

Risk assessment RA12

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Faculty / Service Area	Faculty of Health Sciences and Sport	Location	1A101/ S11B /Analytical Lab 4B140/Biopsy Lab 3B144G, Sport Science laboratories	
Description of work task / equipment /area being assessed				
Liquid Nitrogen Storage and Use				
Change log	17/01/2013	Gillian Dreczkowski		
	02/02/2015	Gillian Dreczkowski		
	25/10/2016	Gillian Dreczkowski		
	07/07/2022	Added service contract and supplier details Added link to BCGA Code of Practice CP30		
	Version 1.1 29 Aug 2022	New format		
	25 Aug 2023	Added links to safety legislation, Gas Safety Training course and training procedure		
Head of faculty	Prof Jayne Donaldson	Safety officer	Dr Nidia Rodriguez Sanchez	
Completed by	Gillian Dreczkowski	Date	1 st Sep 2015	
Reviewed by	Kerry Bartie Chris Grigson Dr Nidia Rodriguez Sanchez	Date	25 th Aug 2023	
		Date of next review	25 th Aug 2024	
Equipment used	Liquid nitrogen containers and Dewar flasks			
Categories of people involved	Staff, UG, PG, Visitors			

Duration of activity	Handling of liquid nitrogen normally less than 1 h	Frequency of activity	Daily in some cases
Legal compliance to standards and regulations required	Health and Safety at Work act 1974 (HASAWA) https://www.hse.gov.uk/legislation/hswa.htm Management of Health and Safety at Work Regulations 1999 (MHSWR) https://www.legislation.gov.uk/uk/si/1999/3242/contents/made Provision of Work Equipment Regulations 1998 (PUWER) https://www.hse.gov.uk/work-equipment-machinery/puwer.htm The Control of Substances Hazardous to Health Regulations 2004 (COSHH) https://www.hse.gov.uk/coshh/		

COSHH Hazards

Anything in category F.6 (Chemical and biological hazards) should go here

*Details under relevant heading in appendix

Manufacturers MSDS data sheets are required for all chemical hazards and are attached

The Substance What are the hazards and *classification? *Route of exposure	*WEL mg/m3	Who might be harmed and how?	What are you already doing to control the risks?	*Risk rating	What additional controls (if any) are required to reduce the risks?	*Risk rating	Action by who?	Action by when?	Date of completion	Health monitoring
Liquid Nitrogen		Investigators Cryogenic burns Liquid nitrogen contact with skin may cause cold burns or frost bite	SOP Suitable, containers must be used Laboratory coat and cryoprotective gloves and safety glasses should be worn when handling liquid nitrogen In the event of a cryogenic burn: All cold burns should be checked by a first-aider or, in extreme circumstances, by a medical expert to confirm the extent of damage. First Aid Advice: Flush affected area(s) of skin or	Medium	Only trained users will be able to handle LN2 following completion of a Gas Safety course and supervised practice until deemed competent Users to inform colleagues if entering the nitrogen store alone and confirming safe completion of activities					No

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			eyes with copious quantities of tepid water but do not apply any form of direct heat.							
		All Asphyxiation In high concentrations nitrogen may displace oxygen from the air causing asphyxiation.	SOP Adequate ventilation reduces build-up of asphyxiant N2 Oxygen monitor worn whenever entering liquid nitrogen storage facility 1A101. Set to alarm at < 19.5% O2. In the event of an oxygen deficient atmosphere being detected, personnel are instructed to	Medium						No

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			<p>vacate until the level has returned >20%</p> <p>Attempts to rescue person(s) from oxygen deficient atmospheres only to be made by trained persons using breathing apparatus</p> <p>If medical attention is not immediately available, arrange for the casualty to be transported to hospital</p> <p>In event of a spillage - Evacuate all personnel from the area likely to be affected by liquid nitrogen and evolved nitrogen gas.</p>							

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			Open exterior doors and windows to encourage evaporation of the liquid and safe disposal of the nitrogen gas							
		Transient and short exposure of cold on lungs can produce discomfort in breathing	SOP Adequate ventilation reduces risk of exposure to cold LN2	Low						
Explosion due to formation of ice plug in dewar vessel		Users Ruptured container leads to flying debris and a rapid release of low temperature, asphyxiant gas.	If a blockage occurs in the storage vessel - Evacuate all personnel from the storage room area *Contact BOC for further advice and arrange for an engineer to examine	Low						

