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

JAN 30 2017

Ms. Gail Mattson
Brookhaven Science Associates, LLC
Brookhaven National Laboratory
Upton, New York 11973

Dear Ms. Mattson:

SUBJECT: APPROVAL OF THE REVISED ACCELERATOR SAFETY ENVELOPE (ASE) FOR THE NATIONAL SYNCHROTRON LIGHT SOURCE II (NSLS-II)

Reference: Letter from G. Mattson, BSA to F. Crescenzo, SC-BHSO, Subject: Request BHSO's Approval of the USI No. NSLS-II EVAL-2017-001, "PPS Functional Testing and Recertification/Revalidation Interval Change from Every Six Months to Twelve Months", dated January 23, 2017

The Department of Energy (DOE) Brookhaven Site Office (BHSO) has reviewed your request for approval of the revised NSLS-II ASE. The ASE revision changes the recertification and revalidation time interval of the Personal Protective System from every six months to every twelve months in accordance with the Brookhaven National Laboratory Internal Waiver granted by the Radiological Control Division. Based on the analysis presented in the waiver and the Unreviewed Safety Issue, BHSO approves the ASE revision.

If you have any questions please contact Patrick Sullivan, of my staff, at extension 4092.

Sincerely,

Frank J. Crescenzo
Site Manager

cc: M. Dikeakos, SC-BHSO
R. Gordon, SC-BHSO
P. Sullivan, SC-BHSO
R. Lee, BSA
C. Schaefer, BSA

ACCELERATOR SAFETY ENVELOPE (ASE)

NSLS–II

SUBMITTED: _____ 01/17/2017
Steven Moss DATE
National Synchrotron Light Source II – Preparer
Brookhaven National Laboratory

SUBMITTED: _____ 01/18/2017
Timor Shaftan DATE
National Synchrotron Light Source II – Interim Accelerator Director
Brookhaven National Laboratory

SUBMITTED: _____ 18 JAN 2017
Paul Zschack DATE
National Synchrotron Light Source II – Photon Science Director
Brookhaven National Laboratory

APPROVAL: _____ 1/18/17
John Hill DATE
National Synchrotron Light Source II - Director
Brookhaven National Laboratory

APPROVAL: _____ S. Coleman for G. Mattson 1/24/17
Gail Mattson DATE
ES&H Directorate – Associate Laboratory Director
Brookhaven National Laboratory

This document is associated with the revised NSLS-II SAD dated May 2015, as modified by USI No.: NSLS-II-EVAL-2015-004, Rev. 1, USI No.: NSLS-II-EVAL-2016-005 and by USI No.:NSLS-II-EVAL-2017-001.

BROOKHAVEN NATIONAL LABORATORY

VERSION CONTROL SHEET

VERSION	DESCRIPTION OF ANY CHANGES	DATE	PREPARER	APPROVED BY
1	Initial Issue	May 2014	William Casey	Steve Dierker / Gail Mattson
2	Includes Top-Off Operations	May 2015	Steven Moss	John Hill / Gail Mattson
3	Re-states Stored Beam Lower Energy Limit	November 2015	Steven Moss	John Hill / Gail Mattson
4	Authorized Alternative for Lower Limit on Minimum Injected Electron Energy to Booster When Operational Conditions Require	June 2016	Steven Moss	John Hill / Gail Mattson
5	Extends PPS function testing and revalidation interval	January 2017	Steven Moss	John Hill / Gail Mattson

SECTION 1 INTRODUCTION

This Accelerator Safety Envelope (ASE) document defines the Credited Controls that are established for the NSLS–II Accelerator Facility to ensure safe operations and to minimize the potential accelerator–related risks to the public, workers and environment. The basis behind each of the credited controls is described in Section 5 of the associated Safety Assessment Document.

1.1 A deviation from the Credited Controls and their Supports, which are described below, must be treated as a violation of the ASE and must be treated as a reportable occurrence, as defined by the BNL SBMS subject area on Occurrence Reporting. Not satisfying a Credited Control, its Supports, or its Authorized Alternative constitutes a violation.

1.2 If a Credited Control or its Supports are not satisfied and the Control has a specific Authorized Alternative, then NSLS-II Management will take immediate action to implement the Authorized Alternative or stop the activity that uses the affected equipment as soon as practicable.

1.3 If a Credited Control or its Supports are not satisfied and have no specific Authorized Alternative, then NSLS-II Management will stop the activity that uses the affected Credited Control as soon as practicable.

1.4 Any proposed modification to the NSLS–II that impacts the credited controls described in the ASE must first undergo a USI determination. A positive USI and/or any change to the ASE requires Laboratory management and DOE approval. These approvals must occur prior to making the modifications to the NSLS–II Facility.

1.5 The term "approved configuration" refers to the approved SAD and any associated USIs.

SECTION 2 CREDITED CONTROLS

2.1 CREDITED CONTROLS FOR MCI

2.1.1 Credited Controls for Linac Maximum Credible Incident

The following limits are the maximum beam energy and electron current that the NSLS–II Linac may operate.

2.1.1.1 The maximum electron charge shall not exceed 360 μC integrated over one hour as measured by an Accumulating Charge Monitor Interlock (ACMI) located immediately downstream of the fourth accelerating cavity.

2.1.1.2 The maximum electron energy shall not exceed 250 MeV.

2.1.1.3. Authorized Alternative: If the ACMI is unavailable the injected charge shall continue to be monitored using the LtB IT1 current transformer and at least one of the following diagnostics devices located within the Linac transport line (i.e., faraday cups in the beam dumps or LtB IT2).

