ASRC Liquid Nitrogen Fill station
Standard Operating Procedure

Upon Entering the Fill Station Area:
- Check O2 sensors are not alarming.
    - Do not enter the room if the O_2 sensors are alarming
- Survey station for any damage.
    - Do not use the fill station if damage is observed.
    - Report any damage to Tom Dickson (tdickson@gc.cuny.edu)

Required items:
- PPE:
    - Insulated cryogen safety gloves
    - Eye & Face protection (Safety goggle/glasses and Face Shield)
    - Lab Coat and/or Cryogen safety apron
- Liquid nitrogen tank
- Large adjustable crescent wrench
- Personal badger account login.
    - You must be a qualified user for the liquid nitrogen system.

Safety Considerations
- Wear required PPE during all fills.
    - It is also recommended that you wear all PPE during transportation of tanks
- Wear lab appropriate clothing and footwear
    - Closed-toe shoes, preferably of non-absorbent fabric
    - Long pants and/or skirt
- **Do not enter the room if any of the O_2 sensors are alarming**.
- Tank vent valve should always be pointed away from you, including during transportation.

IN CASE OF EMERGENCY:
- **Close nitrogen supply valve** to the station.
- Contact Tom Dickson (email: tdickson@gc.cuny.edu, cell: (917) 414-4608) immediately.

Standard Operating Procedure

1. **Enable equipment in Badger**
   a. Open badger on the computer desktop
   b. Sign-in using your credentials.
   c. Select 'N2' tab on the left hand side.
   d. Select 'Liquid Nitrogen Fill Station' to highlight blue.
   e. Right click 'Liquid Nitrogen Fill Station'
   f. Select 'Enable'
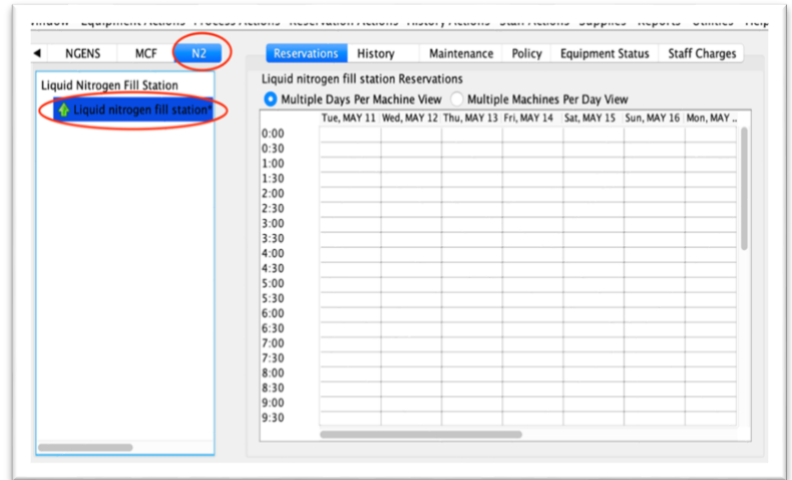
Note: to obtain an account and/or access to the fill station, contact Meghan Hughes (mhughes1@gc.cuny.edu). You must complete trainings to become a qualified user.

