

Notable Event Report

Title of Event			
Event Title:	Shoulder Injury During Disassembly Task		
Date and Time of Occurrence:	03-MAR-2016 11:00am	Notable Event Number:	ACC-16-0303
Event Location:	Test Lab Addition - 1043	Date Notable Event Report is Due*:	15-APR-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 March 3rd, 2016 at approximately 11am in the morning, a worker while attempting to loosen bolts on hardware attached to a 9-cell cryomodule cavity felt and heard an audible pop in their shoulder. They did not think anything of the incident and continued working. Over the weekend, the symptom of pain in shoulder did not go away and Employee #1 reported the incident to their supervisor the following Monday during a toolbox meeting. Employee #1 was evaluated by OccMed on Wednesday when the doctor was available.

Timeline:

- Thursday 03-MAR-2016 – 11:00 Employee #1 assists Employee #2 with disassembly of hardware from a 9-cell cavity because Employee #2 was having trouble breaking the bolt/nut contact hearing a “Pop” from their shoulder but continues to work.
- Friday 04-MAR-2016 – Employee #1 Continues to work as normal with slight discomfort.
- Monday 07-MAR-2016 – During toolbox meeting, Employee #1 notifies supervisor of incident and potential injury, supervisor tells Employee #1 to contact OccMed.
 - Supervisor gives ½” socket head wrench to Employees #1 and #2 to replace 13mm open-end wrench to aid in future disassembly tasks.
- Tuesday 08-MAR-2016 – ~08:00 Employee #1 visits OccMed and is informed that Dr. Chandler will not be back until Wednesday
- Wednesday 09-MAR-2016 – Employee #1 visits Dr. Chandler at OccMed and Employee #1 is diagnosed with “Right shoulder injury of uncertain severity.”
 - Employee #1 referred to an Orthopedist for further evaluation with work restrictions pending the further evaluation.
 - 16:37 OccMed releases preliminary visit report
- Monday 14-MAR-2016 – 15:00 Fact Finding convened after CAIRS determination is positive.
- Tuesday 16-MAR-2016 – 10:00 Safety Observation of 5-cell cavity acid processing performed.

Fact Finding Meeting: March 14th, 2016 – 15:00

Items of discussion during the Fact Finding Meeting:

1. Supervisor had performed similar task with same tools without an issue.
2. Employee #2 had removed two bolts from hardware without issue using same tools.
3. Employee #2 could not loosen the next bolt which was oriented above their head, so Employee #1 attempted to loosen said bolt/nut when both Employee #1 and #2 heard a loud “Pop” from Employee #1’s

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

- shoulder. Employee #1 also said they felt the “Pop” but did not think anything of it as they feel “pops and grinds” all the time.
4. Employee #1 completes disassembly work with Employee #2, not thinking anything of the “Pop” sound.
 5. Employee #1 continues working as normal with slight shoulder discomfort the following day.
 6. Employee #1 felt something wasn’t quite right but decided to see if the issue would correct itself over the weekend.
 7. When issue did not resolve over the weekend, Employee #1 contacted their Supervisor regarding incident.
 8. Supervisor advised Employee #1 to go to OccMed (07-March-2016.)
 9. Supervisor also gave Employee #1 a 1/2” socket wrench to replace 13mm open-ended wrench as it would provide a longer lever arm to ease “breaking” the connection.
 10. All bolts were reported to be torqued to 27 Ft-lbs as more torque risks damage to assembly. No evidence showed damage to flanges or gaskets leading to assumption of proper torque values.
 11. Proper use of dissimilar metals would prevent metal galling but dramatic temperature change during processing may contribute to bolts becoming “frozen.”
 12. Employee went to OccMed the following day, but the doctor was not in (08-March-2016.)
 13. Doctor returned call and saw Employee #1 the next day (09-March-2016.)
 14. 1st set of fixtures these employees had to disassemble from cavities.
 15. Normal disassembly process takes place by other assembly employees but did not take place as it would have introduced unwanted unclean environment to cavity.
 - a. At the request of the Chem Room Techs, the Assembly team will safely loosen these bolts in the future before delivering the cavity for processing.
 16. Cavity was in a fixture which did not lend to an ergonomically friendly disassembly, bolt and nut grouping was above the head of Employee #1 & #2, while a second grouping was below the knees making disassembly task awkward.
 17. Cavity was in an upright position to avoid “pooling” of process chemicals, forcing workers to disassemble the cavity in an awkward position.
 18. Dedicated motorized BackTech[®] lifting equipment (similar to those currently in use in the Cleanroom and Cryomodule Measurement areas) was suggested by chemical techs during the fact finding meeting. This would allow for safe positioning of the fixture & cavity to a comfortable and more ergonomic height to allow safer disassembly.
 19. Additional issues were mentioned by chemical techs regarding bench chemistry activities within the current fume hoods with a potential for introduction of additional hazards. A safety observation was scheduled to observe these issues on March 16th, 2016. An ergonomic assessment on Chem room tasks (starting with injury task) scheduled with Dr. Chandler on April 7th, 2016.

Causal Analysis: (Use attachment as necessary)

Root Cause:	Process changes were made in order to ensure the quality of processed cavities but without fully reevaluating all tasks for additional hazards associated with the changes.
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Causal Analysis: (Use attachment as necessary)

A change was made in historical process steps to keep the cavity in a vertical orientation after cavities are processed. Due to this change in process, disassembly tasks normally carried out in a horizontal orientation, which is more ergonomically friendly for both ends of the cavity, now needed to be carried out above the worker's head and below their knees. Workers used a step ladder to gain better access to the bolt pattern above their heads and kneeled for the bolts below their knees, but used methods which were not ergonomically sound and an employee was injured. While the methods used in the task were cursory evaluated by the supervisor and thought to be satisfactory, the job was not fully evaluated for all hazards prior to execution due in part to a lack of understanding in what to look for.

In addition to the orientation change, another process change was made in an effort to keep the quality of cavity processing at a high level. Assembly Techs who normally would disassemble the cavities were asked to forward the cavities to the Chemical Techs for processing and disassembly. During the investigation, it was noted that while disassembly tasks were similar to other disassembly tasks Chemical Techs provide on a routine basis, the Chemical Techs were not used to the process of disassembling cavities with torqued bolts or while it was in a vertical orientation. It was also noted that different levels of physical capabilities between the work groups may have played a part in the incident.

Management believed that no variability existed in the new process steps and overlooked the fact that a change had occurred leading to differing results than normally realized. These changes were not fully evaluated to see if the different process steps added additional hazards.

DOE Cause Code:

A3B3C04 – LTA Review Based on Assumption that Process Will Not Change

Contributing Causes:

(List as many as apply.)

Along with the Root Cause, several Contributing Causes (or Causal Factors) were identified during the causal analysis and are described below.

The Direct Cause of the incident was due to the Ergonomics being Less Than Adequate (LTA.) The worker manipulated a wrench in an awkward position due to the fixture height, the motion needed to free the nut/bolt from its torqued configuration and the fact that there was a change in process which mandated having the cavity oriented in an upright position versus the historic and more accessible horizontal plane. The orientation and motion to free the bolts were not ergonomically sound and the worker was injured during the process step.

A contributing factor was that Employee #1 underestimated the problem based on evidence of success from a previous event. At least two cavities had recently been disassembled with the same tools without incident. When Employee #2 experienced problems while attempting to unbolt the cavity from the fixture, Employee #1 attempted to unbolt the cavity using the same tools without considering the evidence from Employee #2's failure and possible physical limitations of Employee #1 before proceeding based on the prior success.

Another contributing factor to the event was the job scoping did not identify special circumstances and/or conditions that exist due to alterations to historic task performance. Previously, cavities could be manipulated into an orientation to allow ease of

Causal Analysis: (Use attachment as necessary)

assembly/disassembly. However, recent requests were made to ensure cavity processing quality by keeping the cavity oriented in an upright position versus the historic horizontal and ergonomically friendly orientation. Because the cavity had to be held in an upright position, the normal disassembly tasks were made more difficult due to the creation of awkward angles of the task that did not exist before.

Improper tool selection used for the task was based on previous success with the same tools by another employee during an identical task.

Work plan did not adequately account for all off normal activities and this causal factor is related to the Root Cause:

- Assembly Techs usually carry out disassembly tasks on cavities. An updated process put the disassembly tasks in the hands of the acid techs to reduce the risk of contamination after processing if sent back to the Assembly Techs.
- Cavities needed to be held upright to meet proper processing requirements. Unfortunately, this orientation made it difficult to access all flanges needing disassembly and the ergonomics for this task in the requested orientation was not properly assessed or mitigated prior to task performance.

DOE Cause Codes:

A1B5C01 – Ergonomics LTA [DIRECT CAUSE]

A3B3C06 – Individual underestimated the problem by using past event as basis

A4B3C08 – Job scoping did not identify special circumstances and/or conditions

A4B5C10 – Change-related equipment not developed or revised

Extent of Condition Check		<u>JLab CATS Number</u>	Target Date	Action Owner
See Corrective Action items listed below				
Does this event involve failed equipment?	Y N <input checked="" type="checkbox"/>	Is there similar equipment in other areas?	Y N <input checked="" type="checkbox"/>	** If yes, assign extent of condition check to the appropriate DSO(s).

Corrective Action(s)	<u>JLab CATS Number</u>	Target Date	Action Owner
Conduct an evaluation (Safety Observation) of Production Room bench chemistry activities to identify any other safety concerns (non- ergonomic) and provide the report and recommended improvement actions to SRF Chemical Management for review and consideration. Evidence of completion: Safety Observation link	NE-2016-06-01-01	16 May 2016	Fanning/Davis

Corrective Action(s)	<u>JLab CATS Number</u>	Target Date	Action Owner
<p>Investigate alternatives to Production Chemistry Room task execution and fixtures based on the evaluation (Safety Observation Report).</p> <p>Evidence of completion: Closed CATS entry with statement of actions taken to satisfy Safety Observation Findings</p>	NE-2016-06-01-02	30 Dec 2016	Kirk Davis
<p>Conduct an ergonomic assessment of Production Chemistry standard and abnormal tasks.</p> <p>Evidence of completion: Email from Dr. Chandler with suggestions</p>	MOA-2016-21-01-01	7 Apr 2016	Dr. Chandler
<p>Develop an ergonomic overview for supervisors to assist them in recognizing ergonomic issues needing Subject Matter Expert review.</p> <p>Evidence of completion: E-mail from ES&H on path forward or final training slides.</p>	NE-2016-06-01-03	30 Dec 2016	Fanning/Dr. Chandler

Lessons Learned (Confer with Lessons Learned Coordinator) (Use attachment as necessary)	<u>Lessons Learned Number</u>
<p>Employee became discouraged when they failed to receive feedback from their supervisor with regards to the status of previously identified concerns. The employee further became reluctant to provide additional concerns to their supervision with the idea that they too would not be addressed. In reality, the previously identified concerns were being addressed by the supervisor and management, but incomplete feedback from the management led the employee to believe they were not being addressed.</p> <p>To promote an atmosphere of inclusiveness and enhance overall employee engagement, and to encourage continued feedback within the organization, it is important to close the loop with personnel so they know their feedback is being handled, even if progress is slow.</p>	956
<p>During scope creep, it is important to reassess and ensure correct work planning and control is implemented before work continues. New hazards can be introduced during scope creep and without stopping to reassess the situation, any unmitigated hazards could cause unwanted consequences.</p> <p>Always stop and reassess scope creep to ensure all hazards are mitigated before continuing.</p>	956
<p>Always review tool usage during job specific hazard analysis to ensure worker safety. Ensure the right tool is on hand at the time of task performance and reassess hazards for any tool substitution before continuing work.</p>	956

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

Technician

On Thursday March 3, 2016 around 11am, Ashley and I pulled a LCLSII 9 cell cavity out of the pass-through to remove studs and nuts from the flanges as part of a procedure. Using the wrenches provided and used by my supervisor on a previous cavity, two open end 13mm, I proceeded to pry the nuts loose when I heard and felt my shoulder pop. I kept working at removing the nuts to work it off. I didn't think much of it, and thought it would go away. I did not report the incident immediately. I informed my supervisor, that we had the incorrect wrenches and he provided a socket wrench to use instead. I thought resting over the weekend would allow the injury to heal, but when it was still sore on Monday, I reported it to (supervisor).

