

Experiment Safety Review Form

Review Number: PS-ESR-1-170-2012

PRINCIPAL INVESTIGATOR: Qun Liu

GROUP: NY Structural Bio Ct

EXT: 4778

E-MAIL: qunliu@bnl.gov

LIFE NUMBER: N7576

Project Title: X4 Beamline Support, Protein Crystallography sample preparation
Location(s): 0725
Area(s): 0725-FIRST-1-170
Proposed Start Date and Duration: 4/14/2011 - 4 years

SIGNATURES:

Principal Investigator: Qun Liu	Date: 4/21/2011
Experiment Review Coordinator: Lori Stiegler	Date: 4/21/2011
Reviewer: Frank Zafonte	Date: 3/17/2011
Reviewer: Deborah Bauer	Date: 3/16/2011
Reviewer: Christopher Weilandics	Date: 3/22/2011
Reviewer: Brian Heneveld	Date: 3/16/2011
Approval: Lori Stiegler	Date: 4/21/2011
Review/Approval (ERC) Comments: 04/10/2012 9:55 AM Reviewed for 2012. No changes. 04/21/2011 3:19 PM	
Walkthrough Signature:	Date:
Expiration Date (max 1 yr.): 4/21/2013	
FUA Change Required? No	
Fire Rescue Run Card Changes Required? No	
Has a NEPA Review been Performed for this Project? No	
Required Approvals (i.e., IACUC, IBC, etc.):	
Project Termination Acceptance Signature:	Date:
Comments:	

I. Define the Scope of the Work

A. Description

Experiment Scope

Staff usage:

Electronic and mechanical assembly or use of test equipment in support of Beamline operations, this would include repair or upgrade activities.

Uses of 192L LN₂ Dewar as a gas supply for trap regeneration in the hood. An ODH calculation for the room is in Attachment 1.

User activities:

Users of this lab typically do the following activities:

- 1) Loop crystals from trays using microscope.
 - a. @ Room temperature
 - b. in 5 °C room
- 2) use different (non-hazardous) cryosolvent to optimize freezing conditions.
- 3) Flash freeze looped crystal in LN₂
- 4) Load crystal into robot carousel
- 5) Setup Crystallization tray, leaving trays to crystallize
 - a. @ Room temperature in or out of incubator.
 - b. in 5 °C room.
- 6) Long term storage of frozen Crystal in LN₂ Dewar

Equipment manuals or procedures that are controlled documents:

N/A

B. Human Performance Factors

On occasion unlabeled solutions have been left in the lab, signs have been posted to reinforce BLOSA training to label all solutions.

C. Waste Minimization/Pollution Prevention

Only non-hazardous materials used in this lab.

D. Materials Used /Waste Generated

Materials Used	Disposal Method	Amount per Use	Amount per Year	Comments
Ethanol	Fugitive	0.00 ml	70.00 ml	

Ethanol	Sanitary	0.00 ml	30.00 ml	
Liquid nitrogen	Fugitive	1.00 ltr	300.00 ltr	
Solder scrap	Recycle	0.00 lb	0.10 lb	
Acetone	Fugitive	5.00 ml	50.00 ml	
		0.00	0.00	

II. Identify and Analyze Hazards Associated with the Work

The following hazards were identified:

Physical Hazards:

- Sharps (non medical)
- Cryogenics (any substance or device capable of producing temperatures $\leq 170\text{K}$)
- Soldering of electronic components
- Flammable liquids

Chemical Hazards:

- Flammable liquids

Ionizing and Non-ionizing Radiation Hazards:

- None

Biological Hazards:

- None

Offsite Work:

- None

Other Issues (Security, Notifications, Community, etc.):

- None

Significant Environmental Aspects

- None

III. Develop and Implement Hazard Controls and Assess Risk

A. Physical Hazards, Tasks and Controls

Hazard, Default Controls, Task Specific Info	Risk Level
<p>Hazard: Sharps (non medical)</p> <hr/> <p>Default Controls: Sharps including needles, razor blades and syringes (plastic and glass) must be disposed of in sturdy, rigid, sharps containers. Sharps containers cannot be more than 2/3 full.</p>	Negligible (0-20)
<p>Hazard: Cryogenics (any substance or device capable of producing temperatures $\leq 170\text{K}$)</p> <hr/> <p>Default Controls: General Requirements:</p> <ul style="list-style-type: none"> • Evaluate location oxygen deficiency • Store/transport only in approved containers (i.e. DOT/ASME or BNL LESHG) • Never pour from above chest level • PPE: Long Sleeve Shirt (or Lab Coat), long pants (or skirt covering ankles) and closed shoes <p>Pressurized transfer to open (vented) container; Or-Pouring > 5 liter volumes of LN2 between open containers:</p> <ul style="list-style-type: none"> • Face shield along with either Safety Glasses (w/side shields) or Goggles • Gloves (Cryo or Heavy Leather) 	Negligible (0-20)