2.1.2 Credited Controls for Booster Maximum Credible Incident

The following limits are the maximum beam energy and electron current that the NSLS–II Booster may operate.

2.1.2.1 The maximum electron charge shall not exceed 90 μC integrated over one hour as measured by an ACMI located immediately downstream of the fourth accelerating cavity of the Linac.

2.1.2.2 The maximum electron energy shall not exceed 3.2 GeV.

2.1.2.3 The minimum injected electron energy shall be 150 MeV.

2.1.2.4 Authorized Alternative: In the event that operational conditions require (e.g., only one available klystron) and for the purposes of associated studies, the minimum injected electron energy shall be 90 MeV.

2.1.3 Credited Controls for Storage Ring Maximum Credible Incident

The following limits establish the operational envelope for Storage Ring operation that may not be exceeded.

2.1.3.1 The maximum electron charge shall not exceed 54 μC integrated over one hour as measured by an ACMI located in the Booster to Storage Ring (BtS) transport line. The maximum electron charge stored within the Storage Ring shall not exceed 2.6 μC (2600 nC) at 3.3 GeV.

2.1.3.2 The maximum stored electron energy shall not exceed 3.3 GeV.

2.1.3.3 Injection to the Storage Ring shall be prohibited if the storage ring dipole current is outside of the range which corresponds to 2.8 GeV to 3.3 GeV beam energy.

2.1.3.4 The minimum electron energy transported to the Storage Ring shall be equal to or greater than 2.0 GeV.

2.1.4 Credited Controls for Top-Off Operation MCI

Top-Off Operation shall be defined as the mode of operation when it is desired to inject electrons into the Storage Ring with the photon shutters open.

2.1.4.1 During Top-Off Operation, the maximum electron charge injected into the Storage Ring shall not exceed 2.7 μC integrated over one hour as measured by an ACMI located in the BtS transport line and an ACMI immediately downstream of the fourth accelerating cavity of the Linac.

2.2 Credited Controls for Radiation Hazard

There are a number of credited controls which are required to maintain the radiological consequences within bounds of the MCI. Except as designated, these apply to the operation of all accelerators and beamlines:

2.2.1 Each accelerator and beamline when operational must have its Personnel Protection System (PPS) and associated barriers, including gates, fencing, and berms, and the area radiation monitoring system operational and certified in compliance with the approved procedure. The relevant PPS must be operational during testing of RF cavities.

2.2.2 All required radiological shielding for an area must be in place and certified in compliance with the approved inspection procedure during operation of that area with the radiation hazard.

2.2.3 All required burn-through devices must be in place and certified in compliance with an approved inspection procedure during operation of a front-end with the radiation hazard.

2.2.4 At least one qualified, trained operator shall be on-duty during operation of the accelerators with electron beam.

2.2.5 All required TOSS apertures for approved front ends must be in place and certified in compliance with the approved inspection procedure during Top-Off Operations within that area.

2.3 Credited Controls for Oxygen Deficiency Hazards

The following credited control for oxygen deficient atmospheres within the experimental enclosures has been identified.

- Experimental enclosures equipped with liquid nitrogen supplied directly by the main LN2 distribution system or if determined by analysis to present an ODH hazard will have an oxygen monitoring and alarm system installed. The alarm system will sound inside and outside the enclosure to warn workers of the potential for oxygen deficiency.

2.3.1 Authorized Alternative: In the event the oxygen monitoring system becomes inoperable all staff working within the enclosures will be alerted with the use of personal oxygen monitors or other approved oxygen monitoring device (e.g. Multi gas detector).

SECTION 3 CREDITED CONTROL SUPPORTS

This section identifies the Supports for Credited Controls and their observable parameters that ensure that accelerator operations comply with the Credited Controls in Section 2.

Required Supports for Credited Controls

During RF operations with the accelerating structures or operations with electron and photon beam:

3.1 All required shielding and burn-through devices specified for the start–up of each accelerator or beamline shall be maintained in its approved configuration during operation and properly restored after maintenance periods.

3.2 The accelerators and beamline PPS and associated barriers shall be maintained in its approved configuration.

3.3 The area radiation monitoring system interfaced with the PPS for an area that is operational with beam shall be maintained in its approved configuration (Beam requirement only).

3.4 The polarity of the Booster ring dipoles, the Booster–to–Storage Ring transport line dipoles and all Storage Ring dipole magnets (not including corrector dipoles) must be confirmed to be correct and subject to a formal configuration control program (Beam requirement only).

3.5 All new beamline front ends, and modifications to existing beamline front ends must be approved for Top-Off operation by designated Top-Off Technical Authority, in accordance with procedure, prior to enabling the beamline during Top-Off operation. Top-Off must be disabled prior to enabling any beamline that is not yet approved for Top-Off (Beam requirement only).

SECTION 4 CALIBRATION, TESTING, MAINTENANCE AND INSPECTION THAT MAINTAIN CREDITED CONTROLS

The calibration, testing, maintenance or inspections needed to maintain Credited Controls are:

4.1 All PPS must be functionally tested and revalidated every 12 months, not to exceed 15 months to permit variances in the operations schedule.

4.2 Area radiation monitors must undergo annual calibration. The time between annual calibrations shall not exceed 15 months.

4.3 Following all major shutdowns (>15 days), radiological shielding and barriers (berms, shield blocks and fencing) must undergo visual inspection prior to operations to ensure that all required elements are in place and functional.

4.4 TOSS Credited Aperture locations must be certified biennially (every two years). The time between certifications shall not exceed 30 months.

4.5 Oxygen monitors must undergo annual testing; the maximum time between testing must not exceed 15 months. Authorized alternative devices will also be routinely tested (e.g., functional check monthly)

– End –