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Jefferson Lab
Thomas Jefferson National Accelerator Facility

Operational Safety Procedure Review and Approval Form # 88020
(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		
Serial Number:	***ENP-19-88020-OSP***		
Issue Date:	***7/12/2019***		
Expiration Date:	***6/12/2022***		
Title:	***Hall C power supply maintenance***		
Location: (where work is being performed) Building Floor Plans	***96 - Experimental Hall C - C100***	Location Detail: (specifics about where in the selected location(s) the work is being performed)	
Risk Classification: (See ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment)	Without mitigation measures (3 or 4): With mitigation measures in place (N, 1, or 2):	***4*** ***2***	
Reason:	This document is written to mitigate hazard issues that are : ***Determined to have an unmitigated Risk code of 3 or 4***		
Owning Organization:	***PHALLC***		
Document Owner(s):	***Beaufait, Joe (beaufait@jlab.org)*** Primary ***Segal, Jack (segal@jlab.org)***		

Supplemental Technical Validations

Lock, Tag, Try (Paul Powers, Todd Kujawa)
ESH&Q Liasion (Bert Manzlak)

Document History

Revision	Reason for revision or update	Serial number of superseded document

Lessons Learned	Lessons Learned relating to the hazard issues noted above have been reviewed.
Comments for reviewers/approvers:	

Attachments

Procedure: ***hall c power suppy osp.pdf***

THA: ***THA hallc ps work.pdf***

Additional Files:

Review Signatures	
Subject Matter Expert : Lock-> Tag-> Try	**Signed** on 7/9/2019 3:50:56 PM by Todd Kujawa (kujawa@jlab.org)

Approval Signatures	
Division Safety Officer : PHALLC	**Signed** on 7/10/2019 7:38:03 AM by Ed Folts (folts@jlab.org)
ESH&Q Division Liasion : PHALLC	**Signed** on 7/10/2019 8:38:24 AM by Bert Manzlak (manzlak@jlab.org)
Org Manager : PHALLC	**Signed** on 7/12/2019 8:57:38 AM by Patrizia Rossi (rossi@jlab.org)
Safety Warden : Experimental Hall C - C100	**Signed** on 7/11/2019 7:26:21 AM by Stanley Madlock (smadlock@jlab.org)

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Operational Safety Procedure Form

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

Click For Word Doc

Title:	Testing and Adjusting Power Supplies while Energized		
Location:	Experimental Hall C Test lab High bay	**Type:**	☒ **OSP** ☐ **TOSP**
Risk Classification (per Task Hazard Analysis attached) (See *ESH&Q Manual Chapter 3210 Appendix T3 Risk Code Assignment*.)		**Highest Risk Code Before Mitigation**	
		Highest Risk Code after Mitigation (N, 1, or 2):	
Owning Organization:	Physics hall c	**Date:**	06/24/2019
Document Owner(s):	Joe Beaufait, 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).

To provide guidelines for operating and testing Power Supplies while energized. Guidelines include recognizing hazards, implementing mitigations, choosing proper PPE and following safe work standards.

2. Scope – include all operations, people, and/or areas that the procedure will affect.

Testing and measurement of DC power supplies including Mode 1 and Mode 2 work on Class 2 or Class 3 equipment. Safety guidelines to follow while operating and testing power supplies

3. Description of the Facility – include building, floor plans and layout of the experiment or operation.

Typical operation will be power supplies in Hall C designated operational or Test areas with properly assigned clearance areas. Typical areas for testing by type as follows: 1. Box Power Supplies: Hall C and Test Stands

ANALYZE THE HAZARDS and IMPLEMENT CONTROLS

4. Hazards identified on written Task Hazard Analysis

See attached THA Worksheet

5. Authority and Responsibility:

5.1 Who has authority to implement/terminate

Halls A and C Group Leader or Deputy

5.2 Who is responsible for key tasks

Senior Test Personnel for the system as determined by the Head of the Halls A and C Spectrometer Support Group and the Hall C Work Coordinator

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)

Senior Test Persons leading the tests are responsible for analyzing the hazards

6. Personal and Environmental Hazard Controls Including:

6.1 Shielding

None

6.2 Barriers (magnetic, hearing, elevated or crane work, etc.)

Barriers and covers to prevent inadvertent contact with live electrical equipment. Barriers and covers to protect against ARC flash hazards.

6.3 Interlocks

Door Interlocks, Temperature Interlocks, Load Interlocks, Water Flow Interlocks, Ground Fault Interlocks have to be working during tests.

6.4 Monitoring systems

Fire protection systems are installed in most test areas

6.5 Ventilation

High power testing must be conducted in spaces with adequate air/water cooling for operating power supplies. High power loads must be located in ventilated areas to allow for proper air/water cooling.

6.6 Other (Electrical, ODH, Trip, Ladder) (Attach related Temporary Work Permits or Safety Reviews as appropriate.)

As required

7. List of Safety Equipment:

7.1 List of Safety Equipment:

1. Longs Sleeve shirt and pants (non-melting)
2. Voltage rated gloves with leather protectors
3. Safety glasses
4. ARC Flash rated hood/ suit, minimum of 8 cal/cm^2, arc flash protective clothing; pants and shirt/ or coveralls
5. ARC Flash rated face shield, minimum 8 Cal/cm^2, arc rated balaclava

As required

7.2 Special Tools:

1. Voltage rated meters and probes
2. Insulated Tools
3. High Voltage probes
4. High Voltage or High Current transducers

8. Associated Administrative Controls

9. Training

9.1 What are the Training Requirements (See List of Training Skills)

1. SAF 104, General Lock, Tag, and Try (LT&T) training
2. Equipment specific LT&T training, equipment specific operations and manuals
3. EH&S Manual electrical safety Chapter 6200
4. Task Hazard Analysis form 331T0T1

5. SAF603A, Electrical safety Awareness
6. SAF603N1, SAF603N2, SAF603N3, NFPA70E training

DEVELOP THE PROCEDURE

10. Operating Guidelines

Mode 1 and Mode 2 work on Class 2 or Class 3 equipment as defined in the EH&S Manual Chapter 6230.

