

**Notable Event Report**

Title of Event			
<b>Event Title:</b>	LERF Brought to Beam Permit Without Requisite Authorized Personnel on Site		
<b>Date and Time of Occurrence:</b>	14-Jul-2016 / 17:54	<b>Notable Event Number:</b>	ACC-16-0714
<b>Event Location:</b>	Low Energy Recirculator Facility	<b>Date Notable Event Report is Due*:</b>	25-Aug-2016

\*The Notable Event Report is due to the ESH&Q Reporting Officer with 30 days of the Initial Fact Finding Meeting unless an extension is requested.

**Summary of Event and / or Injuries, including Initial Fact Finding Meeting information: determine the chain of events and timeline. Use attachment as necessary.**

On July 14<sup>th</sup> and 15<sup>th</sup>, 2016, the Low Energy Recirculator Facility (LERF) was placed into Beam Permit without a “Free Electron Laser (FEL) Operator”/LERF Operator on watch. This activity constituted a violation of Administrative Control 6 of Table 1-3 of the current revision of the Accelerator Safety Envelope (ASE.) This violation was a procedural violation of the ASE but personnel and machine safety were not compromised at any time.

This issue was discovered on July 25<sup>th</sup>, 2016 when the MCC Operations Group Leader was checking requirements after a request was made by the LERF Gun Subject Matter Expert (SME) in order to perform LERF gun conditioning activities, the same activities performed during the 14<sup>th</sup> and 15<sup>th</sup> of July. The MCC Operations Group Leader had been on vacation but the Deputy Group Leader was acting in their place. The Group Leader found the Deputy had performed a similar check of restrictions during the previous lock-ups but had not understood the qualification of LERF Gun SME as a LERF Operator based on the LERF Gun SME’s past FEL responsibilities and inconsistent qualification designation within guidance documentation.

“FEL Operator” is no longer a specific designation for staff that operates the LERF, formerly known as the Free Electron Laser (FEL) facility. “LERF Operators” are comprised from experienced and qualified Accelerator Operations staff, and not from within the LERF staff like the previous FEL facility operational paradigm. The LERF Gun SME on duty during the gun conditioning activities in question used to be a qualified FEL Operator and FEL Duty Officer (shift supervisor) and had taken LERF Scientist on Shift (LSOS) to allow unrestricted computer access to operational controls. However, this additional training does not qualify this former FEL Operator as a LERF Operator under the Accelerator Operations paradigm and training requirements. Due to the previous roles and responsibilities as well as the guidance documentation referring to a position that no longer exists, confusion arose as to the LERF Gun SME meeting the required minimum staffing limitations stated in the guidance document.

In addition, a former LERF Operations Coordinator had announced verbally to FEL Operators and Duty Officers that their qualifications as FEL Operators were null and void before the startup of the LERF. The coordinator went on to say that to be re-qualified as a LERF Operator, former FEL Operators would need to take the full regiment of Accelerator Operator training courses and then be qualified via the Accelerator Operations management. The additional LSOS training the LERF Gun SME had taken, as described above, did not qualify the SME as a LERF Operator. Accelerator Operations management knew of the FEL Operator qualification reduction, but it may not have been properly disseminated to all FEL Operators or to all Accelerator Operations staff (especially the acting management) as it had not been written down by the former LERF Operations Coordinator when communicated.

As per the FEL Operations Directives Supplement (FELODS), the former operations guidance document for the FEL, a list of qualified FEL Operators and Duty Officers are to be posted in the FEL and Machine Control Center (MCC) control rooms to define who is qualified. When the FEL Operations staff qualifications had been revoked, the list in the MCC had been removed and a new list of LERF Operators posted, as per the LERF Operations Directives (LOD) the new operations

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guidance document. However, not all lists of qualified FEL staff were removed from the LERF Control Room. During the investigation process, these were discovered and removed, but further added validity to the state of confusion of who could be considered "qualified" without formal revocation of status.

Current ASE requirements for staffing are based on the Personnel Safety System (PSS) state of the machine only and not based on the capability of the machine. According to the current revision (revision 7) of the ASE, Beam ON "is defined as the FEL Vault containing the injector gun being in Beam Permit. Beam OFF is defined as the FEL Vault containing the injector gun not in Beam Permit." The ASE also states, "When the electron beam is ON, there shall be a minimum of one FEL Operator in the MCC or the FEL Control Room. From either location, an FEL Operator can oversee safe operation of the accelerator and shut down operations if necessary."

