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Operational Safety Procedure Review and Approval Form # 78508  
 (See [ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure \(OSP\) and Temporary OSP Procedure](#) for Instructions)

Type:	<i>OSP</i> <a href="#">Click for OSP/TOSP Procedure Form</a> <a href="#">Click for LOSP Procedure Form</a>		
Serial Number:	<i>ENG-18-78508-OSP</i>		
Issue Date:	<i>11/5/2018</i>		
Expiration Date:	<i>12/5/2021</i>		
Title:	<i>LT&amp;T of Equipment without an Operational VVU</i>		
Location: (where work is being performed)  <a href="#">Building Floor Plans</a>	<i>55 - Technology &amp; Engineering Development - 2500-52</i>	Location Detail: (specifics about where in the selected location(s) the work is being performed)	<i>This OSP can be used in many locations including but not limited to: Accelerator Site, Test Lab, TED, and EEL.</i>
Risk Classification: (See <a href="#">ES&amp;H Manual Chapter 3210 Appendix T3 Risk Code Assignment</a> )	Without mitigation measures (3 or 4):	4	
	With mitigation measures in place (N, 1, or 2):	2	
Reason:	This document is written to mitigate hazard issues that are : <i>Determined to have an unmitigated Risk code of 3 or 4</i>		
Owning Organization:	<i>EESDCP</i>		
Document Owner(s):	<i>Coleman, James (<a href="mailto:colemanj@jlab.org">colemanj@jlab.org</a>) Primary</i> <i>Gelhaar, David (<a href="mailto:gelhaar@jlab.org">gelhaar@jlab.org</a>)</i>		
Supplemental Technical Validations <input checked="" type="checkbox"/>			
<i>50V or Greater: De-energized Work (Bill Rainey, Bob May)</i> <i>Radio Frequency (Imani Burton, Jennifer Williams)</i>			
Document History <input checked="" type="checkbox"/>			
Revision <input checked="" type="checkbox"/>	Reason for revision or update <input checked="" type="checkbox"/>	Serial number of superseded document <input checked="" type="checkbox"/>	
4	<i>Renewal/Change in document owners and code edition reference.</i>	<a href="#">ENG-12-17441-OSP</a>	
Lessons Learned	<a href="#">Lessons Learned</a> relating to the hazard issues noted above have been reviewed.		

Comments for reviewers/approvers:

*This OSP has been in place for years. It has been updated to fit the new template. 09/24/18 Made Todd Kujawa, Electrical SME, document owner per TK's request. Once reviewed and approved the document owners will be changed to Jim Coleman and Dave Gelhaar (both have agreed to be the owners).*

Attachments

Procedure: *Procedure-OSP for LT&T without VVU-3.pdf*  
THA: *THA-THA for LT&T without VVU-3.pdf*  
Additional Files:

Review Signatures

Subject Matter Expert : Electricity->50V or Greater: **Signed** on 10/9/2018 10:59:28 AM by Todd Kujawa  
De-energized Work ([kujawa@jlab.org](mailto:kujawa@jlab.org))

Approval Signatures

Division Safety Officer : EESDCP **Signed** on 11/2/2018 3:54:58 PM by Will Oren  
([oren@jlab.org](mailto:oren@jlab.org))  
Org Manager : EESDCP **Signed** on 11/5/2018 1:09:03 PM by Sarin Philip  
([philip@jlab.org](mailto:philip@jlab.org))  
Safety Warden : Technology & Engineering Development - 2500-52 **Signed** on 10/31/2018 3:08:00 PM by Tina Menefee  
([menefee@jlab.org](mailto:menefee@jlab.org))

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

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**DEFINE THE SCOPE OF WORK**

