LIQUID NITROGEN

Introduction
➢ This SOP applies to operation of LIQUID NITROGEN TANKS.

POTENTIAL HAZARDS
➢ Asphyxiation from oxygen displacement
➢ Frostbite and cold burns

Health Hazards
➢ Tissue damage (frostbite) from skin exposure.
➢ Asphyxiation due to oxygen displacement.

Personal Protective Equipment

EYE PROTECTION
➢ Safety glasses, goggles AND face shield shall be worn during operations in which liquid nitrogen might contact the eyes (e.g., through vapors or splashes of solution).
➢ Ordinary (street) prescription glasses do not provide adequate protection. Adequate safety glasses must meet the requirements of the Practice for Occupational Education Eye and Face Protection (ANSI Z87.1-1989) and must be equipped with side shields.

HAND PROTECTION
➢ Use Cryogenic Gloves when working with Liquid Nitrogen.
➢ Laboratory personnel should thoroughly wash hands with soap and water before and immediately upon removal of gloves.

LAB COATS, ETC.
➢ Button lab coats, closed toed shoes, long pants and long sleeved clothing shall be worn when handling liquid nitrogen. Protective clothing shall be worn to prevent any possibility of skin contact with liquid nitrogen.
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**Valve # Description**
2 Liquid Use Valve
3 Vent Valve
6 Pressure Builder Valve
7 Pressure Gauge
10 Gas Use Valve

**Delivery of liquid nitrogen from a Low Pressure tank (do not use a high pressure tank for liquid delivery)**
1) Make sure you are using a low pressure tank. Pressure is clearly stated on the laminated information sheet attached to the upper cage housing.
2) Attach a standard fill hose to valve #2. A small triangular identification tag reading “liquid” is attached to the valve/tubing assembly.
**3) Open valve #2 (counter clockwise looking down on the valve) to deliver liquid. Wait for liquid, it may take a minute to appear.**
**4) When desired amount is delivered close valve #2.**
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Reading level of liquid
1) Push the on button on the CYL-TEL digital monitor.
2) Wait 5 seconds for a reading.
3) The number indicates the % full.
Change gloves regularly (at least every two hours) and wash hands at the time of the glove change.
Do not use a HEPA vacuum for cleaning up liquid nitrogen – liquid nitrogen could react with metal inside the vacuum.

Delivery of Gas (low pressure can deliver 22 psi, high pressure can deliver 230 psi)
1) Connect a regulator approved for nitrogen to valve #10. A small triangular identification tag reading “gas use” is attached to the valve/tubing assembly.
3) Open valve #10 (counter clockwise looking down on valve) to deliver gas
4) Set a secondary regulator as needed.
5) When finished close valve #10.

Building pressure (Low pressure can build to 22 psi, High pressure can build to 230 psi) 124
1) To build gas pressure in tank to 22 or 230 psi (low and high pressure tanks, respectively) open valve #6 (green valve). Turning counterclockwise will open the valve and build pressure.
2) When pressure is reached close valve#6. This could take minutes to hours depending on the initial pressure of the tank.

To Vent tank (If needing to reduce pressure)
1) Open valve #3. A small triangular identification tag reading “vent” is attached to the valve/tubing assembly.
2) When pressure is reached close valve #3.
3) Unless pressure build valve #6 is closed, the pressure will build again.

***PROBLEMS***: In case of continuous and vigorous venting of tank
1) Open vent valve #3 (a few turns counter clockwise looking down on the valve). A small triangular identification tag reading “vent” is attached to the valve/tubing assembly.
2) After a minute close vent valve #2 and check if it is still venting. Repeat steps 1 and 2 until the tank no longer vents.
3) Make sure pressure builder valve #6 is closed (green valve, turn clockwise to close), otherwise the tank will continue to vent.
4) If still venting, roll to the dock and let the gas vent. Call the vendor immediately.
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Special Handling Procedures and Storage Requirements

<table>
<thead>
<tr>
<th>SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>x — Must not be stored together</td>
</tr>
<tr>
<td>0 — May be stored together with specific precautions</td>
</tr>
<tr>
<td>+ — May be stored together</td>
</tr>
</tbody>
</table>

Note: Depending on other risk factors, compatibility assessment based on the table above may not be relevant to storage situations, particularly where large volumes of dangerous goods are stored and handled. Reference should be made to the Safety Data Sheets for each substance or article and risks assessed accordingly.

Emergency Numbers:

<table>
<thead>
<tr>
<th>Emergency Numbers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire and Medical Emergencies</td>
<td>x5911 (911 on cell phone)</td>
</tr>
<tr>
<td>Environmental Health and Safety</td>
<td>x3427</td>
</tr>
<tr>
<td>FastMed Urgent Care (employees)</td>
<td>(336) 714-4616</td>
</tr>
<tr>
<td>Student Health (students only)</td>
<td>x5218</td>
</tr>
<tr>
<td>Poison Control</td>
<td>800-222-1222</td>
</tr>
</tbody>
</table>
# Standard Operating Procedure (SOP)

## LIQUID NITROGEN

<table>
<thead>
<tr>
<th>Effective Date:</th>
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</tbody>
</table>

### First Aid

#### INGESTION
- Not considered a normal route of entry.

#### EYE CONTACT
- If product comes in contact with eyes remove the patient from gas source or contaminated area.
- Take the patient to the nearest eye wash, shower or other source of clean water.
- Open the eyelid(s) wide to allow the material to evaporate.
- Gently rinse the affected eye(s) with clean, cool water for at least 15 minutes. Have the patient lie or sit down and tilt the head back. Hold the eyelid(s) open and pour water slowly over the eyeball(s) at the inner corners, letting the water run out of the outer corners.
- The patient may be in great pain and wish to keep the eyes closed. It is important that the material is rinsed from the eyes to prevent further damage.
- Ensure that the patient looks up, and side to side as the eye is rinsed in order to better reach all parts of the eye(s).
- Transport to hospital or doctor.
- Even when no pain persists and vision is good, a doctor should examine the eye as delayed damage may occur.
- If the patient cannot tolerate light, protect the eyes with a clean, loosely tied bandage.
- Ensure verbal communication and physical contact with the patient.

**DO NOT**
- allow the patient to rub the eyes
- allow the patient to tightly shut the eyes
- introduce oil or ointment into the eye(s) without medical advice
- use hot or tepid water.
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### SKIN CONTACT

If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

For hypothermia:
- Move person to a warm place.
- Wrap in blankets.
- Shock may occur during the correction of hypothermia; cardiac dysrhythmias may be associated with severe hypothermia.
- Seek medical attention.
- Avoid direct heat.
- Arrange for admission to hospital for observation

### INHALATION

Following exposure to gas, remove the patient from the gas source or contaminated area.
- NOTE: Personal Protective Equipment (PPE), including positive pressure self-contained breathing apparatus may be required to assure the safety of the rescuer.
- Prostheses such as false teeth, which may block the airway, should be removed, where possible, prior to initiating first aid procedures.
- If the patient is not breathing spontaneously, administer rescue breathing.
- If the patient does not have a pulse, administer CPR.
- If medical oxygen and appropriately trained personnel are available, administer 100% oxygen.
-Summon an emergency ambulance. If an ambulance is not available, contact a physician, hospital, or Poison Control Centre for further instruction.
- Keep the patient warm, comfortable and at rest while awaiting medical care.
- MONITOR THE BREATHING AND PULSE, CONTINUOUSLY.
- Administer rescue breathing (preferably with a demand-valve resuscitator, bag-valve mask-device, or pocket mask as trained) or CPR if necessary.

### Spill and Accident Procedure

- Evacuate area and contact Lab Manager or EHS at x3427.
- Ventilate the area completely prior to re-entry.