

# Liquid Helium Transfer for Blue Dewar SOP

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Written by:

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## Super Users:

Stephen Kuenstner

Nicholas Rapidis

Note: All qualified users must demonstrate that they have received the EH&S cryogenics training to the super-user before they will be added to the qualified user list.

## Qualified Users:

Saptarshi Chaudhuri

Carl Dawson

Stephen Kuenstner

Betty Young

Arran Phipps (added by Sherry with a confirmation from Saptarshi)

Joe Singh

Cady van Assendelft

Jason Corbin

Nicholas Rapidis

Tom Liu

Abdulla AlShirawi

Antonio Fortes

**WARNING:** Do not attempt to transfer until you have been trained. This involves both cryogenics training from EH&S, as well as in-person training by an Irwin group lab member.

## Required PPE:

- Cryogenic gloves
- Face shield or safety glasses

PPE is located on top of the toolcase in PAB B07, or on the top shelf of the bookcase in Varian 147

## Equipment checklist:

Equipment	PAB location	Varian 147 location
• Blue dewar	Either in B08, or chained to wall in B07	Chained to wall
• LHe storage dewar	Chained to wall of B07	Chained to wall

<ul style="list-style-type: none"> <li>• <b>Transfer fittings</b></li> </ul>	Fitting hardware for blue dewar and storage dewar are both located in a bag zip tied to the blue dewar	Fitting hardware for the storage dewar is on the shelf of bookcase. Consists of a $\frac{1}{2}$ in adapter slid into a $\frac{1}{2}$ in swagelok fitting
<ul style="list-style-type: none"> <li>• <b>Helium level monitor</b></li> </ul>	Fluke multimeter, located in top left drawer on the left side of the middle island in B07	In the equipment rack by the Radiolab computer
<ul style="list-style-type: none"> <li>• <b>Transfer line</b></li> </ul>	Hung on the side of the middle island shelves	Hung against the back wall
<ul style="list-style-type: none"> <li>• <b>He gas cylinder</b></li> </ul>	Cylinder, hose, and connection hardware are against the wall in B07	Cylinder, hose, and connection hardware are against the wall in B07

## Transfer Procedure:

### Filling a warm, empty blue dewar:

1. Measure and record current LHe level in the storage dewar.

- Open the main valve and thump
- Close main valve when finished.

2. Align storage dewar and blue dewar

- Move blue dewar and storage dewar a transfer line distance apart
- Ensure that vent valves on both dewars are pointed away from personnel or doors. This will help prevent cryogenic burns.

3. Start LHe level monitoring

- **For PAB B07:**
  - Connect LHe level sensor on blue dewar to fluke meter
  - When the dewar is warm, the resistance should read around 109 ohms
- **For Varian 147:**
  - First, attach level sensor on blue dewar to probe monitoring box, while the Cryomagnetix LHe level monitor is turned off.
  - Once connected, then turn on the LHe level monitor

4. Prepare storage dewar for transfer

- Attach transfer fitting to storage dewar.
- Close 5 PSI relief valve on storage dewar.

5. Prepare helium gas

- Open He gas cylinder. With the green valve at the end of the hose open, gas should be flowing out at 3-5 PSI. Adjust regulator if pressure is too high/low
- Close off at the green valve at the end of the hose
- Connect He gas to the primary vent valve of the storage dewar with hose barb.

**Put on cryogenic gloves and face shield (or safety glasses). Do not proceed beyond this step without PPE. If in Varian 147, turn on overhead fan for ventilation.**

6. Prepare dewars for transfer line insertion

- While keeping the green valve on the He gas line is closed, open primary vent valve of the storage dewar
- Open the main valve on storage dewar
- Open the vent valve on the blue dewar
- Remove stopper in swagelok fitting on the blue dewar
- Make sure both transfer fittings are loose enough to slide in transfer lines

7. Initiate transfer

- SLOWLY lower transfer line into both dewars, with the long side in the storage dewar. Lower until you have hit the bottom of the storage dewar. At that point, come up ½-inch.
- LHe will start to transfer. For an empty blue dewar, this will be signified by cold gas coming out of the vent valve.

#### 8. Monitor transfer

- As the transfer proceeds, the blue dewar should get colder, signified by a drop in the level sensor resistance.
- **For PAB B07:**
  - At around 90 ohms, liquid starts to fill in the extension of the dewar.
  - This is followed shortly after by filling of the belly and a precipitous drop in resistance.
  - When a few inches of LHe has collected in the belly, the level sensor should essentially be shorted (few tenths of an ohm on the fluke).
  - Thump the blue dewar at ~10 minute intervals to monitor level once the level sensor has shorted. This can be done through one of the two side ports.
- **For Varian 147:**
  - At some point, the LHe level sensor will stop reading “alarm” and begin reading sensible values.
  - Pressurize the storage dewar with LHe gas as needed to accelerate the transfer. This is done by opening the green valve on the gas connection for several seconds.

#### 9. End transfer

- When the blue dewar is full (**PAB B07:** 8-9 inches in belly, **Varian 147:** LHe level monitor reads 25.4 cm), stop the transfer.
- Remove the transfer line from both dewars and hang up on wall

#### 10. Prepare storage dewar to be stored

- Close the primary vent valve on the storage dewar.
- Remove the He gas connection and turn off the gas cylinder.
- Open 5 PSI relief on storage dewar.
- Close main valve.
- Remove transfer fitting from the storage dewar

#### 11. Prepare blue dewar for storage/use

- Put stopper in the swagelok fitting of blue dewar
- After a few minutes, the blue dewar should have de-iced sufficiently. Close the primary vent valve.
- Make sure that a latex glove (with hole in one finger) is attached to the hose on the blue dewar and that gas is flowing through.

#### 12. Double check that all transfer equipment is stored in the appropriate locations

### Refilling a partially full, cold blue dewar:

1. Follow steps 1-6 above to prepare the dewars in the same state as for a transfer to an empty blue dewar
2. Precool the transfer line
  - Insert the long side of the transfer line into the storage dewar, while keeping the short side outside of the blue dewar
  - Lower the transfer line into the storage dewar until you have hit the bottom. At that point, come up ½-inch.
3. When helium begins to flow out of the short side, insert the short side of the transfer line into the blue dewar
4. Follow steps 8-12 to complete the transfer procedure.

### Post-transfer checklist:

1. Dewars in safe state.
  - Only the 5 PSI valve should be open on the storage dewar.
  - Only the hose valve should be open on the blue dewar, with He blowoff flowing through the glove.
2. He gas cylinder closed off.
3. All equipment and PPE in original location.

Should any problems arise, immediately contact a cryogenics superuser (listed on the wiki).