<b>Title:</b>	LT&T of Equipment without an Operational Voltage Verification Unit (VVU)		
<b>Location:</b>	JLab buildings containing electrical equipment that requires LT&T. Typical locators are: Accelerator Site, Test Lab, TED, and EEL.	<b>Type:</b>	<input checked="" type="checkbox"/> OSP <input type="checkbox"/> TOSP
<b>Risk Classification</b> (per <a href="#">Task Hazard Analysis</a> attached) (See <a href="#">ESH&amp;O Manual Chapter 3210 Appendix T3 Risk Code Assignment.</a> )	<b>Highest Risk Code Before Mitigation (3 or 4):</b>	4	
	<b>Highest Risk Code after Mitigation (N, 1, or 2):</b>	2	
<b>Document Owner(s):</b>	Engineering (Jim Coleman & Dave Gelhaar)	<b>Date:</b>	10/15/2018
<b>Document History (Optional)</b>			
<b>Revision:</b>	<b>Reason for revision or update:</b>	<b>Serial number of superseded document</b>	
4	Renewal/Change in document owners	ENG-12-17441-OSP	

**ANALYZE THE HAZARDS**

**1. Purpose of the Procedure**

This procedure describes how to LT&T equipment if the lab approved Voltage Verification Unit (VVU), or other approved metering or external test points, is inoperative or does not exist.

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

This procedure is executed by any persons qualified to LT&T the equipment requiring lockout (see procedure) and covers all equipment at JLab.

**3. Description of the Facility – include floor plans and layout of a typical experiment or operation.**

This procedure covers a wide range of areas including but not limited to: Accelerator Site, Test Lab, TED, and EEL.

**4. Authority and Responsibility:**

**4.1 Who has authority to implement/terminate**

Any individuals qualified in LT&T for the equipment being serviced and meet the training requirements of section 4.4.

**4.2 Who is responsible for key tasks**

Supervisor is responsible for the job and has conducted a Pre-Job Briefing with the workers executing this procedure or when not practical (e.g., off hours) ensure that one was conducted by a qualified worker (e.g., shift leader). Briefing must include but is not limited to the following:

- a. Determine the Class of equipment (typically Class 2 or Class 3).
- b. Determination as to the qualification of the workers.
- c. Discuss the potential hazards.
- d. Determine roles of the workers (who will make the measurement, who will be the Second Qualified and Approved Person and who will be the Observer).

- e. Determine the means of quickly de-energizing the equipment in the event of an emergency. This should include the determination of the disconnect location, required PPE, and the possibility of a third person (e.g., the distance to disconnect power is unreasonably far from the area of work). The ability to quickly de-energize the equipment may very well mean the observer should be wearing PPE at the onset of the measurement (in some cases upstream disconnects may require additional PPE).
- f. Using the calculated incident energy value of the equipment and Table 130.7 (C) (16) of the NFPA70E (2015) Standard; discuss the required PPE and its proper donning. Remind workers that all PPE must be inspected prior to use.
- g. Discuss the importance of verifying, prior to use, that the diagnostic equipment be voltage rated and have the appropriate overvoltage category withstand rating for the work being performed (see Appendix A), and is in good condition.
- h. Discuss all sections and steps described in this OSP. All involved parties (supervisors, workers observers, etc.) MUST sign and post a copy of the OSP at the work site (see Table 1).

**4.3 Who analyzes the special or unusual hazards** (See [ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure](#))

The individuals performing the work in coordination with their Supervisor(s).

**4.4 What are the Training Requirements** (See [http://www.jlab.org/div\\_dept/train/poc.pdf](http://www.jlab.org/div_dept/train/poc.pdf))

Two Qualified and Approved persons with the following skills/knowledge set:

- a) SAF 104 Lock, Tag, and Try training.
- b) SAF 105 CPR and AED training.
- c) SAF 603A Electrical Safety Awareness.
- d) SAF 603N NFPA70-E Basic Electrical Training
- e) Equipment specific LT&T training for the equipment under test and a demonstrated understanding of:
  - i) Proper use of precautionary techniques.
  - ii) Proper use of PPE.
  - iii) Proper use of insulated tools and equipment.
  - iv) Skills and techniques necessary to distinguish exposed energized parts from other parts of electronic equipment.
  - v) Skills and techniques necessary to determine the nominal voltage of exposed energized parts.
  - vi) Ability to properly evaluate information found on the Arc Flash and Shock Hazard WARNING label.
    - (1) Shock hazard boundaries and distances for voltages to which the worker will be exposed.
    - (2) Arc hazard distance and incident energy to which the worker or any workers on adjacent non-related jobs will be exposed.
    - (3) Determine the PPE Category to enable the proper selection of required PPE.
  - vii) Decision process necessary to determine the degree and extent of the arc and shock hazard, the related PPE, the associated boundary marking devices, and job planning necessary to perform the task safely.

