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Experiment Safety Review Form

Review Number: LS-ESR-0017

PRINCIPAL INVESTIGATOR: Neil Whalen

GROUP: PXRR

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LIFE NUMBER: 23466

Project Title: Protein Crystal Preparation Laboratory

Location(s): 0725

Area(s): 0725-FIRST-1-153

Proposed Start Date and Duration: 12/16/2009 - 1 years

SIGNATURES:

Principal Investigator: Neil Whalen	Date:
Experiment Review Coordinator: Keith Klaus	Date: 1/20/2010
	Date:
	Date:
	Date:
Reviewer: Lori Stiegler	Date: 1/25/2010
Reviewer: Keith Klaus	Date:
Reviewer: Deborah Bauer	Date: 1/15/2010
Reviewer: Joshua Allen	Date:
Approval Department Chair:	Date:
Review/Approval (ERC) Comments: 01/20/2010 2:55 PM Removed references to acids, bases and heavy metal soaks. If this type of work is to be conducted in this lab additional work planning is required along with satellite waste area.	
Walkthrough Signature:	Date:
Expiration Date (max 1 yr.): 12/16/2010	
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:
Comments:
Date:

I. Define the Scope of the Work

A. Description

Staff activities: Use of hand tools, electronic equipment – oscilloscope, multimeter etc. for test, troubleshoot and fix beamline equipment. Alcohol in small quantities is used for cleaning vacuum components. Safety glasses and gloves are available. Occasional soldering at the lab bench using soldering station. Oil is stored for use at the beam lines. Users activities: Use cryogenic equipment to transfer samples from cryo shippers to the beamline in small cryo flasks. Lab has cryogenic gloves and goggles. Prepare samples for experiment by transferring from trays to mounting loops. Microscope is used to locate small crystals. Some experiments require heating with an open flame, or use of inert compressed gases. Lab has a sharps waste container for small broken glass parts.

Equipment manuals or procedures that are controlled documents:

N/A

B. Human Performance Factors

N/A

C. Waste Minimization/Pollution Prevention

Quantities are limited to smallest amount needed. Substitution with less hazardous chemicals is done whenever possible.

D. Materials Used /Waste Generated

Materials Used	Disposal Method	Amount per Use	Amount per Year	Comments
Vacuum Oil	Industrial	4.00 ltr	4.00 ltr	
Ethanol	Fugitive	10.00 ml	4.00 ltr	
Isopropanol	Fugitive	10.00 ml	1.00 ltr	
Methanol	Fugitive	10.00 ml	1.00 ltr	
Acetone	Fugitive	10.00 ml	1.00 ltr	
Tetrafluoromethane	Fugitive	10.00 g	200.00 g	
Xenon	Fugitive	1.00 ltr	25.00 ltr	
Non-biological sharps	Medical	0.00 lb	0.50 lb	Not actually medical waste, but handled through the Med Dept

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 $\leq 170\text{K}$) (Area: 0725-FIRST-1-153)
- Powered Hand Tools
- Compressed gases (lecture bottles, cylinders, gas lines) (Area: 0725-FIRST-1-153)
- Pressurized vessels or systems with operating pressure greater than >15 psi and/or with largest dimension (length, width or diagonal) >6 in
- Soldering of electronic components
- Open flames
- Flammable liquids (Area: 0725-FIRST-1-153)

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

- Any amount of industrial waste generation (e.g., oils, vacuum pump oil)

III. Develop and Implement Hazard Controls and Assess Risk

A. Physical Hazards, Tasks and Controls

Hazard, Default Controls, Control Addendum	Risk Level
<p>Hazard: Sharps (non medical)</p> <hr/> <p>Default Controls: Engineering Controls • Sharps (i.e. needles, razor blades) disposed of in sturdy, rigid, sharps containers • Separate trash receptacles exist for the disposal of large broken glassware Administrative Controls • No broken glassware shall be used in experiments • All glass shall be examined by the user before any experiment Personal Protection Equipments • Heavy gloves will be worn when disposal of broken glassware • See Sharps Posting (add link)</p>	<p>Negligible (0-20)</p>
<p>Hazard: Cryogenics (any substance or device capable of producing temperatures <= 170K)</p> <hr/> <p>Default Controls: Cryogenic Controls (additional controls for liquid oxygen or hydrogen) - Non-Commercial Cryogenic systems must be stored and used in containers (dewars) designated by the manufacturers for the specified cryogen(s) (no unshielded glassware). Venting and pressure relief must be utilized, and used as designed. - Locations for storage and use must be evaluated for Oxygen Deficiency Hazard. The calculations are sensitive to room size (larger is better) and dewar size (smaller is better). See the Safety Engineering Group Hazard Evaluation Tools web page for analysis of common systems. Contact the Safety Engineering Group for more complicated systems. - Transfers into warm open vessels can cause splashing. Slowly transfer the liquid, use a phase separator is possible, and use appropriate PPE (listed below). - Move dewars cautiously, so they do not tip over. Be aware of floor obstructions that could impede movement. PPE: Face Protection - transfer and handling within enclosed piping and containers: Safety Glasses</p>	<p>Negligible (0-20)</p>

w/ side shields or chemical/splash goggles (SG or CSG).
 - pressurized transfer into open containers: Full face shield plus SG or CSG as above.
 - 5 liters or less transferred (typ. poured) between open containers: SG or CSG
 - greater than 5 liters otherwise as c): CSG plus full face shield (FC).
Hand Protection
 - Use tongs to manipulate specimens and materials immersed in cryogenes.
 - When handling objects cooled by cryogenes, wear gauntlet style cryo gloves that are loose fitting and easy to remove or cryo gloves with elastic wrist.
 - Where manual dexterity is a requirement, and liquid nitrogen with less than 1 liters volume is used, a combination non-absorbent over insulator (nitrile over cotton) is allowed.
Body Protection
 - All parts of the body must be covered to provide protection from uninsulated equipment in contact with cryogenes.
 - long sleeves (or lab coat), long pants without cuffs, and shoes with closed toes be used during cryogenic transfers.
Cryogen Safety Training
 Note: Oxygen Deficiency Requirements may apply depending (as determined by ODH calculation)
 Comply with Subject Area "Cryogen Safety"

