



Standard Operating Procedure (SOP) TRANSPORTING CRYOGENIC LIQUIDS

This SOP is specific to transporting cryogenic liquids within and between the UTM buildings. It complements the UofT [“Control Program for Liquid Cryogenic Transfer Facilities / Other Low Oxygen Hazardous Rooms”](#) and [“Standard for Inert Cryogenic Liquid Usage in the Laboratory”](#) and does not replace them.

NOTE: Refer to:

Appendix I for Elevator Signage Required to Transport Cryogenic liquids.

Appendix II for location of the elevators in each building, which are equipped with retractable belt barrier.

Hazards:

- Asphyxiation hazard due to oxygen displacement or condensation, resulting in oxygen deficiency
- Extreme cold hazard causing rapid burns or frostbites
- Explosion due to rapid and very high volume expansion

1. Purpose: To provide step-by-step safety guidance on how to transport cryogenic liquids between buildings and floors at UTM.

2. Scope: This SOP applies to all cryogenic liquid “Users” (including the Principal Investigators (PIs), Staff, Students and other lab users) within UTM needing to transport cryogenic liquids.

A cryogenic liquid (nitrogen, helium or argon) is defined as a liquefied gas that is stored or used at cryogenic temperatures, which is defined by NIST as being below 93.15°K (-180°C).

3. Prerequisites: All Users, who transport cryogenic liquids, are required to complete the WHMIS training (EHS101/EHS112), read the [“Standard for Inert Cryogenic Liquid Usage in the Laboratory”](#), and be trained by an experienced and trained person.

4. Training: PIs must ensure that all Users under their supervision, who transport the cryogenic liquids, are provided with appropriate training and education in cryogen safety. PIs shall maintain records of Users training and education. A cryogen safety training program shall include:

- properties and hazards of liquid cryogenics;
- identification and evaluation of liquid cryogen hazards associated with operations and equipment;
- methods of controlling cryogen hazards;
- standard operating procedures for the transport (this SOP);

- proper use and care of personal protective equipment and clothing;
- emergency procedures.

All Users must participate in the training and apply such training to the liquid cryogenics transport.

5. Responsibilities:

- It is the responsibility of Users to read, understand and comply with the UofT Standard and the procedures described in this SOP.
- Users are required to sign a copy of this SOP and all subsequent versions and send a copy to UTM Stores Supervisor (matthew.malcolm@utoronto.ca).
- Users are required to report promptly any accidents, unsafe conditions or unsafe practices for liquid cryogen transport to the PI and the Health & Safety Officer (HSO)
- PIs provide suitable vessels (as described below) for transporting cryogenic liquids.
- PIs provide PPE and ensure all appropriate precautions are being followed.
- PIs provide the elevator sign (a color copy of Appendix I) and update the contact information on it. (UTM HSO can provide a copy upon request)
- PIs designate trained Users for transporting the cryogenic liquid nitrogen, introduce them to the Stores Supervisor at UTM Shipping and Receiving, provide appropriate training, and maintain training records.
- The Stores Supervisor will maintain a list of approved users, including the User and PI's names, the date of training, and the version of the SOP.

6. Personal Protective Equipment (PPE): A lab coat, face shield, cryogenic gloves, long pants or equivalent, and closed-toe shoes are required when handling cryogenic liquids.



7. Vessels for Transporting Cryogenic Liquids: All vessels used to transport cryogenic liquids shall meet ISO 21009-1 or equivalent. Vessels must be specifically designed for use with cryogenics.

Vessels must have a pressure release system to ensure that pressure cannot build up resulting in an explosion. For example, a Dewar flask should contain a cover that allows for boiled off gases to escape.

8. Transporting Cryogenic Liquids within and between UTM buildings:

- Ensure all appropriate PPE is worn correctly.
- Transport liquid cryogen vessels in handcarts with a lip to prevent any potential for spills, or use devices specially designed for moving cryogenic liquid vessels.

9. Transporting Cryogenic Liquids between Floors:

- Before attempting to transport liquid cryogenics between floors, acquire the help of a trained associate and ensure that they are stationed at the destination point.

- b. Use the freight elevator, wherever it is available (eg. to transport between floors 0-3 in Davis Bldg., use the freight elevator that is located at the east end of D block).
- c. In the event that the freight elevator is out of service or unavailable (eg. 4th and 5th floors of Davis Bldg.), use the passenger elevators that are equipped with a retractable belt barrier (Fig. 1).

Note: Only use the elevators that are equipped with a retractable belt barrier (Appendix II).

Note: The exception for this procedure is for quantities less than 1L of cryogenic liquids, as this quantity would not be enough to cause asphyxiation in the elevator.



