat load is directly considered when moving or introducing a new ULT freezer. ULT freezers produce significant amounts of heat which can have negative effects on the efficiency of the other equipment including freezer.

6.4 Working units which are designated for replacement should be offered for sharing internally prior to sending for disposal, unless there are mechanical issues which have rendered the unit a risk to maintain.

1. **Emergency action procedure in the advent of a freezer breakdown**

7.1 In case of an emergency breakdown, do not open freezer door as the ULT freezer are design to keep its temperature for several hours but the exact time it takes to warm up depends on many factors including the age of the freezer and how full it is.

7.2 In case of an ULT freezer emergency breakdown, T-Scan monitoring system will alert via phone call, text alert and an email to the emergency key holders mentioned in item 5.9.

7.3 If you get an alert from T-Scan monitoring system in an emergency ULT freezer breakdown, phone the Oxford University Security Services (OUSS) on the emergency number **01865 289999**, give them freezer room space number which is **696.20.26** and the freezer number (1-6) in question. Ask them to check the current temperature of freezer on the front panel and any error codes it may be displaying such as power failure. Ask them to check that the freezer door has not been left open by mistake by the last user and to call you back. Also, ask them to check the freezer hourly until you attend the emergency.

7.4 Please make sure the OUSS staff know not to open the freezer. This is the easiest way for a freezer to lose temperature and will cut down immensely on the time you have available for you to rescue the contents.

7.5 False alarms are quite common, so be aware of this when deciding on your next action. The time of day can often help in deciding whether the alarm is a false one – freezer doors are usually left open for example during the day, and not at 3am in the morning, so this later time is more likely to be a real emergency.

7.6 Attending the emergency breakdown – once you at work, the first thing you should do is to let the OUSS that you are here to deal with the breakdown. You should call them or go to their office in the basement of the ground floor of the Innovation building.

7.7 Once at the freezer, please consider the situation carefully before opening it. Once the freezer has been opened there is no going back as you will flood the internal chamber with warm air which won’t be able to recover from if it is truly malfunctioning.

7.8 If the freezer door is shut and the temperature shows no sign of correction, you will have to make the decision to relocate the contents to the spare freezer number 6 in the same room **696.20.26** and if this happens then call content owners of the freezer from the emergency contact list front of the freezer to aid you. Use spare trolleys to transport samples from one freezer to another and make sure to wear correct PPE. Move the contents quickly and carefully to the spare freezer 6. The spare freezer 6 is not locked.

7.9 Once you have finished, leave it off at the mains, and put plenty of paper towels on the lab floor to soak up excess water from the freezer as it defrosts. Leave a signage for slip hazard. Use a mop and bucket to soak up excess water from the lab floor.

8.0 If you have used anything other than the empty spare freezer 6 to transfer samples into, please make a note of which freezers you used and the position of the samples so that they can be found easily and put back into their original position once the freezer has been fixed or replacement ULT freezer has been sourced.

1. **Summary Flowchart of procedures to consider in case of a freezer emergency**

Receive call/text/email from T-Scan monitoring system that suggests a freezer malfunction has occurred.

Assess the urgency of the breakdown whether to come to work immediately or whether it can be resolved over the phone to OUSS.

Arrive Onsite to attend to the emergency.

If you need to come to work then call other people on the emergency list to help.

Consider freezer situation carefully-Do Not open freezer until a decision has been made as how to proceed by all.

Inform OUSS you are Onsite.

If a decision is made to move the contents to another freezer (spare freezer), make sure everything is in place before opening the freezer door. Make sure the empty freezer has enough space and that you have cryogloves, lab coat, and safety glasses and trollies and help available.

Move the contents quickly into the empty freezer (spare freezer)

Inform OUSS you have finished and go home.

Close the door of the malfunction freezer and leave it turned off at the mains. Make sure to leave paper towel on the floor and trip- hazard sign in the lab.