The intent of operations on July 14<sup>th</sup> and 15<sup>th</sup> was to facilitate the Gun High Voltage conditioning and restoration of the LERF Injector after a long period of inactivity but there was no intent to operate the electron beam into the machine. To facilitate the LERF Injector resurrection activities, the LERF machine state needed to be in Beam Permit. A valve just downstream of the LERF Gun chamber was closed and an administrative lock and tag was placed on the valve controls by the LERF Gun SME, prior to Gun activities on the 14<sup>th</sup>, to ensure no electron beam operations within the LERF machine were possible as per established FEL Injector protocols which are still in place for LERF Injector operations.

An additional lock and tag was placed on the same beamline valve by Accelerator Operations (OPS) on Friday the 15<sup>th</sup> to give Accelerator OPS an added preventative control over any potential of electron beam emission out of the LERF Gun during or after gun conditioning into the LERF machine. Although the potential for electron beam emission was low and safe conditions were maintained with this Gun lock out, the current revision of the ASE does not allow for an exception to the LERF minimum staffing requirement without Site Office concurrence regardless of machine condition or capability.

This is inconsistent with similar ASE controls and wording for the CEBAF facility where regeneration operations of this nature can be carried out with less than minimum staffing via internal controls spelled out in their Accelerator Operations Directives (AOD). The specific calling out of personnel, "FEL Operator" for minimum staffing at the LERF within the ASE is unique to the LERF facility and is a left over from FEL operations and do not reflect the current LERF operations paradigm which mirrors that of the CEBAF facility where "one authorized person" is called out for operations below 1 MeV for which Gun regeneration activities qualify.

Accelerator Management staff (Accelerator Director of Operations and MCC Operations Group Leader) were both on vacation at the time of the incident and had left their duties to acting management staff. However, the acting management staff was not as familiar with minimum staffing requirements for the LERF or with the disqualification of all former FEL staff by a previous LERF manager. When the acting Accelerator management reviewed the minimum staffing requirement of the LERF as "FEL Operator" for "Beam ON" purposes, they made a judgement that "FEL Operator" was equivalent to LERF Operator where assumptions were made based on the previous qualifications of the LERF Gun SME as an "FEL Operator." The "Beam OFF" state was erroneously considered to be equivalent to the capability of the electron beam in the LERF machine. With the LERF Gun locked out by both LERF Gun SME and OPS making beam delivery impossible, the state was considered "Beam OFF" instead of the ASE and LOD definition of "Beam ON" whenever the LERF PSS State is in Beam Permit.

Since the last 3 year revision cycle of the ASE, the FEL facility has been reorganized and the facility designation has changed from FEL to LERF. Local guidance documents have changed from FELODS to LOD which is in alignment with the AOD. The ASE for CEBAF operation has the ability to utilize "authorized personnel" based on AOD guidance. The LOD was written to mirror this requirement, but the ASE still refers to "FEL Operator" as being the required minimum staff. This added to the initial confusion while acting management looked at the regulations for minimum staffing requirements for the LERF as the "FEL" designation no longer exists.

**Causal Analysis: (Use attachment as necessary)**

<b>Root Cause:</b>	<p>A3B1C06 – Wrong Action was selected based on similarity with other actions. OPS did not follow the LERF procedures (LOD and ASE) the way they were written based on flawed assumed equivalency to CEBAF procedures (AOD and ASE) which would allow them to run with reduced staffing during certain low energy (&lt;1MeV) related tasks. The LERF Operation Directives clearly state minimum staffing requirements for the LERF activities event though the ASE is out dated.</p>
<b>Contributing Causes:</b> (List as many as apply.)	<p>A4B3C05 – Insufficient Number of Trained or Experienced Workers Assigned to Task.</p> <ul style="list-style-type: none"> <li>While the worker assigned to the activities had previous experience and authorization during the FEL era, that authorization had been revoked at the beginning of the LERF activities. New authorization as LERF Operator required completion of an extensive training catalog which the individual in question had never taken. An improper assumption by acting management of equivalence was made based on past authorization and duties (FEL Operator ≠ LERF Operator).</li> </ul> <p>A4B2C06 – Means not Provided to Assure Procedures are Up-to-Date. A5B2C07 – Facts Wrong/Requirements Not Correct.</p> <ul style="list-style-type: none"> <li>The ASE had not been updated to reflect changes made with governing documents from FEL to LERF operations which caused confusion during minimum staffing requirements.</li> <li>The ASE is inconsistent between FEL and CEBAF minimum staffing requirements (“FEL Operator” vs. “Authorized Personnel”) which caused confusion during decision making for staffing during shift operations.</li> <li>AOD is consistent with all ASE staffing requirements for CEBAF. FELODS has been rewritten to align the LOD more with AOD standards. However, the LOD is not consistent with all AOD minimum staffing requirements for machine related tasks (equal to/below 1MeV) lending confusion with OPS driven staffing requirements.</li> </ul> <p>A4B5C11 – Changes not Adequately Communicated.</p> <ul style="list-style-type: none"> <li>Previous operational paradigm is hard to shake and new roles and responsibilities are not clear to all invested parties. Unofficial verbal communications were LTA as only a subset of effected parties were informed of changes, leaving others out of the loop.</li> <li>No formal transition from FEL to LERF operations which highlights the major changes to the LERF Operators vs. former FEL Operators.</li> </ul>