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		Injury from flying debris Asphyxiation Cryogenic burns	the storage vessel before returning it to service. Annual Service of storage dewar by BOC engineer carried out in compliance with **BCGA Code of Practice CP30 procedures							
<p>^Service and supply contact details:</p> <p>Account number 1307590 Location number 2902558</p> <p>Contacts in this order: Joe Fullerton Service engineer and delivery driver Mobile 07774 281665 Cryospeed supply and Cryocare 0800 111 333</p> <p>References **BCGA Code of Practice CP30 https://bcga.co.uk/wp-content/uploads/2021/09/BCGA-CP30-Rev-3-23-07-2019.pdf Cryocare Cryogenic Vessel Maintenance https://www.boconline.co.uk/en/services/customer-engineering-services/cryogenic-vessel-maintenance/cryogenic-vessel-maintenance.html Gas safety training</p>										

Commented [KB1]: Are these contact details up to date?

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Append supplier safety data sheets for all substances here:





Standard operating procedure

Procedure:

Room 1A101 (S11B) liquid nitrogen storage facility contains a Cryostor 180 litre storage vessel and a 50 litre sample storage dewar.

Entering the storage facility

A personal oxygen monitor must be worn on entry into the storage area. The oxygen monitor can be obtained from room 3B142C along with the storage room access key. The monitor displays the oxygen concentration continuously and should read "20.9" in open air (it cannot be switched off). If in the event of low oxygen readings (19.5% or less) the monitor alarm will sound and the LCD display will repeatedly flash. All personnel should vacate the room and not re-enter until the oxygen level has returned to normal. If working alone tell a colleague of your intention to enter the LN2 storage facility and check out.

Dispensing Liquid Nitrogen

Only trained members of staff or students are allowed to dispense liquid nitrogen from the Cryostor storage vessel. Cryoprotective gloves, a face visor/goggles and a protective apron/ lab coat must be worn when dispensing liquid nitrogen.

Liquid Nitrogen Sample Storage

Cryoprotective gloves, lab coat and goggles are worn when adding or removing samples to or from the liquid nitrogen storage Dewar. Avoid splashing or spillages and remember to replace the storage Dewar plug after use before closing the lid.

Transportation Procedure

The transport dewar (25 litre Cryolab with trolley) should only be filled to 90% of the net capacity to reduce the risk of spillage. The transport dewar must be adequately secure during transportation and protective clothing must be worn at all times ie. Non-absorbent gloves (PVC or leather) and a lab coat. Shoes or boots must be worn and not open-toe sandals or flip flops. Two people are required to transport the dewar from the storage area to the Analytical or Biopsy labs (Room 4B140/Room 3B144G).

Transportation of liquid nitrogen to the lab area is permitted by lift access, providing that access is restricted during transportation and the vessel is placed in the lift and collected at the other end. (Never accompany the filled liquid nitrogen dewar in a lift).

Use of Liquid Nitrogen

Rooms 4B140/3B144G. Ensure that the working area is well ventilated. Wearing appropriate gloves and clothing, carefully decant liquid nitrogen from the transport dewar into the small Nalgene 1 L/2L dewars for snap freezing or temporary storage of samples. Remove samples from the dewar using cryo tongs or forceps. Avoid storage and spillage of large volumes of liquid nitrogen.

(Volumes of 20 L and under are acceptable for lab storage providing that the liquid nitrogen is stored in a suitable storage vessel as directed by **BCGA Code of Practice CP30)

Method of Disposal/Waste Liquid Nitrogen

Allow to evaporate slowly at room temperature in a well-ventilated area.

If a blockage occurs in the storage vessel - Evacuate all personnel from the storage room area.



^Contact BOC for further advice and arrange for an engineer to examine the storage vessel before returning it to service. Ensure that regular maintenance checks are carried out in compliance with **BCGA Code of Practice CP30 procedures.

In the event of an incident

Oxygen deficient atmosphere detected:

- Attempts to rescue person(s) from oxygen deficient atmospheres should only be made by trained persons using breathing apparatus
- If medical attention is not immediately available, arrange for the casualty to be transported to hospital

Cryogenic burn

- All cold burns should be checked by a first-aider or in extreme circumstances, by a medical expert to confirm the extent of damage
- First Aid
 - + Flush affected area(s) of skin with copious quantities of tepid water but do not apply any form of direct heat
 - + Move casualty to a warm place and advise them to seek medical attention

Spillage:

- Evacuate all personnel from the area likely to be affected by liquid nitrogen and evolved nitrogen gas
- Open exterior doors and windows to encourage evaporation of the liquid and safe disposal of the nitrogen gas