## 5. Personal and Environmental Hazard Controls Including:

### 5.1 Training

See section 4.4

### 5.2 Shielding

N/A

### 5.3 Interlocks

N/A

### 5.4 Monitoring systems

N/A

### 5.5 Ventilation

N/A

### 5.6 Others

N/A

## 6 List Of Safety Equipment

### Personal Protective Equipment

PPE will vary dependent upon the calculated incident energy. Use table 130.7 (C) (16) of the NFPA70E (2015) Standard to determine what is required.

### Special Tools

Digital Volt Meter (DVM) rated for the measurement being made (see Appendix A).

## DEVELOP THE PROCEDURE

### 1. Associated Administrative Controls

N/A

### 2. Operating Guidelines

N/A

### 3. Notification of Affected Personnel (who, how, and when)

See section 4.2

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

#### 1.0 Identify the Hazards

1. Locate the Arc Flash and Shock Hazard WARNING label posted on the equipment.
2. Understand the identified hazards (voltage, current, stored energy, etc.).
3. Determine the Limited, Restricted, and Arc Flash boundary limits that will exist during the execution of this procedure.
  - a. Limited Approach Boundary - Only Qualified and Approved workers can enter this area; unqualified persons must be escorted by a qualified person if there is a need to cross this boundary.
  - b. Restricted Approach Boundary – Only Qualified and Approved workers can enter this area

when they are insulated or guarded from the energized parts.

c. Arc Flash Boundary - Only Qualified and Approved workers can enter this area while wearing the appropriate Arc Flash PPE.

4. Determine if the required PPE (clothing, gloves, arc rated face shield, hearing protection, safety glasses, etc.) is commensurate with what was discussed at the Pre-Job Briefing. If not, contact your supervisor or shift leader before proceeding.

## 2.0 Set-up for the measurement to confirm a de-energized state

1. The Second Qualified and Approved person must be prepared to quickly de-energize the equipment, using a crash button, circuit breaker, control or other disconnect method in case of an emergency, and to alert emergency personnel. **DO NOT** proceed unless the method to de-energize was determined during the Pre-Job Briefing.
2. The Second Qualified and Approved person must be prepared to rescue the worker in an emergency.
3. Rope the area off at the Limited Approach Boundary or the Arc Flash Boundary, whichever is greater, or post an Observer (third person) with instruction to keep personnel outside this distance. The Observer should not cross the Limited Approach or Arc Flash Boundary; whichever is greater.
4. Verify that all diagnostic devices, to be used during the execution of this procedure, are functioning properly (e.g., test meters), have their insulation intact, are rated for the voltage and current under test, and have the appropriate overvoltage category withstand rating (see Appendix A).
5. The Qualified and Approved person performing the measurement (and possibly the Second Qualified and Approved person) dons the appropriate PPE as discussed at the Pre-Job Briefing. Must be equal to or greater than what is identified on the Arc Flash and Shock Hazard WARNING label.

## 3.0 Perform the Measurement

1. The person identified as the Second Qualified and Approved person positions their self to watch the person making each measurement.
2. The Qualified and Approved person, making the measurement, test the diagnostic device (typically a DVM) to be operating satisfactorily on a known voltage source.
3. After removing power to the equipment being LTT'd (Lock, Tag, & Try), the Qualified and Approved person, making the measurement, proceeds to carefully remove the required barriers to enable access to the location of the required measurement.

