BELLA Center Accelerator Safety Self-Assessment Guide

Date of Assessment:_____

Participants:_____

Scope: Every 3 years, BELLA Center must demonstrate that our self-assessment processes provide an adequate review of our safety systems and compliance with the Accelerator Safety Order. The most recent triennial review was in **November 2013**. The purpose of our annual BELLA Center Accelerator Safety Self-Assessment is to maintain our safety systems and help prepare for the next triennial review by identifying any needs for updating documents or resolving safety issues. The assessment scope should include a review of the results of EHS surveillance and a summary of institutional assurance activities reviewed by the Accelerator Readiness Safety Committee since November 2013, referring to the relevant sections of the following documents as needed:

- DOE Order 420.2C
- EHS 703, Institutional Assurance of Accelerator Safety
- EHS 703.1 Documentation for Accelerator Safety Order Compliance Activities
- Safety Assessment Document for Routine Operation, LOASIS Facility (LOASIS LPA SAD)
- BSO LOASIS Accelerator Review (LOASIS LPA ASE)
- RSC Report for the Review of the Personnel Protection System for the LOASIS LPA 4/24/2011
- Safety Assessment Document for Routine Operation, BELLA Facility (BELLA SAD)
- BSO BELLA Accelerator Review (BELLA ASE)

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Required safety analysis and credited controls	**Assurance Mechanism/ Data Source for LOASIS LPA**	**Assurance Mechanism/ Data Source for BELLA**	**Changes / Actions Needed**
1) A documented ASE must define the physical and administrative bounding conditions and controls for safe operations based on the safety analysis documented in the SAD. (DOE Order 420.2C, CRD, 1 ASE #1)	The LOASIS LPA ASE was submitted to BSO in 2010, and conditionally approved on 1/03/2011. A revised ASE has been submitted on 2/28/2011 w/closure of Conditions of Approval, and it was approved on 4/08/2011.	The BELLA ASE was submitted to BSO in May 2012, and it was approved on 6/7/2012.	
2) The ASE must be submitted to DOE for approval and may be submitted as a separate document from the SAD. (DOE Order 420.2C, CRD, 1 ASE #1)	The LOASIS LPA ASE was submitted to BSO and was approved.	The BELLA ASE was submitted to BSO and was approved.	
3) A SAD represents the technical basis for the ASE, is maintained current and must: a. identify hazards and associated onsite and offsite impacts to workers, the public, and the environment from the facility for both normal operations and credible accidents; (DOE Order 420.2C, CRD, 1 SAD #2)	The SAD was submitted to BSO in 2010.	The SAD was submitted to BSO in 2012.	*Updated SAD waiting for Wim Leemans' signature (new version with BELLA Center and new Division Director)*

4) b. contains sufficient descriptive information and analytical results pertaining to specific hazards and risks identified during the safety analysis process to provide an understanding of risks presented by the proposed operations; (DOE Order 420.2C, CRD, 1 SAD #2)	The SAD contains sufficient descriptive information and analytical results.	The SAD contains sufficient descriptive information and analytical results.	
5) c. provide detailed descriptions of engineered controls (e.g., interlocks and physical barriers) and administrative measures (e.g., training) taken to eliminate, control, or mitigate hazards from operation; (DOE Order 420.2C, CRD, 1 SAD #2)	The SAD contains detailed descriptions of engineering controls and expected results.	The SAD contains detailed descriptions of engineering controls and expected results.	
6) d. include or reference a description of facility function, location, and management organization in addition to details of major facility components and their operation. (DOE Order 420.2C, CRD, 1 SAD #2)	The SAD contains description of the accelerator components and operations.	The SAD contains description of the accelerator components and operations.	

7) Appropriate documentation shall be developed to authorize operations at an accelerator facility as defined in DOE O 420.2C (EHS 703.1 Documentation for Accelerator Safety Order Compliance Activities, 1.2 Scope)	The SAD follows 420.2B, and is in compliance with revision C.	The SAD follows 420.2B, and is in compliance with revision C.	
8) The SAD and ASE shall be developed by the accelerator program division, which has line management responsibility for the accelerator. (EHS 703.1 Documentation for Accelerator Safety Order Compliance Activities, 5.4 SAD/ASE Development)	The SAD and ASE include descriptions of responsibilities for the division and line managers.	The SAD and ASE include descriptions of responsibilities for the division and line managers.	
9) The SAD and ASE must follow the format established in the IG. Deviation from this format must be approved by the RPG prior to submission of the document for institutional approval (described in EHS Procedure 703)	The SAD and ASE follow the format established in the DOE Office of Inspector General (IG).	The SAD and ASE follow the format established in the DOE Office of Inspector General (IG).	

