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Related documents: UNSW Hazardous Substances and Dangerous Goods Procedure

1. Purpose – context for development of the protocol

This Protocol is designed to provide guidance on the correct handling of liquid nitrogen within the School of Medical Sciences

2. Scope – to which positions/groups does the protocol apply

All staff and students in the School of Medical Sciences

3. Definitions and acronyms used

Cryogen: Liquefied gases that are cooled below room temperature

Dewar: Vacuum Flask used to store cryogen such as liquid nitrogen

4. Protocol statement

4.1. Handling Liquid Nitrogen

When handling Liquid Nitrogen ALWAYS REMEMBER liquid nitrogen poses two main dangers: Suffocation and Freezing

4.1.1. Suffocation

- **Make sure** there is enough ventilation: 1 litre of liquid nitrogen becomes about 700 litres of gas
- **DO NOT** transport liquid nitrogen in lifts carrying people – use the goods lift, and do not ride in the lift with the liquid nitrogen.
- As Nitrogen is heavier than air so take extra care with cellars.
- Carbon dioxide in air is a potential danger. Concentrations from 2.5% cause breathing problems and a concentration of 20% is deadly within some seconds (also when there is still enough oxygen available)

4.1.2. Freezing

- Liquid nitrogen can freeze body tissues, including those of the eye. ALWAYS use appropriate PPE (see below).
- Liquid nitrogen makes lino and stone floors, normal shoe soles and plastic materials crisp and crumble easily, so avoid spills where possible and take extra care around liquid nitrogen.
- Normal thermos flasks cannot handle low temperatures and the danger of explosion is present.

4.2. Personal Protective Equipment (PPE) for Liquid Nitrogen

- Wear clean and dry clothing that covers arms and legs.
- The clothing should be loose, so it is easy to remove it when an accident happens.
- **Avoid** wearing open trouser pockets and wrapped sleeves.
- Wear **cryogenic gloves** *under* the sleeves so no liquid can fall in the gloves.

- Wear a **face shield** or **safety glasses**
- Wear non-slip **closed footwear** and **apron**.

4.3. Clean-up Procedures

- If cryogenic liquids are spilt inside a building make sure there is adequate ventilation.
- Evacuate the area until the liquid has evaporated and oxygen levels are at normal atmospheric levels.
- If cryogenic liquids are spilt outside, keep up wind of the spill.
- A claw can be used to retrieve samples/tubes. In this case, please contact Meredith Hatton (x52536).
- If there is a large spill, or if a vessel is leaking, contact emergency services (UNSW Emergency, x56666), the school OHS Officer (Jen Hartley x58288) and notify the supplier.

4.4. Dispensing Liquid Nitrogen From Storage Tanks

- Always follow the safety guidelines for the Liquid Nitrogen store(s), posted on the outside of the door(s).
- Dispense only into Dewars that are rated for liquid nitrogen:
 - Never use a Dewar that does not have a pressure relief valve or pressure venting lid/stopper.
 - Never use Dewars with makeshift or homemade lids/stoppers.
 - Use pressure venting lids/stoppers supplied by the Dewar manufacturer
- Dispense only into Dewars that are:
 - Equipped with carrying handles or wheels
 - Stable/not in danger of tipping over easily
- Persons filling Dewar(s) will be in constant attendance during filling
- Prevent Splashing. Place filling hose at or below the mouth of the receiving Dewar
- Use a dipstick to assess the level of the liquid where necessary. Not your hand.
- Wear Required Personal Protective Equipment (see **PPE for Liquid Nitrogen**)

4.5. Refilling Dewars In Laboratories

- Never refill Dewars or transfer Liquid Nitrogen alone!
- Make sure that there is good ventilation. Open a door if you are in a small room.
- Use Dewars rated for liquid nitrogen (see A.2 above)
- Dewars larger than 20 Litres will be lifted and poured by two people
- Do not use a Funnel
- Use a dipstick to assess the level of the liquid where necessary. Not your hand.
- Wear Required Personal Protective Equipment (see **PPE for Liquid Nitrogen**)

4.6. Transporting Liquid Nitrogen

- Only use Dewars rated for liquid nitrogen to transport liquid nitrogen. (See A.2 above)
- Ensure that the Dewar is your **ONLY** load (no books, coffee, other items)
- Never Transport Liquid Nitrogen in an Open Container
- Wear or Carry Required Personal Protective Equipment (see PPE for Liquid Nitrogen)
- Do not use unstable wheeled carts or Dewars
- Avoid other people who may bump into you and grates, large cracks in sidewalks/pavement, and other hazards that could cause tipping of the liquid nitrogen
- **NEVER** transport Liquid Nitrogen in passenger lifts. Always use the goods lift
- If you are carrying a Dewar containing Liquid Nitrogen carry transport Dewar as far away from your face and body as possible

5. Roles and responsibilities

N/A