Light Sources Directorate Policies and Requirements Manual

Number:	**LS-ESH-PRM- 2.6.0**
Section:	**BERYLLIUM MANAGEMENT**
Date:	**01/28/2010**
Revision:	**1**
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Approval signatures on file with master copy.

1.0 PURPOSE

This procedure is to establish requirements for work with beryllium (Be) metal, and beryllium alloys (>0.1%) within the Light Sources Directorate in order to control risks to personnel and the environment. It is based upon the BNL Beryllium Subject Area, which should be consulted for detailed information beyond the scope of this NSLS PRM, and for training requirements.

2.0 SCOPE

The requirements outlined here apply to work with beryllium articles including windows and vacuum enclosures, and to work with copper/beryllium (Cu/Be) parts such as electrical contacts and springs.

Any experimental use of beryllium requires review and is documented in an Experimental Safety Approval Form in the NSLS PASS System.

All work involving beryllium must be planned. Beryllium Use Review Forms (BURF's), shown in Attachment 1, list controls for common activities such as handling intact beryllium items. All work involving damaged beryllium items must be evaluated on a case by case basis and be reviewed and documented through the work planning process.

Enhanced work planning and a written work permit are required before working with broken, damaged, or oxidized Beryllium articles, including Cu/Be springs, or Cu/Be electrical contact materials. Medical monitoring, wipe samples and/or air samples may be required depending on the nature of the damage and potential for airborne exposure.

3.0 RESPONSIBILITIES

3.1 All Staff: NSLS technicians, engineers and scientists are responsible to plan projects or work activities that involve beryllium with attention to controlling any personnel or environmental risks presented.

3.2 NSLS ES&H Staff: The NSLS ES&H Staff is responsible for providing guidance on work practices, exposure monitoring, and control measures for beryllium projects.

3.3 NSLS Work Control Manager: The Work Control Manager is responsible for coordinating required work planning.

3.4 NSLS Users: Users are responsible to report use of beryllium on the NSLS Experimental Safety Approval Form and are required to contact the Control Room or NSLS ESH staff upon discovery of a broken beryllium article.

4.0 WORK CONTROL REQUIREMENTS

Current use of beryllium at the NSLS is limited to various intact beryllium articles such as vacuum windows in X-ray beam lines and detectors, domes, RF components, copper/beryllium springs, copper/beryllium tools, and copper/beryllium electrical contacts. Any additional uses of beryllium will require ESH review prior to introduction of beryllium into the work place.

The requirements contained in this procedure will minimize the ES&H risks associated with beryllium work projects and will ensure compliance with the BNL Beryllium Subject Area. Dust producing activities are prohibited at BNL.

Proper handling of articles and proper disposal of beryllium containing scrap that results from damaged articles is important. When undisturbed, beryllium articles present no significant risk to personnel. Dust exposure and contact with sharp edges must be avoided.

If practical, locations that contain beryllium articles that are in current use (such as cabinets with electrical contacts) should be labeled to aid in identification of hazard potential in case of damage.

4.1 Storage and Handling

- All beryllium articles should be inspected for oxidation before handling. Articles with less than 2% beryllium content do not generally oxidize. An oxide layer appears as a fine white powder. The oxide layer is dispersible and could present risk for inhalation. Contact a member of the NSLS ESH staff for help with work planning if oxidation of a beryllium surface is noticed.

- Beryllium articles (>2%) are to be handled with disposable vinyl or nitrile gloves available in the NSLS Stock Room.

4.1.1 Beryllium windows, domes, and detectors

Beryllium articles (>2%) in storage including domes, windows and detectors with beryllium windows must be kept in sealed, impermeable 6 mil bags or sealed containers. The bag or container must be labeled with a completed NFPA label that includes the following information:

- Identity
- Date
- Completed diamond:
  - Health – 3
  - Fire – 0
  - Reactivity – 0
- Owner Name

4.2 Damaged Beryllium Articles

Specific requirements for managing damaged beryllium articles will be established during Enhanced Work Planning. The Environmental Protection Division Waste Operations Group may assist with the cleanup, as listed in the Memorandum of Understanding on file. General requirements/considerations follow:

Consider turning off the ventilation in the area to prevent contamination from becoming airborne, if that would not cause a greater hazard.

4.2.1 Broken Articles

- The necessity of respiratory protection is determined by airborne dust generation potential. Experience suggests that broken articles that are not oxidized present minimal risk of airborne dust generation. See Attachment 2 for past airborne monitoring results.
- Broken beryllium articles such as beryllium windows or beryllium enclosures must be handled with care to avoid injury from sharp pieces and to avoid dispersal of any beryllium dust
- Workers must don gloves before collecting large pieces by hand. Thicker gloves, such as neoprene, or cotton with a disposable glove underneath, should be selected for protection from cuts and punctures. Large pieces should be

placed in a rigid container to avoid injury from sharp edges. Collection with tongs, tweezers, tape or forceps is preferable.
- Surfaces, and any cracks or small openings should be vacuumed with a HEPA filtered vacuum (available from the NSLS User Shop Manager).
- Contaminated surfaces should be wiped with alcohol soaked rags after collection of large pieces and vacuuming to remove smaller pieces and any dust.

4.2.2 Oxidized Beryllium Surfaces, and Burned/Melted Electrical Contacts

- Oxidized beryllium articles must be handled with care to avoid dispersal of any beryllium dust.
- When practical, the oxidized equipment should be moved to a clear area such as a fume hood for the cleanup. Access to the area should be restricted to those personnel involved in the cleaning.
- Workers must don disposable nitrile or neoprene gloves and clean surfaces with solvent soaked rags, cotton, cotton swabs, or gauze. Isopropyl or ethyl alcohols are the preferred solvents. Workers must be careful to minimize the potential creation of airborne beryllium dust. Contact the Safety & Health Representative for guidance on glove selection.
- Secondary containment trays or adsorbent pads should be used to control any surface contamination that may result from the cleaning operation.

5.0 Wastes

- Waste beryllium articles, Cu/Be materials, beryllium cleanup wastes, and beryllium contaminated items must be disposed through the BNL Waste Management Facility of the Environmental Protection Division.

- Solvent soaked rags must be disposed through the BNL Waste Management Facility of the Environmental Protection Division.

Attachment 1 Documentation & List of NSLS Beryllium Use Review Forms

Attachment 2 NSLS Negative Exposure Assessment for Beryllium Cleanup Activities

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PRM Table of Contents

Document Review Frequency	3 Years

Review signatures on file with master copy of controlled document

LIGHT SOURCES DIRECTORATE REVISION LOG	
Document Number:	LS-ESH-PRM-2.6.0
Subject:	**BERYLLIUM MANAGEMENT**

> See NSLS Quality Control Coordinator for original revision and review signatures <

REVISION TABLE

Rev	Description	Date
1	Original Document, Changed PRM number to 2.6.0 from 6.30. Changed requirements to coincide with new SBMS Subject Area Major revisions. Clarified requirement for Work Permit for spill cleanup. Required labeling of all Beryllium articles in storage, changed glove requirement for cleanup to nitrile. Added Attachments for Negative exposure assessment and reference to MOU with Waste Management for cleanup. In response to ATS 4567.8.1 Clarified training requirements. Clarified need for work planning for cleanup of broken beryllium articles.	01/28/10