10) The RSC staffs the ARSC to prepare for the activity. The RSC, in conjunction with RCM, must document a formal charge for each ARSC. (EHS 703, Institutional Assurance of Accelerator Safety Order Compliance, 5.3.2 Institutional Assurance for Nonroutine Assurance Activities)	n.a.	n.a.	
11) DOE comments received on SADs and ASEs must be reviewed and responded to by the RCM and the cognizant accelerator program division. Formal responses to DOE comments must be forwarded through the RCM via the EHS Division Office to DOE. (EHS703, Institutional Assurance for of Accelerator Safety Order Compliance, 5.3.2 Institutional Assurance for Nonroutine Assurance Activities)	n.a.	n.a.	

12) If the SAD review indicates that it adequately addresses all safety hazards, but minor changes are needed for improved documentation, then an administrative update may be issued to the current version of the SAD. This process does not require institutional assurance or ASE review; however, copies of the update must be provided to the RCM and BSO (courtesy copy within thirty (30) days of the update. (EHS 703, Institutional Assurance of Accelerator Safety Order Compliance, 5.3.3 Institutional Assurance for Activities Required on a Defined Interval SAD/ASE Review)	Update of the SAD was in progress (2013 Nov), focusing on harmonization of the LOASIS LPA and BELLA accelerators; copies of the updates to be provided to RCM and BSO after finishing the updates.	Update of the SAD was in progress (2013 Nov), focusing on harmonization of the LOASIS LPA and BELLA accelerators; copies of the updates to be provided to RCM and BSO after finishing the updates.	*Updated SAD waiting for Wim Leemans' signature*

13) The ASE is reviewed and approved by the DOE Berkeley Site Office (BSO). Any activity violating the ASE must be terminated immediately and DOE / BSO must be promptly notified of the violation and are treated as reportable occurrences. (LOASIS SAD, Section 5.1 Introduction, Accelerator Safety Review)	The LOASIS LPA ASE was submitted to BSO in 2010, and conditionally approved on 1/03/2011. A revised ASE has been submitted on 2/28/2011 w/closure of Conditions of Approval, it was reviewed by BSO, and approved on 4/08/2011.	The BELLA ASE was submitted to BSO in May 2012. It was reviewed by BSO and approved on 6/7/2012.	

Implementation Procedures	**Assurance Mechanism/ Data Source for LOASIS LPA**	**Assurance Mechanism/Data Source for BELLA**	**Changes / Other Actions Needed**
14) As part of the ARR process, the contractor must demonstrate to the satisfaction of the Field Element Manager that the following processes are in place: a. A Contractor Assurance System that maintains an internal assessment process (DOE Order 420.2C, CRD, 1 ARR #4)	The current Triennial Review of the LOASIS LPA constitutes as part of the internal assessment process of the CAS	The current Triennial Review of BELLA constitutes part of the internal assessment process of the CAS	*Add QUEST workplace assessment and Accelerator self-assessment*
15) b. A Facility Configuration Management Program that is related to accelerator safety; (DOE Order 420.2C, CRD, 1 ARR #4)	Approved and current LOASIS-BELLA Configuration Control Policy and Checklists.	Approved and current LOASIS-BELLA Configuration Control Policy and Checklists.	*Review configuration control for this year's events*

16) c. Credited controls and appropriate administrative processes related to accelerator safety (e.g. training, procedures, etc.). (DOE Order 420.2C, CRD, 1 ARR #4)	Approved and current LOASIS Procedures related to Accelerator Safety: LSP04_Site-SpecificTraining LSP-05_Procedure Format; EC-02r4_Search & Clear; EC-01r7_Interlock Checklist	Approved and current BELLA Procedures related to Accelerator Safety: Procedure on Procedures – BOP-00; Procedure on Search & Secure - BOP-10; Procedure on PPS Annual Review - BOP-11; Procedure on Training - BOP-12; Procedure on EIC Training - BOP-12-Appx-2;	
17) The RCM must be provided with copies of all USI screens performed by an accelerator program division. (EHS 703, Institutional Assurance of Accelerator Safety Order Compliance, 5.3.4 Assured Compliance with Unreviewed Safety Issue Requirements)	Copies of all USI screenings have been provided to RCM, log maintained of total 6 USIs during review period (see Appendix)	Copies of all USI screenings have been provided to RCM, log maintained of total 3 USIs during review period (see Appendix)	*Verify this year's USIs have been resolved.*

18) If a potential safety-related discrepancy between the facility and the safety analysis is discovered it shall be documented. (EHS 703.1 Documentation for Accelerator Safety Order Compliance Activities Attachment E)	No discrepancy has been discovered.	No discrepancy has been discovered.	
19) A potential increase in consequences shall be evaluated by comparing the anticipated consequences of an accident with the consequences of a same or similar "family" of accident that has already been analyzed. (EHS 703.1 Documentation for Accelerator Safety Order Compliance Activities Attachment E, Q2)	No increase in consequences has been found.	No increase in consequences has been found.	

