Standard Operation Procedure: Liquid Nitrogen

Hazard:
- Liquid nitrogen is colder than -196°C and can cause severe burns and tissue damage (such as frost bite). Moving liquid or a jet of vapors can freeze the skin or eyes faster than liquid contact. Because eyes contain fluids they are especially sensitive to cryogen exposure. The fluids in the eye can freeze upon contact with the cryogen, causing permanent eye damage.
- Liquid nitrogen (LN2) vaporizes as it is dispensed from the compressed tank at the rate of 700 liters of gas per liter of liquid. This “boil-off” can cause replacement of air in the room, which can cause an oxygen-deficient atmosphere (<19% O2). Oxygen-deficient atmospheres can lead to asphyxiation.
- Pressure build-up and explosions can occur if the liquid nitrogen is trapped and rapidly brought to room temperature. Store LN2 in insulated dewars with pressure relief valves.

Protective Equipment:
- Wear protective gloves. Gloves should be loose and easy to remove; be sure to remove or cover jewelry as it can freeze to skin.
- Protect eyes by wearing safety glasses or goggles, and protect the face with a face shield.
- Wear long pants and closed toed shoes, recommend wearing long sleeve shirt or lab coat.

Special Handling Precautions for Portable Dewars:
- Avoid contact with cryogenic liquid. Wear personal protective equipment.
- Dispense, store, and use in well-ventilated area.
- Make certain all valves are off before changing tanks.
- Systems that may become pressurized must have pressure relief valves.
- Transport dewars in service elevators if available.
- Protective equipment should be available where LN2 is dispensed; if not, it must be provided by users.

Disposal:
- Small amounts can be disposed of in a well-ventilated, non-public place, preferably outdoors. Air is approximately 79% Nitrogen.

Emergency Procedures:
- In case of skin burns, immediately immerse the frozen area in a warm water (not to exceed 105 F). Treat as a burn and seek medical attention.
- If splashed in eye, flush with warm water and seek immediate emergency medical attention.
- If big spill on body, get cloths off fast; immerse affected areas in warm water.

Spill Procedures:
- Less than 100 ml: In a well-ventilated area, allow to simply evaporate.
- Move all personnel away from the direct area of spillage to prevent any chance contact with the spill.
- More than 100 ml: Because of the rapid conversion of even a small amount of LN2 into a large volume of gaseous nitrogen (a 700-fold expansion), any enclosed area may rapidly be depleted of all oxygen, leading to asphyxiation and death. ALL personnel must be IMMEDIATELY EVACUATED from the surrounding area.
- If a tank of LN2 is leaking and valves cannot be shut, carefully move the tank outside where the leaking gas will not cause asphyxiation. Contact the vendor of the gas or cylinder to repair the leak.
Requirements/Access:
LN2 request sheet signed and turned in to Anthony. Must be signed by PI and Safety Warden indicating in person training on dispenser system has been complete.
Complete EHS Cryogens safety training via UC Learning Center. Submit the certificate with completed LN2 access request sheet in to the service desk in 151 Le Conte
After documents have been turned in service desk will issue a code to activate dispenser and door to LN2 shed. Service desk will also activate your Cal ID for the loading dock door so you may fill LN2 after 4pm
This is a personal code. Sharing of the code is prohibited and shall result in loss of access.

Emergency Shut off-
There are two emergency shut offs for the station. The large scale has a large red stop button that may be pressed in the event the system continues to dispense after being filled. The second emergency stop is a valve that is outside of the station located next to the gauges in the storage shed. You may manually close the valve in the event LN2 doesn’t turn off. Please report any issues to Anthony1

Use:
2 PERSONS ARE REQUIRED TO TRANSPORT ALL DEWARS ON CASTERS (NO EXCEPTIONS). HANDLING A LARGE DEWAR BY YOURSELF WILL LIKELY RESULT IN A DEWAR TIP, SPILL OR OTHER ACCIDENT.
Small Scale-Wear required PPE for scale (gloves, pants, shoes and face shield). Inspect your dewar. Make sure dewar isn’t damaged or leak. Must be in working condition to use. Do not leave the small scale while dispensing. Small scale can fill quickly. Please wait until your dewar is finished filling. Dewars larger than 4l will not fit on scale.
Large Scale-Wear required PPE for scale (Pants, gloves, shoes). Inspect your dewar. Make sure it is in good working condition per manufacturer’s specifications. You may leave your large dewar while it is filling. Depending on line temperature dewars may take up to an hour to fill.

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