Extent of Condition Check	<u>JLab CATS Number</u>	Target Date	Action Owner
<p>Check procedures for CEBAF operations to ensure that there are no loop holes in minimum staffing requirements.</p> <p>Evidence of completion: Updated procedures or memo to DSO stating the results of the review</p>	NE-2016-15-01-01	01/31/2017	Paul Vasilauskis
<p>Does this event involve failed equipment?</p> <p style="text-align: center;">Y    N           ✓</p>	<p>Is there similar equipment in other areas?</p>	<p style="text-align: center;">Y    N           ✓</p>	** If yes, assign extent of condition check to the appropriate DSO(s).

Corrective Action(s)	JLab CATS Number	Target Date	Action Owner
<p>FSAD and ASE need to be updated to align LERF safety envelopes to be the same as CEBAF safety envelopes. Current wording in the ASE refer to "FEL Operator" for the FEL facility vs. "authorized personnel" in the CEBAF machine for minimum staffing requirements. "FEL" references should be removed from the ASE and FSAD during their next triennial review and update.</p> <p>Evidence of Completion: Links to updated FSAD and ASE</p>	NE-2016-15-01-02	03/31/2017	Bob May
<p>Ensure all "FEL Operator" references and qualification postings are removed from MCC and LERF Control Rooms and their governing procedures.</p> <p>Evidence of Completion: e-mail from Operations Group Leader that this has been carried out</p>	NE-2016-15-01-03	03/31/2017	Paul Vasilauskis
<p>Formal letter to all former FEL staff that "FEL Operator" and "Duty Officer" qualifications have been revoked. New list of qualified LERF Operators should accompany this letter to ease confusion about who is qualified to act as a LERF Operator.</p> <p>Evidence of Completion: Letter to former FEL Operators</p>	NE-2016-15-01-04	12/01/2016	Arne Freyberger
<p>Update LOD to be more specific about minimum staffing requirements at different conditions and operating levels, which is more in line with AOD guidance.</p> <p>Evidence of Completion: Link to updated LOD</p>	NE-2016-15-01-05	03/31/2017	LERF Operations Coordinator
<p>Letter to TJSO from Lab Management stating the violation and steps for path forward.</p> <p>Evidence of completion- Letter to TJSO</p>	NE-2016-15-01-06	07/28/2016	Harry Fanning

Lessons Learned (Confer with Lessons Learned Coordinator) (Use attachment as necessary)	Lessons Learned Number
When operational paradigms are changed, ensure supporting and governing documents are also updated to reflect changed conditions to reduce risk of compliance violation	972

Lessons Learned (Confer with Lessons Learned Coordinator) (Use attachment as necessary)	<u>Lessons Learned Number</u>

**Witness Accounts:** (Use attachments as necessary. Box will expand as necessary)

**Records, Documents, Pictures, and Other References:** (Copy and paste, use attachments or document links as necessary)

FSAD  
<https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-21395/FSAD%207a%20with%20signature.pdf>

ASE  
[https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-62667/ASE%20REV7%20\(Dated%20110112\).pdf](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-62667/ASE%20REV7%20(Dated%20110112).pdf)

LOD  
[http://opsntsrv.acc.jlab.org/ops\\_docs/online\\_document\\_files/LERF\\_online\\_files/LERF\\_Operations\\_Directives\\_twosided.pdf](http://opsntsrv.acc.jlab.org/ops_docs/online_document_files/LERF_online_files/LERF_Operations_Directives_twosided.pdf)