20) Procedures required by the ASE are present, approved and current. (DOE G 420.2-1 reference .II A. 5)	LOASIS Procedures required by the ASE are present, approved and current: - EC-02r4_Search & Clear; - EC-01r7_Interlock Checklist; - LOASIS-BELLA Configuration Control Policy and Checklists	BELLA Procedures required by the ASE are present, approved and current: - Procedure on Search & Secure - BOP-10; Procedure on PPS Annual Review - BOP-11; LOASIS-BELLA Configuration Control Policy and Checklists	*Also review other QA procedures. Verify all current. Use cover sheet if no revision.*
21) Beam interlock systems are established to prevent personnel exposure. (DOE G 420.2-1 reference I. B. 3a)	LOASIS LPA beam interlock systems designed, reviewed, approved, installed, verified and validated to prevent personnel exposure.	BELLA beam interlock systems designed, reviewed, approved, installed, verified and validated to prevent personnel exposure	
22) Beam interlock systems are maintained and tested using an approved procedure. (DOE G 420.2-1 reference II. B. 3a)	LOASIS Procedure: EC-01r7_Interlock Checklist; tests performed annually	BELLA Procedure on PPS Annual Review - BOP-11; tests performed annually	

23) Controlled Access to exclusion areas, if allowed, is authorized utilizing approved procedures. (DOE G 420.2-1 reference II. B. 3a)	Access to exclusion areas is not allowed	Access to exclusion areas is not allowed	

Effectiveness of Procedures	Assurance Mechanism / Data Source for LOASIS LPA	Assurance Mechanism / Data Source for BELLA	Changes / Actions Needed
24) How effective is the shielding? Does it meet the Shielding Policy; Is it ALARA; Does monitoring confirm shielding calculations? (LOASIS & BELLA ASE – RWA requirements)	Shielding effectively contains radiation during LOASIS LPA experiments, proven by on-line telemetry based on monitoring radiation detectors installed inside and outside of TEA	Shielding effectively contains radiation during BELLA experiments, proven by on-line telemetry based on monitoring radiation detectors installed inside and outside of TEA	
25) How well does the LOASIS-BELLA Shielding Control Procedure work? (LOASIS & BELLA ASE – OP 02-01)	18-month monitoring implemented, (last occurrence in Jan 2014; next in June 2015)	18-month monitoring will be implemented last occurrence in Jan 2014; next in June 2015)	
26) How effective are the LOASIS-BELLA interlocks? (LOASIS &BELLA ASE)	LOASIS LPA Interlock systems provide effective protection of workers via locking out the TEA during experiments and activating shutters if elevated radiation observed by monitoring detectors	BELLA Interlock systems provide effective protection of workers via locking out the TEA during experiments and activating shutters if elevated radiation observed by monitoring detectors	

27) How well do the LOASIS-BELLA interlock procedures work (design and work control)? (LOASIS &BELLA ASE)	LOASIS LPA Interlock procedures are developed via close collaboration with the LBNL interlock engineer and regularly reviewed, modified, if needed based on annual tests	BELLA Interlock procedures are developed via close collaboration with the LBNL interlock engineer and regularly reviewed, modified, if needed based on annual tests	
28) How effective is the search and secure procedure? (LOASIS &BELLA ASE)	The LOASIS LPA Search and Secure procedure is regularly implemented and effectively locks out workers from the TEA during experiments. All search and secure events are logged.	The BELLA Search and Secure procedure is regularly implemented and effectively locks out workers from the TEA during experiments. All search and secure events are logged.	
29) How well does the Beamline Review process work? (LOASIS &BELLA ASE)	Modification in the beamlines are controlled by the LOASIS-BELLA Configuration the Control Policy and Checklists: several examples show the appropriate review and authorization process (e.g.: addition of Staging beamline)	Modification in the beamlines are controlled by the LOASIS-BELLA Configuration Control Policy and Checklists: examples show the appropriate review and authorization process (e.g.: shielding requirement changes during pre-ARR process)	
[Items 30-34 identification of exempt and non-exempt accelerators not applicable]	n.a.	n.a.	n.a

