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Status: PROCESSED
Saved: 8/16/2021 8:18:05 AM
Submitted: 8/16/2021 8:18:05 AM



Operational Safety Procedure Review and Approval Form # 119588
(See [ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure \(OSP\) and Temporary OSP Procedure](#) for Instructions)

Type:	OSP Click for OSP/TOSP Procedure Form Click for LOSP Procedure Form Click for LOTO-COMPLEX Information Click for LOTO-GROUP Information		
Serial Number:	ENP-21-119588-OSP		
Issue Date:	8/28/2021		
Expiration Date:	7/28/2024		
Title:	Super Big Bite and Corrector Magnets' Power Supplies		
Location: (where work is being performed) Building Floor Plans	101 - Experimental Hall A - A100 85 - Machine Control Center (MCC) - 104	Location Detail: (specifics about where in the selected location(s) the work is being performed)	Operation of the Hall A magnets from a workstation in MCC
Risk Classification: (See ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment)	Without mitigation measures (3 or 4):		3
	With mitigation measures in place (N, 1, or 2):		1
Reason:	This document is written to mitigate hazard issues that are : New/previously unrecognized Hazard Issue Determined to have an unmitigated Risk code of 3 or 4		
Owning Organization:	PHALLA		
Document Owner(s):	Flay, David (flay@jlab.org) Primary Roblin, Yves (roblin@jlab.org) Benesch, Jay (benesch@jlab.org)		

Supplemental Technical Validations

Mode 2: Class 2 and 3 Equipment (Phillip Stanley, Tim Fitzgerald)
Radiological Controlled Area (Adam Hartberger, David Hamlette, Keith Welch)
ESH&Q Liasion (Bert Manzlak)

Other Hazards:
Beam operations (Yves Roblin)
Beam operations (Jay Benesch)
Mag field modeling (David Flay)
Mag field modeling (Bogdan Wojtsekhowski)
Beam operations (Todd Satogata)

Document History

Revision <input type="checkbox"/>	Reason for revision or update <input type="checkbox"/>	Serial number of superseded document <input type="checkbox"/>
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Lessons Learned

[Lessons Learned](#) relating to the hazard issues noted above have been reviewed.

Comments for reviewers/approvers:

08/16/2021: Addressed comments from Phillip Stanley.

Attachments

Procedure: *sbs_power_supply_osp_rev_1.pdf*
 THA: *sbs_power_supply_tha_rev_1.pdf*
 Additional Files:

Review Signatures

Additional Authorization : Associate Director - ESH&Q	Signed on 8/16/2021 8:21:28 AM by Steven Hoey (hoey@jlab.org)
Person : Subject Matter Expert : Beam operations	Signed on 8/16/2021 8:31:31 AM by Todd Satogata (satogata@jlab.org)
Person : Subject Matter Expert : Beam operations	Signed on 8/16/2021 8:32:30 AM by Jay Benesch (benesch@jlab.org)
Person : Subject Matter Expert : Beam operations	Signed on 8/23/2021 1:14:43 PM by Yves Roblin (roblin@jlab.org)
Person : Subject Matter Expert : Mag field modeling	Signed on 8/17/2021 9:30:10 AM by David Flay (flay@jlab.org)
Person : Subject Matter Expert : Mag field modeling	Signed on 8/16/2021 9:01:19 AM by Bogdan Wojtsekhowski (bogdanw@jlab.org)
Subject Matter Expert : Electricity->Mode 2: Class 2 and 3 Equipment	Signed on 8/16/2021 12:08:46 PM by Phillip Stanley (pstanley@jlab.org)
Subject Matter Expert : Radiation - Ionizing->Radiological Controlled Area	Signed on 8/16/2021 9:41:18 AM by Keith Welch (welch@jlab.org)

