ACCELERATOR SAFETY ENVELOPE

SOURCE DEVELOPMENT LAB (SDL)

OCTOBER 01, 2010

LS-SDL-0019; REV D

PREPARED BY ACKERMAN, KELLEY, & STIEGLER

Xijie Wang, SDL Manager — Date: 9/13/2010

Andrew Ackerman, NSLS ESH&Q Manager — Date: 9/7/10

Lori Stiegler, NSLS ESH Committee — Date: 9/7/10

James Murphy, NSLS Assoc. Chair for Accelerator — Date: 9/7/10

Erik Johnson, NSLS Chairman (interim) — Date: 7 September 2010

Steven Dierker, ALD for Light Sources — Date: 9/10/10

Michael Bebon, Deputy Director of Operations — Date: 9/23/10

1 Introduction

This Accelerator Safety Envelope (ASE) governs the operation of the Source Development Laboratory or SDL), including the photoinjector, linear accelerator, transport lines, Free Electron Laser (FEL) and beam stops. The controls are derived from analysis within the SDL Safety Assessment Document (SAD).

System operation that exceeds the limits or fails to meet the credited control requirements established by this document is considered an ASE violation and will result in immediate termination of the activity by line management and prompt notification to Department of Energy-Brookhaven Site Office (DOE-BHSO), Brookhaven National Laboratory (BNL), SDL and National Synchrotron Light Source (NSLS) management personnel. Violations will be analyzed as dictated by BNL SBMS policy. Activity restart is managed and authorized by NSLS and SDL line management. DOE-BHSO personnel must be notified before restart.

Restart of any activity terminated by order from the DOE-BHSO staff will be managed and authorized by that office.

Un-reviewed Safety Issues (USI) are managed through application of the BNL institutional SBMS process. SBMS requirements dictate analysis and document revision needs for new issues, not addressed in the SAD, that arise either from planning or discovery.

This document is maintained and revision controlled within the NSLS configuration management system.

2 Safety Envelope Limits

The operation of the SDL must be carried out in a manner that ensures conformance to the following ALARA safety envelope limits:

2.1 For personnel working at the SDL, the annual personal radiation dose equivalent received resulting from accelerator operations shall not exceed 1250 mrem unless approved by line management.

3 Operational Limits

Change control for accelerator components that impact the limits below is managed through the BNL SBMS Unreviewed Safety (USI) Issue process.

3.1 The allowed Maximum Electron Beam Energy is 300 MeV.
[*Ref.* SAD 4.6 and 3.4]

3.2 The allowed Maximum Average Current is 20 nA for electron beam energies higher than 30 MeV.
[*Ref.* SAD 4.6 and 3.4]

4 Required Credited Controls; Engineered

For operation with electron beam, the following engineering control programs must be implemented and each must be documented, meet applicable BNL SBMS requirements, and be line management approved.

4.1 A personnel protection interlock program for radiation and laser hazard control that establishes SDL system specific operation requirements.
[*Ref.* SAD 3.5.2, 4.5.3, and 4.6, App 3]

Verifiable program elements:

- Six month system validation interval satisfied (not to exceed eight months).
- Access controls must always be satisfied.

4.2 An SDL specific active area radiation monitor program configured to warn personnel of elevated levels and to provide for alarm response.
[*Ref.* SAD 4.6 and App 3].

Verifiable program elements:

- Monitoring at all three designated locations.
- System alarm response procedures.
- Annual monitor calibration (not to exceed 15 months).

4.3 A radiation protection configuration control program that establishes SDL system specific shielding and change control requirements.
[*Ref.* SAD 3.5.1]

Verifiable program element:

- Completed shielding configuration checklist.

5 Required Credited Controls; Administrative

For operation with electron beam, the following administrative control program must be documented, meet applicable BNL SBMS requirements, and be line management approved.

5.1 One qualified operator must be available within the SDL facility (Building 729) at all times.
[*Ref.* SAD App 3]

Verifiable program elements:

- Attendance tracking.
- Qualified operator.

file with LS-SDL-0019-D

Deputy Director for Operations

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September 21, 2010

SUBJECT: Request for Approval of Source Development Laboratory Accelerator Safety Envelope (ASE) dated October 1, 2010

Dear Mr. Holland:

I concur with the Laboratory ESH Committee (LESHC) recommendation to approve the Source Development Laboratory (SDL) ASE.

I am submitting this ASE to the Brookhaven Site Office for review and approval. Attached are relevant files to assist you, including the approved SDL SAD.