- d. Place the liquid cryogen vessel within the elevator.
- e. Barricade the elevator entrance by utilizing the retractable belt barriers mounted within the elevator (Fig. 2). For the elevators that have two entrances, barricade at front and rear.
- f. Affix the signage (a print of the last page of this SOP) onto the belt barrier (Fig. 3). Ensure the contact information on the signage is up-to-date.



- g. Press the floor button of the destination point and exit the elevator. Under no circumstances are passengers allowed to travel in an elevator with cryogenic liquids.
- h. The associate at the destination point shall then remove the belt barrier(s) and signage, and remove the liquid cryogen vessel from the elevator.

10. In case of a spill or incident:

- a. Remove the contaminated clothes immediately as liquid cryogenics penetrate clothing much more quickly than water.
- b. Secure the area – this means guard the area so that no one walks thru the spill and ask them to leave the area. Stay as far as possible from the spill.
- c. Inform your supervisor.
- d. For large spills, leave the area immediately and call the Campus Safety (905.828.5200 or 905.569.4333) and the Stores Supervisor (Matt Malcolm - 905-828-5277).
- e. Fill out the online incident/accident form (<https://ehs.utoronto.ca/report-an-incident/>)

- I understand the importance of the safety and welfare of myself, all others in the buildings, and the environment. I recognize my responsibility and legal obligation to comply with the instructions in this SOP and in the [Standard for Inert Cryogenic Liquid Usage in the Laboratory](#) and practice necessary precautions while handling and transporting cryogenic liquids.

_____ Signature of the User	_____ Signature of the PI / Supervisor
_____ Print Name	_____ Print Name
_____ Date	_____ Date

