

## STANDARD OPERATING PROCEDURE

<b>Procedure</b>	<b>Loading, transporting and filling of liquid nitrogen containers offsite</b>
<b>School/Department:</b>	School of Molecular Bioscience
<b>SOP prepared by:</b>	Ben Monaghan and Nick Coleman
<b>Version:</b>	SMB055.2

### Section 1 - Personal Protective Equipment (PPE)

1. Lab coat
2. Thick temperature-resistant gloves
3. Proper enclosed footwear, preferably leather to prevent cryogenic liquids penetrating the shoe fabric
4. Safety glasses at minimum, and full face-shield if handling large quantities (>100 ml)
5. Hair tied back if long
6. Appropriate hearing protection

### Section 2 – Potential Hazards

1. **Contact with skin or eyes may result in severe burns**, permanent tissue damage and loss of eyesight. Wear your PPE as described above and be aware of the risks by reading and understanding this document, and the risk assessment for Cryogenics.
2. **Spills of cryogenics in enclosed spaces can result in suffocation** as the gases expand and force the air out. Only use/decant gases in well-ventilated areas. **Never travel in a lift that contains with dewar of liquefied gases. People must take the stairs.**
3. Use of inappropriate container (e.g. glass dewar) can result in explosion if the glass breaks e.g. by rough contact by metal forceps, and the cryogenic agent is rapidly vapourised. **THIS HAS HAPPENED IN OUR SCHOOL!** Replace any glass dewars with metal ones.
4. The public could be exposed to cryogenic material if a leak or spill occurs during loading, transport or unloading. Only authorised and trained personnel should be performing this task.
5. Leaks and spills could occur due to equipment failure. Only use approved equipment, and monitor periodically for wear or breakage.
6. Explosions can occur if liquid oxygen pools in hoses, and contacts hydrocarbons such as oil or grease. Hoses must kept clean and in good repair, and in the case of liquid oxygen, hoses must be organised to stop pooling from occurring.
7. Workers with pre-existing medical conditions (e.g. allergy, immunocompromised state, chemical sensitivity) and workers who are pregnant or expecting pregnancy must consult with their supervisor AND medical specialist AND the university's WHS services before performing this procedure. If there are any serious concerns expressed by any of these individuals, this task must not be performed.

### Section 3 – Procedure

#### A) Transport of Cryogenics in Vehicles

1. Cryogenic transport can only be done by trained personnel, with a current drivers licence, using an approved university vehicle (i.e. the SMB ute only, the station wagon is not approved and must not be used!).
2. Special care must be taken when handling and transporting liquefied gases in vehicles. Shocks and bumps may lead to damage/failure of containers or spills. **Liquefied gases should not be transported in the enclosed cabins of vehicles** such as sedans or station wagons, and should only be transported on the open tray of a utility or truck as this will allow any gases to safely disperse in the event of a spill.

#### B) Loading of SMB Utility

1. Transport of liquefied gases should occur on open topped vehicles only.
2. Lower the back tray of the ute and park the ute as close as possible to the SMB dock.
3. Check whether tyre pressure of car and container trolleys require adjusting
4. Install bars to hold Nitrogen Containers onto the back of utility. Tighten up the bolts that fix the bars in place with a small adjustable spanner

5. Attach venting nozzle to Nitrogen Container's vent valve directing it upwards
6. Using a flat metal plate, push container on to ute and into vertical fixed bars.
7. Use ratchet straps to hold containers in place between vertical bars
8. Carefully drive to the Chemistry Building (F11) and park with the open tray of the utility as close as possible to the Main Tanks Dock Gate.

**C) Filling Nitrogen Container**

1. Back up the utility to the main nitrogen tank's dock carefully and as close as possible.
2. After donning appropriate safety gear and unlocking the main tank's dock gate, connect up hose from main tank outlet to nitrogen container to be filled on back of utility. Use liquid transfer hose extensions as required. Tighten up connection points with spanners.
3. Open VENT valve fully on nitrogen container and turn back valve one full revolution to stop valve from sticking when closing.
4. Open LIQUID valve fully on nitrogen container and turn back valve one full revolution to stop valve from sticking when closing.
5. Open MAIN TANK valve as required.
6. When nitrogen container is full, close the MAIN TANK valve
7. Close nitrogen container's LIQUID valve
8. Close nitrogen container's VENT valve
9. Loosen the transfer hose attached to the nitrogen container (cool water might be required for thawing the nut) slightly to vent pressure and gas.
10. Once the hose has been vented, disconnect from nitrogen container
11. Thaw any connection joins necessary between transfer hoses connected to main tank's hose and nitrogen container and disconnect.
12. Place main tank's hose back inside main tanks cage
13. Lock up gate to main tank's cage and main tank's dock gate

**D) Unloading of SMB Utility**

1. Drive carefully back to SMB, avoiding bumps as much as possible. Back up the SMB ute as close to the edge of the loading dock as possible
2. Place flat metal ramp over gap between ute and dock
3. Unwrap handle and loosen ratchet straps from around liquid nitrogen holding container
4. Carefully pull off nitrogen containers on the utility over the flat metal plate onto the dock
5. Put away the bars and ratchet straps

**Section 4 – Disposal / Spills / Incidents**

1. If an emergency occurs, turn off the main tank valve, the liquid valve on the nitrogen container and vent valve on the nitrogen container.
2. If a very large amount of cryogenic material like liquid nitrogen is spilled (>1 L) leave the area immediately and notify nearby workers to also leave. Consult your supervisor. No particular cleanup is necessary, but it is important to allow the gas to dissipate before returning to work. (time required depends how well ventilated the area is, most likely 5-10 min, but longer for less-ventilated spaces).
3. Any large spills (>1L) or incidents resulting in injury must be reported to your supervisor immediately and via the online incident report form within 24 h. Near misses (dangerous situations not leading to an incident) should also be reported.
4. A large-scale uncontrolled leak of a cryogenic agent could constitute a serious emergency. For example, a rupture in the hoses or the main tank of liquid nitrogen cylinder outside the Chemistry Building would require the immediate notification of University Security (1-3333) and possibly also emergency services (000 or 0-000).

**Section 5 – Repairs / Certification / Validation**

1. Ensure that all equipment is in good repair, especially hoses and regulators. Report any issues to the SMB workshop or the manufacturer.

**Section 6 – Relevant safety data sheets (to be available and accessible)**

1. SDS for liquid nitrogen

**Section 7 - References**

1. SOP for Cryogenics Including Liquid Nitrogen (SMB010)
2. University of Sydney Safety Health & Wellbeing Transporting Liquefied Gases (Cryogenic Liquids or Fluids)

**SOP Consultation, Training and Approval**

Print names and enter signatures and dates to certify that the persons named in this section have been consulted/trained in relation to the development and implementation of this Standard Operating Procedure. WHS Representative (WHS Committee) certifies that consultation has taken place.

Position	Name	Signature	Date
Supervisor			
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**Name Authorising (Printed):** DIANNE FISHER .....

**Signature:**  **Date:** 30/3/15 .....

**WHS Committee Representative Name (Printed):** MARKUS HOFER .....

**Signature:**  **Date:** 30/3/15 .....