**WARNING: If voltage is present during the next step, back away from the equipment, close the open door(s) and/or reinstall panels, and notify your supervisor immediately.**

4. The Qualified and Approved person, making the measurement, carefully probes the location for verification of a de-energized state (e.g., test each phase conductor or circuit part both phase-to-phase and phase-to-ground).

a. Was voltage absent for every reading?

i. Yes => GOTO step 5

ii. NO => **DO NOT Proceed**. Report the faulty equipment to your supervisor immediately. Additional hazard analysis is required before proceeding.

5. The Qualified and Approved person, making the measurement, test the diagnostic device (typically a DVM) to be operating satisfactorily on a known voltage source.
6. If both Qualified and Approved persons agree that the voltage was not present in step 4, then the equipment being LTT'd can be considered in a de-energized condition.
7. Procedure complete.

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

N/A

**6. Special environmental control requirements:**

**6.1 Environmental impacts** (See [EMP-04 Project/Activity/Experiment Environmental Review](#))

N/A

**6.2 Abatement steps** (secondary containment or special packaging requirements)

N/A

**7. Unusual/Emergency Procedures** (e.g., loss of power, spills, fire, etc.)

N/A

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

N/A

**9. Inspection Schedules**

N/A

**10. References/Associated Documentation**

Table 130.7 (C) (16) of the NFPA70E (2015) Standard.

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

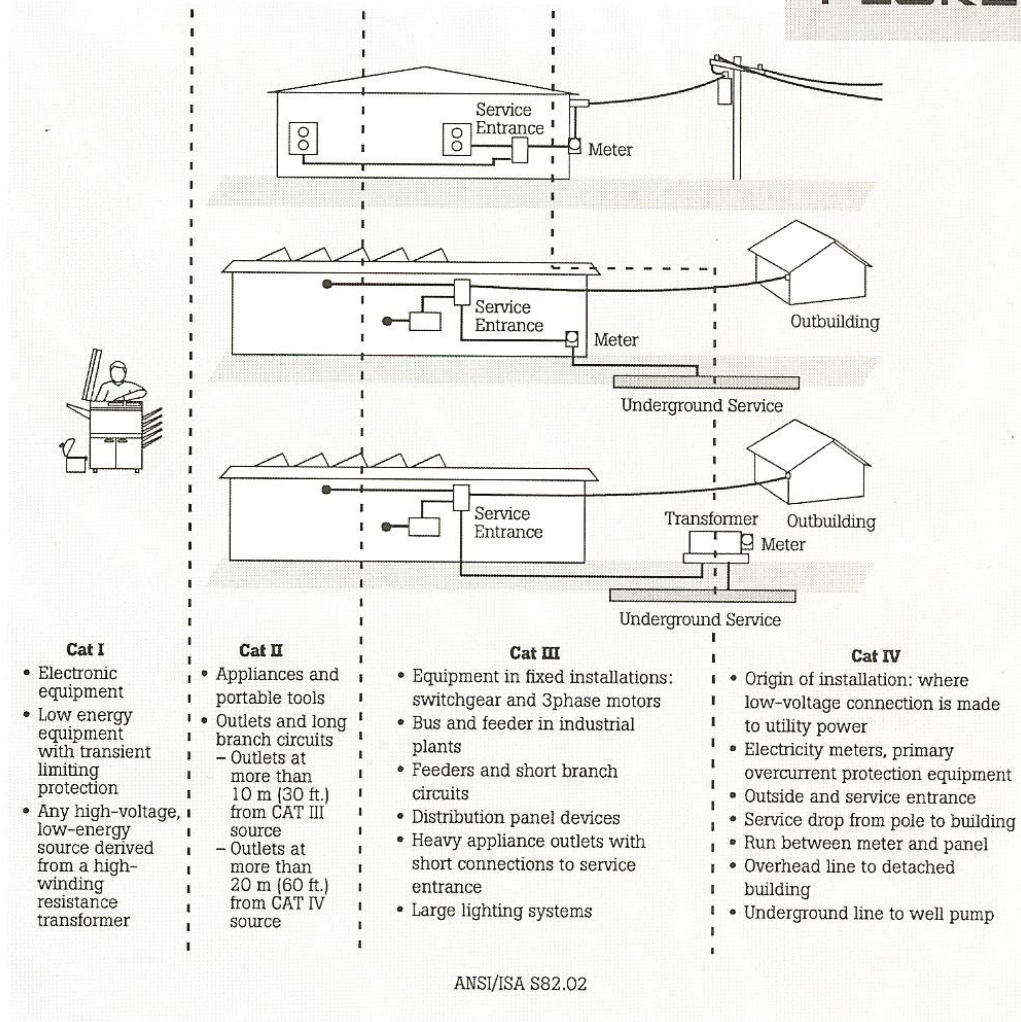
**All participating workers shall sign below to indicate that they have read, understand, and agree to perform the work according to this OSP.**