11. Notification of Affected Personnel (who, how, and when include building manager, safety warden, and area coordinator)

1. Hall C Work Coordinator via email and phone
2. Halls A and C Spectrometer Support Group Leader via email and phone
3. Other Groups: ATLIS and E-mail

12. List the Steps Required to Execute the Procedure: from start to finish.

1. Test Plan put together by person leading the test. The test plan must use this OSP as part of the guidelines.
2. Proper PPE and Work Tools gathered
3. Task Hazard Analysis performed by Senior Test Person/qualified test personnel
4. Test Plan approved by Halls A and C Spectrometer Support group leader or Senior Test Personnel if in Hall A Test Stands
5. Testing/Adjustment under general guidance of this OSP
6. Restoration of circuits and equipment. Follow ABIL requirements if necessary
7. Inspection of test data and approval for restoring operation from Senior Test Personnel

13. Back Out Procedure(s) i.e. steps necessary to restore the equipment/area to a safe level.

1. LT&T equipment according to equipment specific procedures
2. Remove all test equipment
3. Restore all circuits to their proper operational condition
4. Re-test interlocks
5. Restore operation of power supply

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, fire, etc.)

None

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

1. Testing and verifying proper operation of multi-meters and test probes
2. Calibration of Current and voltage transducers and readouts if required
3. Interlocks re-certification if required

17. Inspection Schedules

Hall C maintenance periods

18. References/Associated/Relevant Documentation

2004 Edition NFPA70E Electrical Safety

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

1. HALOG Entries where necessary
2. ABIL tag and Log Entry if necessary

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://mis.jlab.org/mis/apps/mis_forms/operational_safety_procedure_form.cfm
- 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 ESH&Q Document Control

Form Revision Summary

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.
ESH&Q Division	Harry Fanning	04/11/18	04/11/21	1.5

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Task Hazard Analysis (THA) Worksheet

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

Click For Word

Author:	Joseph Beaufait	**Date:**	6/27/2019	**Task #:** If applicable	

Complete all information. Use as many sheets as necessary

Task Title:	Testing and Adjusting DC Power Supplies while fully Powered			**Task Location:**	Hall C, Test lab
Division:	Physics	**Department:**	Hall C	**Frequency of use:**	Regular use during testing or troubleshooting DC Power Supplies
Lead Worker:	Jack Segal, Joe Beaufait, Steve Lassiter or assigned				
Mitigation already in place: Standard Protecting Measures Work Control Documents	SAF 104 –LT&T SAF603A –Basic Electrical Safety SAF603N – NFPA70E Equipment Specific LT&T Procedure for Power Supplies				

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
1	Lock and Tag of PS: Arc Flash Hazards, Exposure to Class 3 Voltages up to 2300VDC and 480VAC if not using VVU. High Current AC and DC buss	Medium	Medium	4/3	LT&T, using VVU to verify voltage is removed, use ground stick to remove stored energy. Barriers installed as required	Equipment Specific LT&T procedure and training, PPE usage, ground stick usage, Flash and Limited Approach Boundaries observed. Only Authorized people may perform work, 2-man rule	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
2	Energized testing of PS with Doors Open and interlocks bypassed, with barriers – Observation only: same hazards as #1 above	Medium	Medium	4/3	Area around PS is restricted for access to trained personnel, PPE as defined in document, No crossing of the prohibited approach boundaries allowed. Barriers/shields installed as required.	Hands off observation of indicator lights inside PS only, PPE required to be inside ARC Flash and Limited Approach Boundaries. Only Authorized people may perform work, 2-man rule.	1
3	Energized Testing of the PS with doors open and interlocks bypassed, with test equipment, performed using Hands-On probing. Class 3 shock hazard, Arc Flash Hazard	Medium	Medium	4/3	Perform measurement equipment connection with PS de-energized and LT&T where necessary. Re-energize supply to make measurements. L&T the PS to remove or reposition test equipment. Barriers/shields installed as required.	Hands Off observation of instruments connected to PS only, PPE required to be inside Arc Flash and Limited Approach Boundaries. Only Authorized people may perform work under supervision of senior personnel, 2-man rule, safety watch requirements	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
4	Energized Testing of the PS with doors open and interlocks bypassed, with test equipment, performed using Hands-On probing. Class 3 shock hazard, Arc Flash Hazard	Medium	Medium	4/3	Hands-on probing to make measurements on safe measurement points using appropriately rated equipment and PPE. Barriers/Shields installed as required to prevent inadvertent contact with nearby circuitry.	Procedures and techniques described in the document. PPE required, authorized personnel only under direct supervision of senior personnel, 2-man rule, safety watch requirements, voltage rated test equipment or isolated test equipment used	2

Highest Risk Code before Mitigation:		**Highest Risk Code after Mitigation:**	2

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.)

Task Hazard Analysis (THA) Worksheet

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

Form Revision Summary

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.
ESH&Q Division	Harry Fanning	08/29/18	08/29/21	0.1

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By signing this page, you testify that you have read, understand, and agree to abide by the procedure specified in the above referenced work control document:

Serial Number: ENP-19-88020-OSP

Title: Hall C power supply maintenance

Name	Signature	Date