Pouring small (5 liters or less) volumes of LN2 between open containers:

- Safety Goggles (face shield recommended if possible)
- Gloves (Cryo or Heavy Leather)

Work with samples immersed in LN2 in small (~1 liter) dewars:

- Use Tongs (tools) to manipulate/handle cryogenic samples (do not touch with gloves)• Use insulated non-absorbent gloves with dexterity (cotton/nylon gloves under disposable nitrile gloves)
- Safety Goggles

Hazard: Soldering of electronic components

Negligible (0-20)

Default Controls:

Engineering Controls

- Substitute non-lead solder when applicable to components.
- Designate area (eg metal tray, or disposable liner).
- Minimum PPE: Safety glasses

Hazard: Flammable liquids

Negligible (0-20)

Default Controls:

As for chemicals, plus

Store large quantities in Flam. cabinets as required

B. Chemical Hazards, Tasks and Controls

Hazard, Default Controls, Task Specific Info	Risk Level
<p>Hazard: Flammable liquids</p> <hr/> <p>Default Controls: Use hazardous chemicals controls. Review large quantity storage with Fire Protection Engineer Note location on fire run card and hazard info. placard for storage of solids, greater than 40 pounds; liquids, greater than 5 gallons; gases, greater than 10 pounds</p>	<p>Negligible (0-20)</p>

C. Environmental Hazards, Tasks and Controls (include on/off site transportation and products/services)

None

D. Radiation Hazards, Tasks and Controls

None

E. Biological Hazards, Tasks and Controls

None

F. Offsite Work Hazards, Tasks and Controls

None

G. Other Issues (Security, Notifications to Other Organizations, Community Involvement, etc.)

None

H. Recommended Exposure Monitoring

- None

Description or comments:

I. EPHA Determination

Chemical Name	Quantity (lbs, gal)	Location (Bldg/Room#)
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IV. Perform Work Within Controls

A. Recommended Training and Medical Surveillance Summary

- NSLS R2A2 for Lab Steward (LS-R2A2-LAB-STWD)
- Laboratory Standard (HP-IND-220)
- Cryogen Safety (HP-OSH-025)

B. Personnel Training, Qualification, and Authorization List

Employee/Guest Name	Life/Guest#	Dept	Required Training Course(s)	Signed
Randy Abramowitz	A0271	LU	Cryogen Safety (HP-OSH-025) [EXPIRES: NEVER] Laboratory Standard (HP-IND-220) [EXPIRES: 7/5/2013] NSLS R2A2 for Lab Steward (LS-R2A2-LAB-STWD) [EXPIRED: 3/24/2011]	
Qun Liu	N7576	LU	Cryogen Safety (HP-OSH-025) [EXPIRES: NEVER] Laboratory Standard (HP-IND-220) [EXPIRES: 10/3/2013] NSLS R2A2 for Lab Steward (LS-R2A2-LAB-STWD) [EXPIRES: 10/4/2012]	

C. Emergency Procedures

Spill supplies are located outside lab 1-170. Follow the building 725 Local Emergency Plan for any spills or incidents.

D. Transportation

None

E. Logistical Interactions

None

F. Termination/Decommissioning

All chemicals and equipment will be dispositioned or transferred at the termination of work.

V. Provide Feedback

Hazardous chemicals are no longer allowed in this lab. The satellite accumulation area was removed.

VI. Attachments

1. ODH Calculation for Room 1-170

Failure Scenario #1 - Loss of Dewar Vacuum

Dewar size – 1920 L (evaporates to 3806 ft³ of gaseous nitrogen)

Spill Rate – loss of vacuum failure – 12 cfm

Room volume – 344 ft² x 12 ft high = 4128 ft³

Room Ventilation – 6 air changes/hour assumed = 412.8 cfm + ventilation from one chemical fume hood – 300 cfm = 712.8 cfm

Using SBMS ODH Case B: the oxygen concentration at the end of the spill (approximately 5 hours) is 20.7 %. Since it did not go below 18%, no further ODH evaluation is necessary.

Failure Scenario #2 – Loss of ventilation with normal boil-off

Dewar size – 192 L

Boil-off rate – 2% /day – 3.84 L/day = 0.066 cfm

Room volume = 4128 ft³

Using SBMS ODH Case C: the oxygen concentration at the end of a 3 day weekend would be 19.6%. Since it did not go below 18%, no further ODH evaluation is necessary.

Attached Files: