

Standard Operating Procedure

Filling the 500/600/800/ and 900 MHz magnets with liquid nitrogen

Date: 02-12-13

SOP Title: Filling 500.600.800, and 900 MHz magnets

Principal Investigator: _____

Room and Building: B304 – Stanley Hall

Lab Phone Number: _____

Section 1 – Process

Filling of liquid nitrogen for the 500, 600, 800, and 900 MHz magnets

Section 2 – Hazardous Chemicals

Liquid nitrogen

Section 3 – Potential Hazards

- ***Liquid cryogens pose a potential asphyxiation hazard. Nitrogen expands by a factor of 680 and helium expands by a factor of 740 when changing from the liquid to gas phase. The expanding gas displaces breathable oxygen. To limit the asphyxiation hazard, liquid nitrogen and liquid helium should only be handled in well ventilated areas. Immediately evacuate the room if oxygen sensor audible alarm sounds.***
- ***The extreme cold of liquid nitrogen and helium can cause oxygen to condense from the air, resulting in fire danger. Keep cryogen use areas free of combustible materials (paper, cardboard, machine oil, etc) and eliminate any other sources of ignition.***
- ***Only use non-magnetic wrenches when working with the magnets. Steel or other ferromagnetic tools may be sucked into or against the magnet causing equipment damage and/or bodily injury.***

Section 4 – Approvals Required

Wemmer group members must be trained by Jeff Pelton and sign the SOP. They must also take the UC Berkeley on-line Cryogenics Safety course.

Section 5 – Designated Area

Fills are to occur in Rm B304.

Section 6 – Special Handling Procedures and Storage Requirements

Section 7 – Personal Protective Equipment

The main hazards associated with handling liquid nitrogen and liquid helium are: A) burns when skin comes into contact with cold pipes or liquid, and b) asphyxiation if nitrogen or helium has expanded from its liquid form and the gas has displaced oxygen. To reduce the potential for injury, follow these guidelines:

- ***Avoid contact with cold unprotected pipes and vessels when working with liquid nitrogen or liquid helium.***
- ***Wear proper protective equipment:***
 - ***Dry leather or cryogenic gloves must be worn to avoid cold burns. The gloves must be loose fitting so that they can be removed easily.***
 - ***Goggles or a face shield must be worn to protect the eyes and face.***
 - ***Wear close-toed shoes and long pants while handling cryogenics to protect feet and legs from accidental spills.***
- ***Metallic objects (e.g. jewelry) should be removed from those parts of the body that may come into contact with the liquid.***
- ***Never accompany cryogenics in the elevator. If the elevator were to malfunction, the expanding gas could fill the elevator and pose a serious risk of asphyxiation.***

Load dewar on elevator, post “No Passengers” sign on the dewar, and retrieve it after using

separate route (stairs or another elevator).

- *When transferring cryogenic liquids, always direct the flow away from others.*

Section 8 – Engineering/Ventilation Controls

none

Section 9 – Spill and Accident Procedures

In case of a liquid nitrogen spill, provide plenty of ventilation and wait for the liquid to vaporize.

In the event of a fire alarm, turn off the liquid flow. Leave hoses connected. Leave the building.

Section 10 – Waste Disposal

No waste is generated.

Section 11 - Decontamination

Section 12 – Process Steps

Process Steps	Safety Measures
Identify either the 250 Lt or 100 liter dewar in Room B304B.	Wear a face shield, goggles, and gloves
Identify polypropylene tubing on concrete block in Center of B304.	
Identify brown (Cu/Be) non-magnetic wrench kept On the concrete block in B304.	
Roll dewar over to magnet.	
Attach polypropylene tubing to liquid port of Dewar.	A mistake is to connect the tube to the vent port. Only use a non-magnetic (brown) wrench!
Remove the safety release cover to the magnet	For the 800, also remove the tube attached to

Fill port.	The vent port. Not required for the 500/600/900.
Attach other end of tubing to the fill port of the Magnet.	
Slowly open valve to the liquid port – approx ¼ open	
Wait approximately 3 minutes for the tubing to cool.	
Continue to open port to approximately ½ open	
Fill liquid nitrogen until it comes out of the vent ports.	
Once full, close the liquid port valve.	
Allow approximately 5 minutes for the tubing to warm	
.Disconnect the tube from the magnet.	Only use a non-magnetic (brown) wrench.
Use the brown non-magnetic wrench to disconnect	.
The tube from the dewar.	
Re-attach safety release valve to magnet fill port. For the 800, also re-attach the vent tubing.	It is easy to forget to replace the safety release Valve.

Training Documentation

Name (Printed)	Signature	Date

Tuesday, February 12, 2013