A: Nitrogen Supply Valve – EMERGENCY USE ONLY
B: Display Panel
C: Fill Line
D: Vent Line
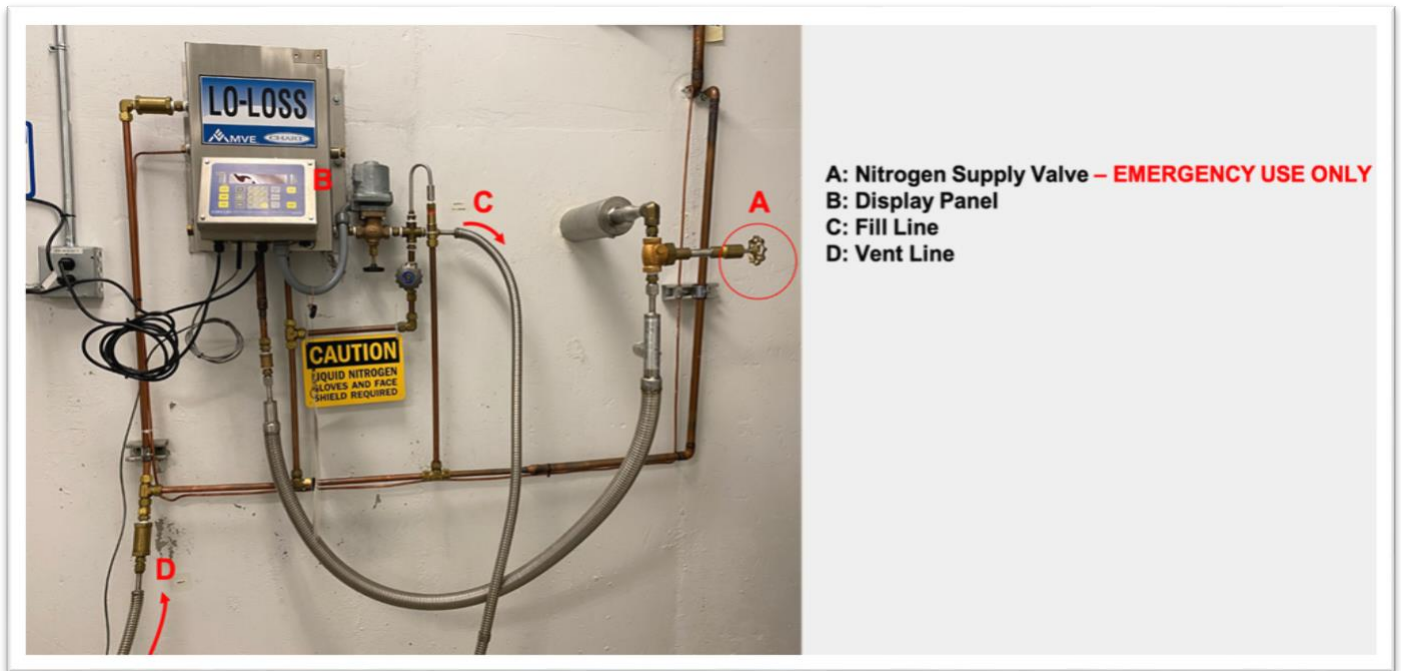
2. Wait for the system to initialize.
   a. The reading on the display panel will stabilize and show a constant reading.
3. **Check the system is set to lbs.**
   a. Check the front of the display panel. Lbs. should be highlighted.
   b. Verify by standing on the scale. Weight will be displayed on the display panel.
4. Remove all items/debris from the scales.
   a. This includes any hoses which may leaning on/adding weight to the scale.
5. **Ensure the scale reads zero** lbs.
6. **Roll the tank up the ramp and onto the scale**.
   a. The vent valve should be on our left, and the liquid valve on your right.
   b. Note: tanks typically have labelling to indicate which valve is which. If you are unsure, please contact your supplier for assistance. (or a POC?)
7. **Connect the tank valves to the fill station lines**
   a. Connect the fill station's vent line to the vent valve of the tank first.

      b.   Connect the fill line to the liquid valve of the tank.

      c.   Verify that vent lines and connected to vent valve - NOT GAS or any other valve.

8. **Tighten the connections between the tank and fill station.**

      a.   Tighten by hand, then by wrench

      b.   Do not over-tighten the connectors, since they will freeze up during the filling step. A ¼-turn past hand tighten is normally sufficient.

9.   **Open up the tank vent and liquid valves fully.**

      a.   Open vent valve first, then the liquid valve

10. Do not step on or add another weight to the scale from this point until the fill is complete

11. The fill station's display will show the weight of the empty tank (tare weight) plus whatever liquid nitrogen is in the tank.

12. Program the fill station

      a.   Press the "Start" button.

      b.   Enter "2"

      c.   Enter the tare weight in lbs. on the fill station

           i.   Note: tare weight is typically labelled on the tank you are using. If listed in kgs on the tank, please calculate the weight in lbs. (1kg = 2.205 lbs).

          ii.   If you are unsure of the tare weight, contact your supplier for confirmation.

      d.   Press "Enter".

      e.   Enter the fill weight in lbs.

           i.   Note: fill weight is the weight of liquid nitrogen you would like to add to the tank.

          ii.   If you are unsure of the fill weight you require, contact your supplier for verification.

         iii.   Reference for maximum fill weights:

Tank Size (L)	Suggested fill weight (lbs.)	Max. fill weight (lbs.)
240	340	425
230	325	407

      f.   Press 'Enter'

      g.   You will hear a 'snap' from the system as the solenoid valve opens. This indicates the start of the nitrogen fill.

13. If any leak from fill line connection, tighten connector until the leak stops.

      a.   If leak does not stop, hit 'stop' on the fill station panel and contact;Tom Dickson (tdickson@gc.cuny.edu), Brian Giebel (bgiebel@gc.cuny.edu), Milan Begliarbekov (mbegliarbekov@gc.cuny.edu), and/or James Aramini (jaramini@gc.cuny.edu).

14. **DO NOT LEAVE THE STATION UNATTENDED DURING FILL**.

      a.   The fill station display panel will indicate the weight of liquid nitrogen added to the tank.

15. The fill station will automatically stop fill when the fill weight is reached.

      a.   A 'snap' from the solenoid closing indicates the end of the fill.

      b.   The scale will now show the total weight of the tank (tare weight + liquid nitrogen weight)

16. Close liquid valve on the tank.

17. Close vent valve on the tank.

18. **Detach hoses from the tank**

      a.   Use wrench to remove the lines from the tank.

      b.   If frozen, use a heat gun to gradually warm the connection.

19. **Remove the tank from the scale**

20. **Disable the equipment in Badger**.

      a.   Right click 'Liquid Nitrogen Fill Station'

      b.   Select 'disable'

21. **Close Badger** program on the PC to log out.