Recommendations in the LOASIS LPA ASE Acceptance Report -- December 2010	Assurance Mechanism/Data Source for LOASIS LPA	Assurance Mechanism / Data Source for BELLA	Changes/Action Items
35) The accident analysis discussion in section 3.5.1 of the SAD should be relocated to Chapter 4, which provides the safety analysis and provides the technical basis for selection of credited controls. [Review and Acceptance Report (LOASIS LPA ASE, Rev 3), 4.2.1 Recommendations]	Update of the SAD was in progress (2013 Nov); copies of the updates will be provided to RCM and BSO after finishing the updates.	n.a.	*Updated SAD waiting for Wim Leemans' signature*
36) The role of the EIC should be clearly defined in chapter 4. [Review and Acceptance Report (LOASIS LPA ASE, Rev 3), 4.2.2 Recommendations]	Update of the SAD was in progress (2013 Nov); copies of the updates will be provided to RCM and BSO after finishing the updates.	n.a.	*Updated SAD waiting for Wim Leemans' signature*
[37 upper bounding radiological inventory/MAR not applicable]	n.a.	n.a.	n.a.

Recommendations in the LOASIS PPS Review – April 2011	Assurance Mechanism/Data Source for LOASIS LPA	Assurance Mechanism / Data Source for BELLA	Changes/Action Items
[Items 38-41 closed}	n.a.	n.a.	n.a.
42) Circuits identified in the Safety System Design and Implementation section of this report should be evaluated and corrected and the drawings updated to reflect the finished and installed design. (5) (LOASIS PPS review, 4/24/11)	Circuits has been evaluated during the LOASIS Interlock CAP - 2012, Final report: 7/23/2012	n.a.	*Check and verify status*
[Items 43-45 closed]	n.a.	n.a.	n.a.
46) Training to operate or maintain the safety interlock system should be documented. (9) (LOASIS PPS review, 4/24/11)	Training to operate the safety interlock system has been incorporated into RWA-OJT. Specific training and documentation for authorization of Experimenter-in-Charge (EIC) in progress	n.a.	*On-going – check status*

Recommendations in the BELLA ASE Acceptance Report – June 2012	Assurance Mechanism/Data Source for LOASIS LPA	Assurance Mechanism / Data Source for BELLA	Changes/Action Items
47) Include the administrative control establishing the upper bounding radiological inventory as less than thresholds defined in DOE STD 1027-92 which constitute a Hazard Category 3 nuclear facility as an initial condition for BELLA. LBNL should consider specifically citing the 500-millicurie limit specified in the hazard table for event 6a. (DOE BSO Review and Acceptance Report (BELLA ASE, Rev 0), 4.2.1 Recommendations)	n.a.	Update of the SAD was in progress (2013 Nov); copies of the updates will be provided to RCM and BSO after finishing the updates.	*Updated SAD waiting for Wim Leemans' signature*
48) Update event 1c in Table 4.2-3 of the SAD to reflect the crash off button as a preventive engineered control rather than a mitigative engineered control. (DOE BSO Review and Acceptance Report (BELLA ASE, Rev 0), 4.2.2 Recommendations)	n.a.	Update of the SAD was in progress (2013 Nov); copies of the updates will be provided to RCM and BSO after finishing the updates.	*Updated SAD waiting for Wim Leemans' signature*

49) Consider revising the consequence discussions to emphasize exposure rates and the timeframes over which the unmitigated consequence to a worker would become unacceptably high rather than giving a “potential dose/exposure”. (DOE BSO Review and Acceptance Report (BELLA ASE, Rev 0), 4.2.3 Recommendations)	n.a.	Update of the SAD was in progress (2013 Nov); copies of the updates will be provided to RCM and BSO after finishing the updates.	*Updated SAD waiting for Wim Leemans’ signature*
50) BSO noted that consequence discussions seemed to have used the terms “rem” and “rad” interchangeably. While this is a minor issue, BSO recommends that future revisions to the SAD ensure the correct terminology is used. (DOE BSO Review and Acceptance Report (BELLA ASE, Rev 0), 4.2.4 Recommendations)	n.a.	Update of the SAD was in progress (2013 Nov); copies of the updates will be provided to RCM and BSO after finishing the updates.	*Updated SAD waiting for Wim Leemans’ signature*