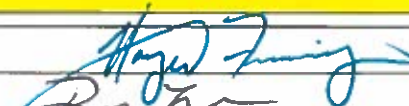
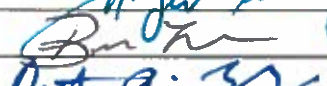
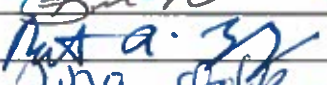

Emergency Notifications Made (Subsequent to the Event):	Date	Time
Fire, Rescue & Emergency Medical: (9-911)		
Guard Post: x5822; 269-5822		
Occupational Medicine 269-7539		
ESH&Q Reporting Officer: 876-1750	25-July-2016	~ 1000
Crew Chief 630-7050		
Industrial Hygiene: 269-7863:		
Other: TJSO	25-July-2016	~1600

<p><b>Confirmation Review Distribution:</b> Investigation Team Members Affected Division Managers ESH&amp;Q Reporting Officer</p>	<p>It is asked that you review and provide comments to this document to the Lead Investigator (denoted on Page 1) within ____ days. Your comments will be reviewed and incorporated as appropriate. Thank you for your consideration in this matter.</p>
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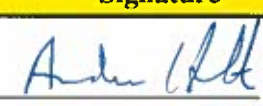
**Investigation Team Confirmation:**

The below signees, confirm to the best of their knowledge, that the information presented in this document is accurate and complete.

Role	Print	Signature	Date

Lead Investigator	Harry Fanning		26 SEPT 2016
	Brian Freeman		28 SEPT 2016
	Bob Legg		28 SEPT 2016
	Tina Johnson		9/28/16

### Acceptance/Acknowledgement of Facts

	Print	Signature	Date:
Associate Director/ Department Manger	Andrew Hutton		9/29/16

Upon confirmation submit document to the ES&H Reporting Officer for completion and distribution.

### Documentation of Findings: (To be Completed by ESH&Q Reporting Officer)

<u>Notable Event Number:</u>	ACC-16-0714
<u>CATS Number:</u>	NE-2016-15-01
<u>Lessons Learned Number:</u>	972
<u>ORPS Number:</u>	N/A
<u>NTS Number:</u>	N/A
<u>CAIRS Entry:</u>	N/A
<u>DOE Cause Code:</u>	A3B1C06; A4B3C05, A4B2C06, A5B2C07, A4B5C11
<u>ISM Code:</u>	Perform Work Within Controls

Unless otherwise specified the following is to be completed by the Lead Investigator.

Step 1 Initial Fact-Finding Meeting (To be held as soon as reasonably possible following event (within 24 hours))			
Date:	26-Jul-2016	Time:	08:30
		Location:	MCC
Required Attendees: (Print Name)		Optional Attendees: (Print Name) Present	
Lead Investigator:	Harry Fanning	Associate Director:	Fulvia Pilat (invited) Acting ACC AD
ESH&Q Representative:	Tina Johnson	TJSO Observer:	Patty Hunt Present
Supervisor of involved persons(s):	Paul Vasilauskis	<u>Subject Matter Expert(s)</u> , Facility/Equipment Owner as applicable:	
Involved or impacted person(s):	Matt Bickley, Mike Aiken, Ken Surles-Law (invited)		
Witness(es):			

Agenda (Ensure the pace of the meeting allows time for accurate note taking.)	√ if Complete
1. Introduction – Provide Event Title, Date and Time of Occurrence, and Location:	✓
2. Attendance - Are Required Attendees present.	✓
3. Purpose of Initial Fact-Finding meeting.	✓
4. Event Reconstruction – Use information to complete Section 3. <u>Summary of Event and/or Injuries</u> below.	✓
a. Personnel and organizations involved in the event.	✓
b. Conditions and actions preceding the event.	✓
c. Chronology (timeline) of the event; and	✓
d. Immediate actions taken in response to the event.	✓
5. Clarify information – <u>Subject-Matter Expert</u> (SME) confirms work conditions.	✓
6. <u>Stop Work</u> or the <u>Tag Out</u> Required? If “Yes” – establish the restart criteria and inform the affected Management chain.	✓
7. Compensatory Actions Required? If “Yes” determine responsibility and include confirmation documentation.	✓
8. Records or documentation required to confirm, clarify, or complete information (i.e., work plans, work control documents, photos, etc).	✓
9. Other Questions or Concerns: Ask attendees if there are any other questions, concerns, or information that they wish to provide.	✓
10. Obtain TJSO Observer feedback on conduct of fact finding meeting and potential improvements.	✓