Appendix I

Elevator Signage

DO NOT ENTER

Please wait for the next elevator



WARNING

Asphyxiation Hazard

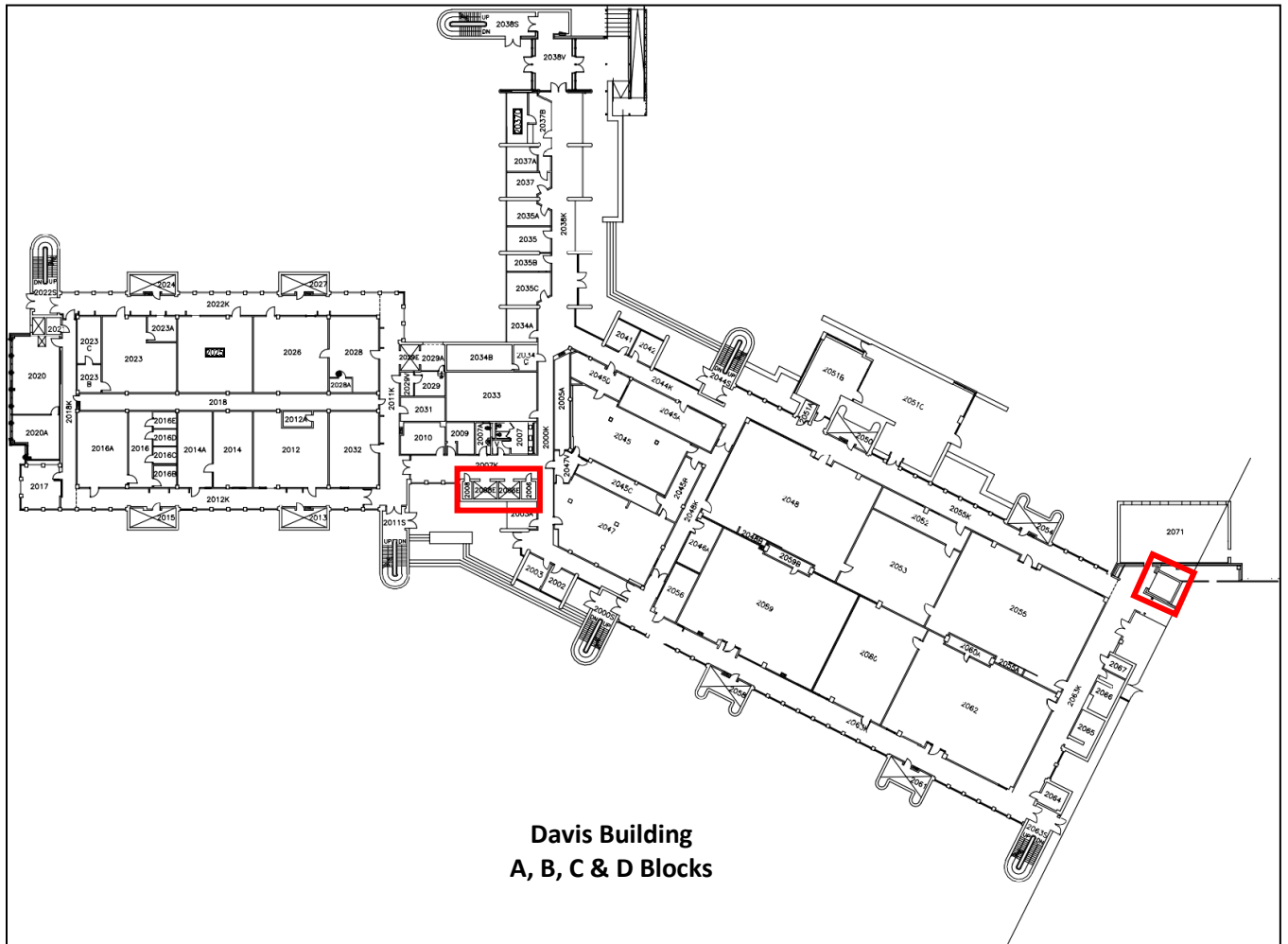
Cryogenic Liquid Being Transported

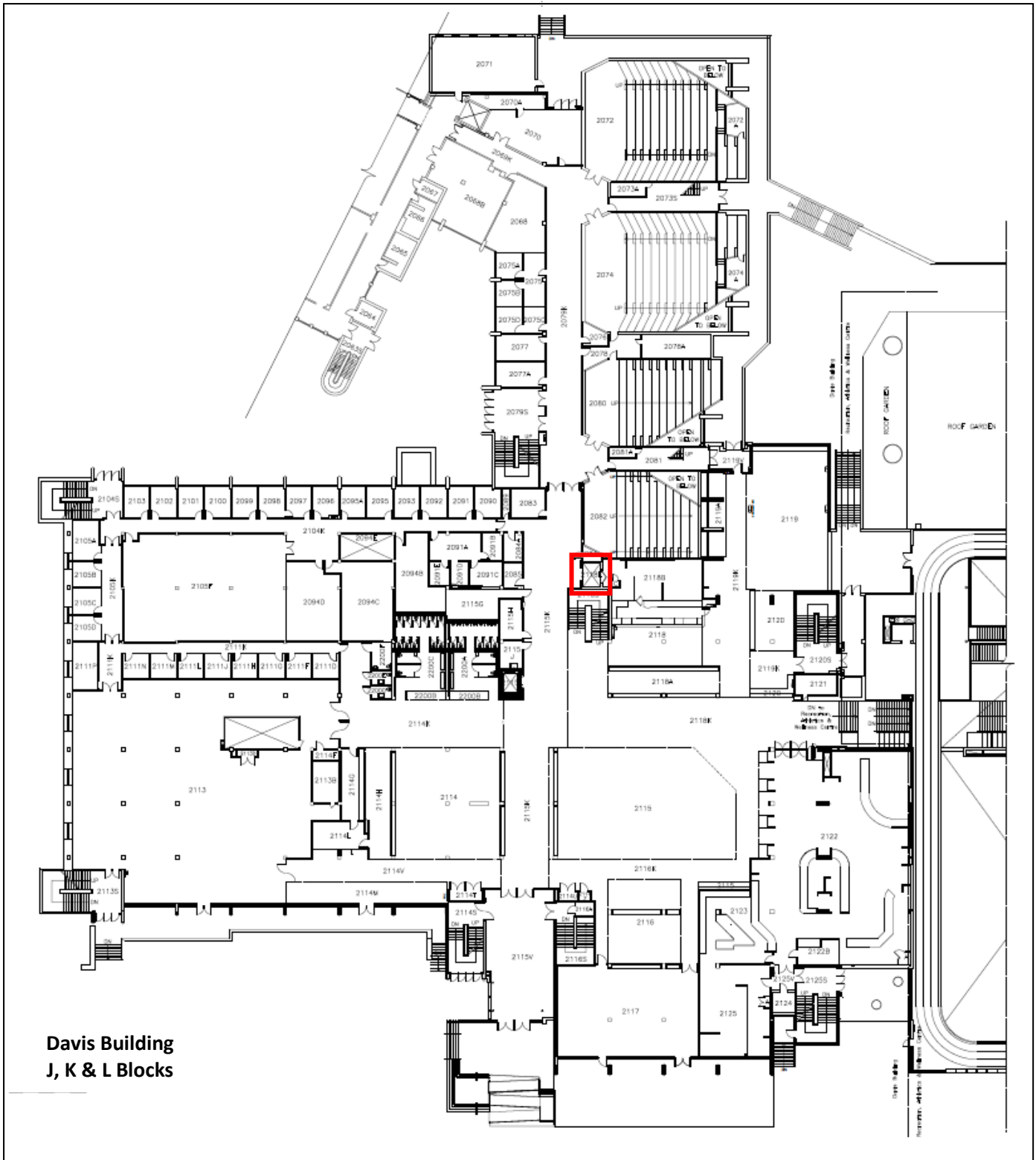
Name of PI:

Emergency Tel #:

Appendix II Buildings Floor Plans

Equipped elevators are marked by red squares.





Davis Building
J, K & L Blocks