Kind regards,

Michael J. Bebon, PE
Deputy Director, Operations

Attachments:

1. Recommendation Memorandum from the LESHC
2. Signed copy of Source Development Laboratory ASE dated Oct. 1, 2010
3. Signed copy of Source Development Laboratory SAD dated Oct. 1, 2010

Copy to:

A. Ackerman, C. Conrad, S. Dierker, G. Goode, E. Johnson, S. Kane, E. Lessard, J. Murphy, E. Nowak, G. Shepherd, L. Stiegler, X. Wang,

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Memo

date: *September 20, 2010*

to: *M. Bebon, Deputy Director for Operations and G. Goode, Interim ALD for ESH*

from: *E. Lessard, Chair, Laboratory ESH Committee (LESHC)* ETL

subject: *Request to Approve Source Development Laboratory (SDL) Safety Documents*

The Laboratory ESH Committee (LESHC) recommends that you approve the 10/1/2010 Source Development Laboratory (SDL) SAD and ASE.

As background, in September 2009 the SAD was approved, and BHSO granted a one year interim approval of the ASE until September 30, 2010. BHSO provided comments that the ASE be rewritten to provide more clarity and include a better definition of credited controls with references to the relevant sections of the SAD supporting these credited controls. The ASE was rewritten to address BHSO's September 2009 comments, and sections of the SAD were rewritten as follows: (1) a discussion summarizing the hardware capability was added to SAD Sec. 4.6 providing configuration control as the means for verifying the physical operational limits for beam energy and average beam current in the ASE, (2) two risk assessments were added to SAD Appendix 3 to support credited controls for the Maximum Credible Incident that involved the potential for personnel exposure from a prompt ionizing radiation field resulting from loss of charge from the accelerated electron beam, and (3) Chapter 5, ASE Development Basis, was rewritten.

The LESHC reviewed documents dated July 28, 2010 at our meeting of August 5, 2010. As documented in our Meeting Minutes (LESHC 10-09, attached), the Committee recommended approval of the SDL SAD and ASE, subject to the conditions outlined in Section 2 of the Minutes and listed below:

2.1.1 Incorporate into the ASE and SAD the comments and editorial changes offered by the Committee during the meeting. Complete.

2.1.2 Submit the final August 2010 SDL SAD and ASE to the LESHC Secretary for verification that the changes have been made. Complete.

These Conditions have been completed to the Committee's satisfaction, and the Committee recommends your approval of the SDL SAD and ASE dated 10/1/2010. Post dating these authorization basis documents is requested by NSLS but it has no impact on safety in my opinion.

The LESHC recommends that you forward both the approved SDL SAD and ASE to the Brookhaven Site Office for review. In accordance with DOE Order 420.2B, Safety of Accelerator Facilities, DOE approval of the SAD is not required. However, the related ASE requires approval by the DOE.

Copy to: Committee Members, Meeting Attendees, S. Dierker, E. Johnson, J. Murphy, E. Nowak
Attachments: Approved LESHC 10-09 Minutes, SDL SAD and ASE

file with LS-SDL-0019-D

Department of Energy
Brookhaven Site Office
P.O. Box 5000
Upton, New York 11973

SEP 30 2010

Mr. Michael J. Bebon
Brookhaven Science Associates, LLC
Brookhaven National Laboratory
Upton, New York 11973

Dear Mr. Bebon:

SUBJECT: APPROVAL OF SOURCE DEVELOPMENT LABORATORY (SDL) ACCELERATOR SAFETY ENVELOPE (ASE)

Reference: Letter from M. Bebon, BSA, to M. Holland, SC-BHSO, Subject: Request for Approval of SDL ASE Dated October 1, 2010, dated September 21, 2010.

The Department of Energy's Brookhaven Site Office has reviewed the request for approval of the SDL ASE. Based on our review, the proposed SDL ASE is approved and is effective as of October 1, 2010.

If you have any questions, please contact Robert Desmarais, of my staff, at extension 5434.

Sincerely,

Michael D. Holland
Site Manager

cc: P. Kelley, SC-BHSO
G. Goode, BSA
E. Johnson, BSA
S. Kane, BSA
E. Lessard, BSA
A. Ackerman, BSA
L. Stiegler, BSA

Document Review Frequency	
5	Years

Review signatures on file with master copy of controlled document

LIGHT SOURCES DIRECTORATE REVISION LOG

Document Number:	LS-SDL-0019
Subject:	Source Development Laboratory Accelerator Safety Envelope

Rev	Description	Date
A	First Issue	10/5/01
B	Changed 'SDL' to 'DUV-FEL" Links to new procedures added Rev. A sections 4.5 & 4.6 deleted Rev. A section 4.7 moved to Rev. B section 5.5 All references to 230 MeV changed to 300 MeV Rev. A section 5.4 deleted Rev. B section 5.4 enhanced to refer to new procedure	10/1/04
C	Changed 'DUV-FEL' to 'SDL' Added allowance for 15 month calibration frequency	10/1/09
D	Complete rewrite. Clarified credited controls and included SAD references.	10/1/10