<b>Step 2 Investigation Team:</b>		<b>Date Convened:</b> (Within 24 hours of Fact Finding Meeting.)		28-Jul-2016 – 13:30
Role	Name	Department/Group	Phone	
Lead Investigator	Harry Fanning	ACCMGT	7619	
LERF	Bob Legg	SRFOPS	6133	
ACC Ops	Brian Freeman	MCCOPS	6107	
ESH&Q	Tina Johnson	ESH&Q	7611	
<u>TJSO Observer</u>	Patty Hunt	TJSO	7039	

Environmental Aspects			
<b>Type of Material Released:</b>		<b>Quantity:</b>	
<b>Source:</b>		<b>Time Flow was Halted or Controlled:</b>	
For Investigation Team (√ All That Apply):			
<input type="checkbox"/> Reportable Quantity	<input type="checkbox"/> Impact Ground/Soil	<input type="checkbox"/> Storm Water Channel/Drain	<input type="checkbox"/> Sanitary Sewer



**Categorization and Reporting**  
 (To be completed by ESH&Q Reporting Officer within two hours – unless essential information is still pending)

<b>ORPS Determination:</b>	<b>Date:</b> 07/26/2016	<b>Time:</b>	1659 – Following verbal notification
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Zimbra cjohnson@jlab.org

**ORPS/NTS Determination: ASE Violation on Minimum Staffing of the LERF while in "Beam Permit"**

**From :** Tina Johnson <cjohnson@jlab.org> Tue, Jul 26, 2016 04:59 PM  
**Subject :** ORPS/NTS Determination: ASE Violation on Minimum Staffing of the LERF while in "Beam Permit"  
**To :** Patty Hunt <phunt@jlab.org>  
**Cc :** Tina Johnson <cjohnson@jlab.org>, Bill Rainey <wrainey@jlab.org>, Harry Fanning <fanning@jlab.org>

Patty,

As you know on July 14th and 15th, the LERF was brought to Beam Permit without minimum staffing on site. Per the ASE: "When the electron beam is ON, there shall be a minimum of one FEL Operator in the MCC or the FEL Control Room. From either location, an FEL Operator can oversee safe operation of the accelerator and shut down operations if necessary."

During the 14th and 15th of July, only an SSO and a SME were present on site, and neither were approved FEL/LERF Operators. "Beam On" is described in the ASE as "the FEL Vault containing the injector gun being in Beam Permit."

Operations at the times in question were LERF gun conditioning with a locked out valve just down stream of the Electron Gun, so exposure to hazards were at a minimum.

The Lab has determined that this is not ORPS/NTS reportable at this time however, we will process this as a Notable Event.

If you have any questions or concerns, feel free to contact me.

Regards,

Tina

<b>10 CFR 851 Screen:</b>	<b>Date:</b> 07/26/2016	<b>Time:</b>	1659 – Following verbal notification
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Negative: This event does not meet the voluntary criteria as a discreet programmatic weakness.

**Final Distribution:**

- [ES&H Reporting Officer](#) (Original)
- Associate Director/Department Manager
- [Division Safety Officer](#)
- Investigation Team Members
- [ESH&Q Liaisons](#)

**Form Revision Summary**

- Revision 1.6 – 02/22/16** – Updated form to reflect extent of condition ensuring it covers failed equipment per MOA
- Revision 1.5 – 10/04/13** – Changed COE to Lessons Learned; updated links.
- Revision 1.4 – 09/06/12** – Qualifying Periodic Review. Clarification of content only.
- Revision 1.3 – 01/31/12** – Updated ESH&Q Reporting Officer assignment from S.Smith to C.Johnson per M.Logue Edited to clarify process steps.
- Revision 1.2 – 10/20/11** – Updated ESH&Q Reporting Officer assignment from J.Kelly to S.Smith per M.Logue.
- Revision 1.1 – 05/24/11** – Edited to clarify process steps.
- Revision 1.0 – 11/23/10** – Updated to reflect current laboratory operations.

ISSUING AUTHORITY	FORM TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ESH&Q Division	<a href="#">Tina Johnson</a>	02/22/16	02/22/19	1.6

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