Print Name	Sign Name

Table 1



**FLUKE**®



## Appendix A

**Click**  
 To Submit OSP  
 for Electronic Review

**Distribution:** Copies to: affected area, authors, Division Safety Officer  
**Expiration:** Forward to ESH&Q Document Control

### Form Revision Summary

- 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 – 12/01/11** - Added reasoning for OSP to aid in appropriate review determination.
- Revision 0 - 10/05/09** – Updated to reflect current laboratory operations

ISSUING AUTHORITY	FORM TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	EXPIRATION DATE	REV.
ESH&Q Division	<a href="#">Harry Fanning</a>	12/01/11	12/01/14	1.2

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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 Doc

<b>Author:</b>	Engineering (Jim Coleman & Dave Gelhaar)	<b>Date:</b>	10/15/2018	<b>Task #:</b> If applicable	
<b>Complete all information. Use as many sheets as necessary</b>					
<b>Task Title:</b>	LT&T of Equipment without an Operational Voltage Verification Unit (VVU)	<b>Task Location:</b>	This procedure covers a wide range of areas including but not limited to: Accelerator Site, Test Lab, TED, and EEL.		
<b>Division:</b>	Engineering (DC & RF Power)	<b>Department:</b>	Electrical	<b>Frequency of use:</b>	Infrequent
<b>Lead Worker:</b>					
<b>Mitigation already in place:</b> <a href="#">Standard Protecting Measures</a> <a href="#">Work Control Documents</a>	OSP – “LT&T of Equipment without an Operational Voltage Verification Unit (VVU)”				

Sequence of Task Steps	Task Steps/Potential Hazards	<u>Consequence Level</u>	<u>Probability Level</u>	<u>Risk Code</u> (before mitigation)	Proposed Mitigation (Required for <u>Risk Code</u> >2)	Safety Procedures/ Practices/Controls/Training	<u>Risk Code</u> (after mitigation)
3.0 Perform the Measurement steps 2 & 5	Contact with Class 2 or Class 3 voltages (verification of voltage present is expected)	High	Medium	4	Following the approved OSP; Wearing proper PPE, performing a pre-job briefing, and ensuring proper qualification of the workers.	OSP – “LT&T of Equipment without an Operational Voltage Verification Unit (VVU)” SAF104 SAF105 SAF603A SAF603N Equipment specific LT&T training for the equipment under test	2

# 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)
3.0 Perform the Measurement step 4	Contact with Class 2 or Class 3 voltages (verification of voltage not present is expected)	High	Low	3	Following the approved OSP; Wearing proper PPE, performing a pre-job briefing, and ensuring proper qualification of the workers.	OSP – “LT&T of Equipment without an Operational Voltage Verification Unit (VVU)” SAF104 SAF105 SAF603A SAF603N Equipment specific LT&T training for the equipment under test	1

Highest Risk Code before Mitigation:

4

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](#).)

### Form Revision Summary

**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	FORM TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	EXPIRATION DATE	REV.
ESH&Q Division	<a href="#">Harry Fanning</a>	06/19/12	06/19/15	0.1

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For questions or comments regarding this form contact the Technical Point-of-Contact [Harry Fanning](#)