Approval Signatures

Division Safety Officer : PHALLA	Signed on 8/23/2021 2:19:46 PM by Ed Folts (folts@jlab.org)
ESH&Q Division Liasion : PHALLA	Signed on 8/23/2021 1:35:56 PM by Bert Manzlak (manzlak@jlab.org)
Org Manager : PHALLA	Signed on 8/23/2021 4:10:13 PM by Cynthia (Thia) Keppel (keppel@jlab.org)
Safety Warden : Experimental Hall A - A100	Signed on 8/25/2021 8:30:04 AM by Jessie Butler (jbutler@jlab.org)
Safety Warden : Machine Control Center (MCC) - 104	Signed on 8/28/2021 8:36:24 AM by Chris Humphry (chumphry@jlab.org)



Operational Safety Procedure Form

(See [ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure \(OSP\) and Temporary OSP Procedure](#) for instructions.)

Title:	Safe Operation of the Super Big Bite Power Supply and Corrector Magnets' Power Supplies During Commissioning and SBS Experiments		
Location:	Hall A	Type:	<input checked="" type="checkbox"/> OSP <input type="checkbox"/> TOSP
Risk Classification (per Task Hazard Analysis attached) (See ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment.)	Highest Risk Code Before Mitigation		3
	Highest Risk Code after Mitigation (N, 1, or 2):		1
Owning Organization:	Physics	Date:	08/09/21
Document Owner(s):	Jack Segal		

DEFINE THE SCOPE OF WORK

1. Purpose of the Procedure – Describe in detail the reason for the procedure (what is being done and why).
The intent of this procedure is to provide instruction for authorized personnel to safely operate the Super Big Bite Power supply and corrector magnets' power supplies during commissioning and SBS experiments.
2. Scope – include all operations, people, and/or areas that the procedure will affect.
The operation of the Super Big Bite magnet is anticipated to deflect the beam on the beam dump. To correct this deflection two corrector magnets have been installed on the exit beam line in Hall A. One upstream of the Super Big Bite magnet and one downstream of the Super Big Bite magnet. The required currents in the corrector magnets will need to be established for each desired Super Big Bite magnet current setting and physical position. Each corrector magnet has two coils, each powered by an independent power supply. The Super Big Bite magnet has one power supply driving all its coils in series. The currents of all five power supplies will be monitored by a FSD ADC model Y0512 designed by JLAB.
3. Description of the Facility – include building, floor plans and layout of the experiment or operation.
One water cooled 2200 amp, 290 volt DC power supply. Four air cooled 330 amp, 10 volt DC power supplies. All five will be remotely controlled using existing software.

ANALYZE THE HAZARDS and IMPLEMENT CONTROLS

4. Hazards identified on written Task Hazard Analysis
Electrical Magnetic Field Fire Missteering of Beam
5. Authority and Responsibility:
5.1 Who has authority to implement/terminate

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	Yves Roblin, Jay Benesch, Crew Chief
5.2	Who is responsible for key tasks
	Yves Roblin, Jay Benesch
5.3	Who analyzes the special or unusual hazards including elevated work, chemicals, gases, fire or sparks (See ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure)
	Yves Roblin (accelerator operations) Jay Benesch (accelerator operations) Jack Segal (power supplies, electrical) Jessie Butler (Hall A Work Coordinator)
6. Personal and Environmental Hazard Controls Including:	
6.1	Shielding
	Standard Hall A shielding
6.2	Barriers (magnetic, hearing, elevated or crane work, etc.)
	The entire hall is considered a five Gauss zone.
6.3	Interlocks
	The five power supply faults will be interlocked back to EESSAF to prevent beam steering problems. All five power supplies will be configured such that if one supply trips off it will trip off the other power supplies.
6.4	Monitoring systems
	While the power supplies can be monitored through the EPICS GUIs, remote control of the supplies will only be enabled for MCC.
6.5	Ventilation
	<ul style="list-style-type: none"> ● LCW (Low Conductivity Water) ● Free Air (fans integral to the power supplies)
6.6	Other (Electrical, ODH, Trip, Ladder) (Attach related Temporary Work Permits or Safety Reviews as appropriate.)
	None
7. List of Safety Equipment:	
7.1	List of Safety Equipment:
	Machine Protection System
7.1.1	Special Tools:
	The specific procedure for determining the operating parameters for the magnets is being developed by Yves Roblin and Jay Benesch with assistance from David Flay and Bogdan Wojtsekhowski
8. Associated Administrative Controls	
	Standard for beam operations
9. Training	