Hazard: Powered Hand Tools

Default Controls:

Inspected and used in accordance with manufacturer's manual.
 PPE as per Work Permit or SOP (Minimum: Safety Glasses)

Negligible (0-20)

Hazard: Compressed gases (lecture bottles, cylinders, gas lines)

Default Controls:

Engineering Controls

- Use regulators, hoses and components compatible for gas used and rated for maximum regular output, or install pressure relief device.
- Label piping/tubing if great than 10 ft, passes through walls/barriers or bundled to other lines.
- If manifolds are used, rate for 5x max. system pressure and use isolation/backflow valves leak test to maximum pressure.

Administrative Controls

- Remove regulator and install valve cap cylinder when not in use.
- Transport cylinders on approved cart; secure cylinder to a fixed object/wall.

Note: No filling of cylinders without SME approved procedure/equipment.

Training: Compressed Gas Safety (TQ-COMPGAS1)

PPE: Safety glasses when installing/removing/ or adjusting regulator

Comply with SBMS Subject Area "Compressed Gas Cylinders and Related Systems".

Negligible (0-20)

Review installation for applicability to Pressure Safety Subject Area.

Hazard: Pressurized vessels or systems with operating pressure greater than >15 psi and/or with largest dimension (length, width or diagonal) >6 in

Default Controls:

ASME stamped or reviewed and approved by SME
Comply with Subject Area "Pressure Safety"

Negligible (0-20)

Hazard: Soldering of electronic components

Default Controls:

Engineering Controls

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

Negligible (0-20)

Hazard: Open flames

Default Controls:

- Place the bunsen burner away from any overhead shelving, equipment, remove all papers, notebooks, combustible materials and excess chemicals from the area.
- Tie-back any long hair, dangling jewelry, or loose clothing.
- Inspect hose for cracks, holes, pinched points, or any other defect and ensure that the hose fits securely on the gas valve and the bunsen burner.
- Replace all hoses found to have a defect before using.
- Ensure the gas tubing is not too long to cause looping into the flame when moved closer to the valve.
- Flame guard should not be turned to be used as a tool rest, it should guard the hose from the flame.
- Notify others in the laboratory that the burner will be in use.
- Utilize a sparker / lighter with extended nozzle to ignite the bunsen burner. Never use a match to ignite burner.
- Have the sparker / lighter available before turning on gas.
- Adjust the flame by turning the collar to regulate air flow and produce an appropriate flame for the experiment (typically a medium blue flame).
- Do not leave open flames unattended and never leave laboratory while burner is on.
- Shut-off gas when its use is complete.
- Allow the burner to cool before handling. Ensure that the main gas valve is off before leaving the laboratory.

Negligible (0-20)

<p>Hazard: Flammable liquids</p> <hr/> <p>Default Controls: As for chemicals, plus Store large quantities in Flam. cabinets as required</p>	<p>Negligible (0-20)</p>
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B. Chemical Hazards, Tasks and Controls

Hazard, Default Controls, Control Addendum	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)

Hazard, Default Controls, Control Addendum	Risk Level
<p>Hazard: Any amount of industrial waste generation (e.g., oils, vacuum pump oil)</p> <hr/> <p>Default Controls: Engineering Controls <ul style="list-style-type: none"> • Store only compatible wastes together, in suitable containers. • Provide secondary containment for liquid wastes if potential for environmental release exists. • Keep containers closed and secured unless adding waste to container. Administrative Controls <ul style="list-style-type: none"> • Use a green industrial waste label, with generator’s name and chemical contents (trade name/formula NOT acceptable). Label oils “Used Oil”. • When full, complete and submit a WCF for pick up. The waste may be stored in the 90-day area. Training: Hazardous Waste Generator (HP-RCRIGEN3) Comply with the SBMS Subject Area: “Industrial Waste”.</p>	<p>Negligible (0-20)</p>

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**

- Laboratory Standard (HP-IND-220)
- Cryogen Safety (HP-OSH-025)
- Hazardous Waste Generator (HP-RCRIGEN3)
- Compressed Gas Safety (TQ-COMPGAS1)
- Hand and Power Tool Safety (TQ-TOOLSAFE)

B. Personnel Training, Qualification, and Authorization List

Employee/Guest Name	Life/Guest#	Required Training Course(s)	Signed
Cornelius Whalen	23466	Cryogen Safety (HP-OSH-025) [EXPIRES: NEVER] Compressed Gas Safety (TQ-COMPGAS1) [EXPIRES: NEVER] Laboratory Standard (HP-IND-220) [EXPIRES: 9/22/2011] Hazardous Waste Generator (HP-RCRIGEN3) [EXPIRES: 9/23/2010]	

C. Emergency Procedures

Emergency evacuation routes are described and shown to users during BLOSA training. Eye wash stations are located in immediate vicinity from the lab. Follow NSLS Emergency Plan.

D. Transportation

None

E. Notifications

None

F. Termination/Decommissioning

Decommissioning will be in accordance with BNL regulation when necessary. All chemicals will be returned or reassigned.

V. Provide Feedback

None

VI. Attachments

Attached Files: