

Notable Event

Event Title: ENG-20-1014- Failure to Identify and Apply LO/TO on Potential Energy Source

Date Submitted: 12/16/2020 09:00:47 AM

Response Owner: Ken Baggett (baggett)

Category: Violation / Inadequate procedures

Date of Occurrence: 10/14/2020 10:00 am

Event Location: 01

Date Notable Event Report is Due: 11/04/2020

Short Summary of Event and/or Injuries

During the course of equipment inspections on October 14, 2020, two of the Lab's new electrical safety inspectors identified a concern on exposed conductors inside an electrical equipment cabinet being overhauled (RF transformer cabinet). The breaker mounted to the cabinet panel front was under a compliant lock-out/tag-out (LO/TO) applied by a qualified electrical worker, and in accordance with the procedure updated in June 2020; however, the electrical lugs feeding that cabinet were exposed. The main distribution panel (MDP) circuit that feeds this RF cabinet was in the OFF position (480V, 200 amp), but was not under a hazardous energy control (danger) LO/TO. The worker that was performing the overhaul work was not aware of the exposed nature of the electrical feed, nor did they confirm the state of the upstream electrical breaker before undertaking work inside this cabinet. Since the worker had no personal control over the electrical circuit feeding the cabinet, this represents a near-miss condition.

Upon investigation, it appears the insulating protective cover inside this cabinet had been installed/reinstalled upside down, leaving the hazard insufficiently guarded. The approved procedure for this work activity presumes all guards within the cabinet are fully intact and installed properly. It is noteworthy that the MDP servicing this equipment/zone had just been replaced within the preceding few days, illustrating the amount of work taking place simultaneously during this maintenance period.

The upstream breaker has since been placed under locked control by Facilities electricians. A suspend work condition has been put in place by Division leadership pending an extent of condition review.

Details of the Event and/or Injuries

A timeline is attached. Work covered many months and involved three workgroups across divisions. We conducted interviews with individuals from each workgroup to identify systemic issues that can allow these near-miss conditions. We were unable to determine when the lead cover was installed incorrectly but the interviews with the witnesses produced several themes. While an OSP was used and followed, the OSP was not appropriate for the work. The work on the CPS was more extensive than typical maintenance. The OSP was not written for a transformer removal. EHS manual section 3210 documents the need for a TOSP in this type of situation. The investigation team looked at who should be aware of 3210 requirements, who is responsibility for identifying the need for a TOSP, and how the lab can ensure work is reviewed more closely by the responsible individual before beginning work.

A second theme involved the integrated work. There were three groups working in the same area on connected systems.

• The RF group was working directly on the CPS power supply.

• The EES electricians were responsible for hooking up the temporary transformer.

• Facilities contractors were performing maintenance on the MDP that feeds the power to the CPS.

Each of these groups was responsible for creating individual work plans and coordinating work through the accelerator operability manager. The coordination provided by the operability manager is vital to daily operations during maintenance periods. Additionally, the 0800 accelerator operations meetings provided an opportunity to discuss work planning and ongoing work. Even with this level of coordination, there are areas that make work planning and information sharing difficult. First, Engineering and Facilities have different systems for creating WCDs. In the case of the Facilities contractor, they develop an Activity Hazard Analysis (AHA) whereas the accelerator and engineering use the EHS Task Hazard Analysis (THA) when doing work planning. These plans are developed independently within their groups with a focus on their specific tasks. Next, while all groups were shown to schedule work through the ATLI system, the work details throughout the tasks were inconsistent and sometimes incomplete. Also, direct communication between workgroups could be improved for tasks involving hazardous energy. The investigation team noted a job walk down with all groups involved did not happen. This could identify turnover points

where communication between groups would be necessary. For example, once the MDP work was complete, the Facilities representative should contact the RF group directly so they understand that there is now a functional breaker that affects the RF group that is not locked out.

For the long term, the lab has identified the need to improve our work integration and hazard identification process. A new Epass system focusing on improving safety is being developed and has the capability to address many of the problems identified in our investigation. The findings of this investigation have already been shared with staff members tasked with the development of the system and investigation team members are also involved. Immediate corrective actions are identified in this report to address deficiencies while the new system is developed.

With respect to the stop-work order, the order was lifted on 10/28/2020 following changes to the existing CPS OSP. The change to the OSP was that the lockout location was moved to the Main Distribution Panel. This would eliminate the possibility for lead side power to exist in the CPS during work even in a situation where the lead cover was attached incorrectly. However, the investigation team also noted that similar problems may exist on older power supplies at JLab.

Causal Analysis

Judgement of Needs

Doe Cause Code: A4: Management Problem

Risk Code: 3

Type: ORPS **ORPS Significance:** Low **Associated Report Number:** SC--TJSO-JSA-TJNAF-2020-0002

Management failed to recognize the exposed 480V conductors (no lock) in close proximity to unaware workers. See root and contributing causes for details.

Corrective Action:

Action Owner(s): Harry Fanning, Ken Baggett, Theo Larrieu **Due Date:** 02/12/2021

Implement temporary improvements to task list systems that ensure proper alignment and effective use of ESH Manual required work control documents per 3210 T1 section 4.2 (recognizing the ePAS will eventually assume this function) . Improve effectiveness of work planning and integration for jobs with pre-mitigated risk codes ≥ 3 . Require that supervisors review the tasks' potential impact(s) on others, that associated WCD's are appropriate to the planned work, and that a pre-job walkdown with impacted supervisors is conducted, all evidenced by supervisor signoff.

Evidence of completion: An step added into the work planning tools (XXList) for tasks with pre-mitigated RC ≥ 3 requiring the work supervisor to authorize the task before it can proceed. Produce a minimum list of items the work supervisor must check before providing the authorization to proceed. At a minimum the list must include checks of:

1. appropriateness of associated WCD and that it is attached to the XXList entry, (does it properly and thoroughly cover the planned work, should it be extended to cover other work or should another document be produced, is it current, have all the workers read/trained on the WCD)
2. proper notification of all parties affected by the work is made in the XXList entry, if the parties are directly affected (their equipment is de-energized, moved/altered, functionality effected, etc.) that they have been contacted and work coordinated with them.
3. that a pre-job walk down has been conducted with relevant stakeholders
4. that the pre/post-mitigated risk codes are properly evaluated and assigned

Corrective Action:

Action Owner(s): Bob May, Theo Larrieu **Due Date:** 03/12/2021

Evaluate the upcoming ePAS system during the contract discovery phase to verify that it will meet these same requirements as referenced in this previous action (Implement improvements to task list systems that ensure proper alignment and effective use of ESH Manual required work control documents per 3210 T1 section 4.2 . Improve effectiveness of work planning and integration for jobs with pre-mitigated risk codes ≥ 3 . Require that supervisors review the tasks' potential impact(s) on others, that associated WCD's are appropriate to the planned work, and that a pre-job walkdown with impacted supervisors is conducted, all evidenced by supervisor signoff.).

Evidence of completion: ePas specification document or screen shot that shows these criteria can be met and will be implemented into the final product.

NOTE: Ensure communications of activities throughout the task lifecycle are accessible when they effect equipment/activities being operated by separate divisions with a particular focus on utilities which contain distributed hazardous energy

Corrective Action:

Action Owner(s): Rick Nelson **Due Date:** 12/18/2020

Modify the CPS LOTO OSP (or associated WCD) to inspect the condition of the required internal guards to ensure they are in place and properly configured.

Evidence of completion: Updated OSP (or associated WCD) that specifies a step for visual inspection of proper guard configuration and satisfactory condition.

Note: This is an immediate action. The following action should be used to deal with long term improvement.

Corrective Action:

Action Owner(s): Tim Fitzgerald **Due Date:** 01/31/2021

Publish a Safety Flash outlining the additional step of guard inspection as a feature that similar OSPs should include.

Evidence of completion: Published/distributed safety flash.

Root Cause

A4B3C09 - Management Problem / Work Organization and Planning LTA / Work Planning not coordinated with all departments involved in task)

Contributing Cause

A3B3C06 - Human Performance LTA / Knowledge Based Error / Individual Underestimated the Problem by using past events as basis)

Contributing Cause

A1B2C01 - Design/Engineering Problem / Design Output LTA / Design Output Scope LTA)

Extent of Condition Check

Risk Code: 3

Type: ORPS **ORPS Significance:** Low **Associated Report Number:** SC--TJSO-JSA-TJNAF-2020-0002

All other equipment of this nature should be checked to ensure that the leads are properly guarded.

All locks and tags should be reviewed to make sure that that the name on the tag matches the lock and that the equipment identified on the tag, if any, is the correct piece of equipment.

Does this event involve failed equipment? NO

Is there similar equipment in other areas? YES

Corrective Action:

Action Owner(s): Harry Fanning, Theo Larrieu, Tim Fitzgerald **Due Date:** 03/12/2021

Conduct an extent of condition check for installed engineered safety measures on ALL class 2-3 electrical/electronic equipment when that equipment is accessed for service. Add a step (checkbox) in the WCD (TOSP/OSP/LOTO procedure) to note what safety equipment must be inspected upon access to the internal structure of the equipment. Create an assessment program within ESH to validate that extent of condition checks are being carried out. Ensure the assessment is

conducted opportunistically during an equipment access and in coordination with the system owner.

Evidence of completion: A modified WCD form(s) including the new inspection step for internal engineered safety measures (ex. internal guards). A modified XXList output with the added reminder box in the Electrical Work Checklist area noting the need to check internal engineered safety measures when accessing the equipment. A documented assessment plan from ESH to validate extent of condition checks are being carried out.

Records, Documents, Pictures, and Other References

OSP link https://mis.jlab.org/mis/apps/mis_forms/operational_safety_procedure_form.cfm?entry_id=101733

AtLis link <http://opsweb.acc.jlab.org/CSUEApps/atlis/task/20393>

Emergency Notifications Made (Subsequent to the Event)

ESH&Q Reporting Officer (876-1750): 10/14/2020

Other (Steve Neilson): 10/14/2020

Documentation of Findings

Notable Event Number: ENG-20-1014

CATS Number: NE-2020-18

Lessons Learned Number: [No Data]

ORPS Number: SC--TJSO-JSA-TJNAF-2020-0002

NTS Number: 10097

CAIRS Entry: N/A

DOE Cause Code: See attached

ISM Code: Analyze the Hazards

Signatures

Investigation Team Ken Baggett (baggett) 12/16/2020 09:00:49 AM

Investigation Team Steve Smith (sjsmith) 12/16/2020 09:10:42 AM

Investigation Team Tim Fitzgerald (tfitzger) 12/16/2020 10:08:02 AM

Associate Director / Department Manager Will Oren (oren) 12/16/2020 05:30:19 PM

Attachment: "20-10-14 Steve Suhring Witness Statement 1L13 CPS .docx" could not be added.

Attachment: "Bonnie Rodriguez statement Memo.docx" could not be added.





Attachment: "Howard Dunlap witness statement.docx" could not be added.

Attachment: "Phillip Stanley.docx" could not be added.

Witness Statement Form

Name: Tim Fitzgerald	Job-Title: Electrical Safety Program Manager
Telephone #: 757.269.7052	Supervisor: Bill Rainey
Work Location: ES&H	Event Time/Date: 1000/10.14.2020

Describe the sequence of events from the start of the task to when the event occurred (use additional paper as needed). I was working from home in compliance with MEDCON 5 protocols. At 1049 on 10.14.2020, Bonnie Rodriguez sent me a picture of exposed terminals on the back side of a breaker through instant message on Microsoft Teams. She explained that the line side of the breaker was connected to a 480VAC transformer and that power was not secured using Lockout/Tagout procedures. Bonnie could not tell me what equipment this was or who owned it, so I recommended to her to contact Steve Suhring to identify whose equipment was in the picture. I also requested Bonnie to ensure that power coming from the Main Distribution Panel be secured using Lockout Tagout and was informed that it had been done. At 1132 Bonnie sent an email to Steve Suhring detailing the findings. 1143 Steve replied requesting that Bonnie contact Rick Nelson to address the issue. Due to MEDCON 5 restrictions, Steve and Rick were both working offsite. At 1300, I contacted Steve Suhring to discuss the issues at 1L13 and sent a message to Bill Rainey, Steve Hoey, and Will Oren requesting a meeting at 1500 to discuss. Steve Suhring and I discussed SAD calendar and what could potentially be impacted with the CPS work. We also discussed the timeline of events that led to this. At the 1500 meeting, Steve Hoey, Bill, Will, and I discussed the next steps in this and my recommendation was to initiate an investigation due to a near miss and LOTO violations. The four of us agreed that a STOP work order was correct and that an extent of condition check was necessary on the CPS units that are actively being worked on.

Describe the work and conditions leading up to the event (use additional paper as needed).
Teleworking from home.

Note anything unusual you noticed leading up to the event (sight, sounds, odor, etc...)
N/A

What was your role?
Electrical Safety Supervisor.

What conditions influenced the event (weather, time of day, equipment malfunction, etc...)

What other people were in the area?

Additional comments/observations:

Signature: *Timothy Fitzgerald*

Date/Time: 10.15.2020

Attachment: "Witness Statement (Charles Garrison).docx" could not be added.

Attachment: "Witness Statement (David Gelhaar).docx" could not be added.

Attachment: "Witness Statement (Timothy Davis).docx" could not be added.

Attachment: "Witness Statement_RN_201018.docx" could not be added.

Attachment: "Witness Statement PLP - LOTO Incident.docx" could not be added.

Attachment: "Timeline 1L13 CPS LOTO.docx" could not be added.

Attachment: "RCA Diagram ENG-20-1014 rev7.xlsx" could not be added.

Attachment: "Corrective Actions.docx" could not be added.