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9.1 What are the Training Requirements (See List of Training Skills)	
	<ul style="list-style-type: none"> ● Standard training for Accelerator Operators ● Authorization from Yves Roblin and Jay Benesch
DEVELOP THE PROCEDURE	
10. Operating Guidelines	
	Power supplies should be operated within manufacturer's guidelines and agreed upon limits set for the experiment.
11. Notification of Affected Personnel (who, how, and when include building manager, safety warden, and area coordinator)	
	Hall A Run Coordinator. Cell phone: (757) 876-1787 Crew Chief
12. List the Steps Required to Execute the Procedure: from start to finish.	
12.1	Perform pre-job briefing
12.2	Verify that permission to operate the power supplies has been given by the Hall A Work Coordinator
12.3	Energize power supplies and clear any faults
12.4	During commissioning and when beam parameters or the desired SBS magnet settings or physical positions are changed, the allowed beam current will be determined by Accelerator Operations. The parameters for the magnet currents will need to be adjusted by MCC. The SBS and corrector magnets' current FSD's will need to be masked. Yves Roblin, Jay Benesch, or their designee, will raise the currents in the magnets as required to maintain the beam position on the dump. After determining the required magnet currents, the high and low trip points for the magnet currents will be set in the Y0512 FSD ADC. The FSD's for the magnet current will then need to be unmasked.
12.5	Incrementally ramp current to power the magnets and check beam position on the dump
12.6	Also, verify that the current output from the Super Big Bite and corrector magnets power supplies are stable and uniform between power supplies at the momentum settings for the power supplies
13. Back Out Procedure(s) i.e. steps necessary to restore the equipment/area to a safe level.	
	Power down and turn off the power supplies.
14. Special environmental control requirements:	
14.1	List materials, chemicals, gasses that could impact the environment (ensure these are considered when choosing Subject Mater Experts) and explore EMP-04 Project/Activity/Experiment Environmental Review below
	None
14.2	Environmental impacts (See EMP-04 Project/Activity/Experiment Environmental Review)
	None
14.3	Abatement steps (secondary containment or special packaging requirements)
	None
15. Unusual/Emergency Procedures (e.g., loss of power, spills, injury, fire, etc.)	
	In the event of injury, or an immediate emergency exists, call 911 and also notify: <ul style="list-style-type: none"> ● Guards (x5822) ● Occupational Medicine (x7539) ● Crew Chief (x7045) (if inside the fence)

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In case of an injury follow standard JLAB procedures. Initial response cards are located with each phone for appropriate emergency phone numbers. Additional information can be found at https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-24400/*.pdf.

16. Instrument Calibration Requirements (e.g., safety system/device recertification, RF probe calibration)

MPS as required by Accelerator Division

17. Inspection Schedules

None

18. References/Associated/Relevant Documentation

Run plan as developed by Yves Robin and Ray Benesch

19. List of Records Generated (Include Location / Review and Approved procedure)

None

Submit Procedure for Review and Approval (See [ES&H Manual Chapter 3310 Appendix T1 OSP & TOSP Instructions – Section 4.2 Submit Draft Procedure for Initial Review](#)):

- Convert this document to .pdf
- Open electronic cover sheet:
<https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-24048/3310T1Form.doc>
- Complete the form
- Upload the pdf document and associated Task Hazard Analysis (also in .pdf format)

Distribution: Copies to Affected Area, Authors, Division Safety Officer

Expiration: Forward to ES&H Document Control

Form Revision Summary

- Revision 1.7 – 02/25/2021** – Corrected link to Word doc; updated ‘ESH&Q’ to ‘ES&H’; other minor edits. No approval required.
- Revision 1.6 – 06/23/2020** – Update section 15 to reflect guard number, what to do in an emergency, crew chief numbers, etc. approved by H. Fanning
- Revision 1.5 – 04/11/18** – Training section moved from section 5 Authority and Responsibility to section 9 Training
- Revision 1.4 – 06/20/16** – Repositioned “Scope of Work” to clarify processes
- Qualifying Periodic Review – 02/19/14** – No substantive changes required
- Revision 1.3 – 11/27/13** – Added “Owning Organization” to more accurately reflect laboratory operations.
- Revision 1.2 – 09/15/12** – Update form to conform to electronic review.
- Revision 1.1 – 04/03/12** – Risk Code 0 switched to N to be consistent with [3210 T3 Risk Code Assignment](#).
- Revision 1.0 – 12/01/11** – Added reasoning for OSP to aid in appropriate review determination.
- Revision 0.0 – 10/05/09** – Updated to reflect current laboratory operations

ISSUING AUTHORITY	FORM TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ES&H Division	Harry Fanning	04/11/18	02/25/24	1.6

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Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Author:	Jack Segal	Date:	08/08/21	Task #: If applicable	
Complete all information. Use as many sheets as necessary					
Task Title:	Operation of the Super Big Bite Power Supply and Corrector Magnets' Power Supplies During Commissioning and SBS Experiments	Task Location:	Hall A		
Division:	Physics	Department:	Hall A	Frequency of use:	For Super Big Bite experiments
Lead Worker:	Jack Segal				
Mitigation already in place: Standard Protecting Measures Work Control Documents	Machine Protection System				

Sequence of Task Steps	Task Steps/Potential Hazards	Consequence Level	Probability Level	Risk Code (before mitigation)	Proposed Mitigation (Required for Risk Code >2)	Safety Procedures/Practices/Controls/Training	Risk Code (after mitigation)
	Electrical	Med	Low	2	<ul style="list-style-type: none"> OSP Proper training & execution of approved procedures Guard all exposed electrical connections 	<ul style="list-style-type: none"> As required by Accelerator Operations 	1
	Magnetic Field	Med	Low	2	<ul style="list-style-type: none"> OSP 	<ul style="list-style-type: none"> Measure and post 5 Gauss boundary Warning beacons 	1
	Fire	Low	Low	1	<ul style="list-style-type: none"> OSP 	<ul style="list-style-type: none"> Hall A Technical Work Permit Protection Systems 	1

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Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Sequence of Task Steps	Task Steps/Potential Hazards	Consequence Level	Probability Level	Risk Code (before mitigation)	Proposed Mitigation (Required for Risk Code >2)	Safety Procedures/ Practices/Controls/Training	Risk Code (after mitigation)
	Missteering of Beam	High	Low	3	<ul style="list-style-type: none"> ● OSP ● Proper training & execution of approved procedures 	<ul style="list-style-type: none"> ● As required by Accelerator Operations 	1

Highest Risk Code before Mitigation:	3	Highest Risk Code after Mitigation:	1
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When completed, if the analysis indicates that the [Risk Code](#) before mitigation for any steps is “medium” or higher (RC≥3), then a formal [Work Control Document](#) (WCD) is developed for the task. Attach this completed Task Hazard Analysis Worksheet. Have the package reviewed and approved prior to beginning work. (See [ES&H Manual Chapter 3310 Operational Safety Procedure Program](#).)

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Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Form Revision Summary

Revision 0.2 – 07/26/21 – Periodic Review; updated header and footer

Periodic Review – 08/29/18 – No changes per TPOC

Periodic Review – 08/13/15 – No changes per TPOC

Revision 0.1 – 06/19/12 - Triennial Review. Update to format.

Revision 0.0 – 10/05/09 – Written to document current laboratory operational procedure.

ISSUING AUTHORITY	TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ES&H Division	Harry Fanning	08/29/18	07/26/24	0.2

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