Production Chemistry Supervisor

Sometime during the workday on Monday, March 7th, (Employee #1) Informed me that her shoulder was hurting. (Employee #1) believed it happened while removing a nut from a stud the previous Thursday (March 3rd, 2016). We both agreed she should report to Occ. Med.

Tuesday morning (March 8th) (Employee #1) went to see Occ. Med. but Dr. Chandler was not in. Dr. Chandler got in touch with (Employee #1) the following afternoon (March 9th) and examined her. He put (Employee #1) on work restrictions pending further examination.

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

SRF Ops SME supplementary statements regarding Notable Event # ACC-16-0303:

- 1) I do not concur with the Causal Analysis. Specifically, I have concluded that the supervisor's reevaluation of all tasks for additional hazards associated with the process changes did not contribute to the injury. The supervisor reevaluated the new task by first performing the new task himself before assigning the task to his direct reports. Furthermore, Employee #2 successfully removed two fasteners using the guidance provided by the supervisor. I have concluded that the root cause was that Employee #1 did not stop and re-evaluate the situation when Employee #2 experienced problems while attempting to complete the task. I assert that freeing a stuck fastener is within all reasonable expectations for a senior chemical technician (employee #1), and that Employee #1 had adequate and recent experience with a wide range of fasteners, including the type of fastener involved in this incident.
- 2) I would also like to add information regarding Lessons Learned, first item. Specifically, while the item description is an accurate representation of Employee #1 statements during the initial fact finding meeting, there is no amplifying information included in the NE report that describes the SRF Operations system for tracking employee safety concerns that existed at the time of this incident. It is not stated whether Employee #1 ever tried to use the existing system to get feedback on his/her concerns. It is not stated whether Employee #1 had ever asked anyone for feedback on his/her previous concerns.

Kirk Davis

Senior Engineer

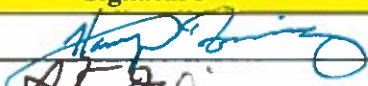


SRF Cavity Processing Group Leader

Emergency Notifications Made (Subsequent to the Event):	Date	Time
Fire, Rescue & Emergency Medical: (9-911)		
Guard Post: x5822; 269-5822		
Occupational Medicine 269-7539	08-Mar-2016	08:00
ESH&Q Reporting Officer: 876-1750	09-Mar-2016	16:37
Crew Chief 630-7050		
Industrial Hygiene: 269-7863:		
Other:		


Confirmation Review Distribution: Investigation Team Members Affected Division Managers ESH&Q Reporting Officer	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.
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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		29 JUN 16
SRFOPS SME	Kirk Davis		29 Jun 16
ESH&Q	Tina Johnson		29 Jun 16

Acceptance/Acknowledgement of Facts

	Print	Signature	Date:
Associate Director/ Department Manger	Andrew Hutton		7/13/16

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)

Notable Event Number:	ACC-16-0303
CATS Number:	NE-2016-06-01, MOA-2016-21-01-01
Lessons Learned Number:	956
ORPS Number:	N/A

<u>NTS Number:</u>	
<u>CAIRS Entry:</u>	16-0303
<u>DOE Cause Code:</u>	A3B3C04, A1B5C01, A3B3C06, A4B3C08, and A4B5C10
<u>ISM Code:</u>	Analyze Hazards, Develop and Implement Hazard 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:	14-Mar-2016	Time:	15:00
		Location:	TEDF - 2559
Required Attendees: (Print Name)		Optional Attendees: (Print Name) Present	
Lead Investigator:	Harry Fanning	Associate Director:	Andrew Hutton Notified
ESH&Q Representative:	Tina Johnson	TJSO Observer:	Steve Neilson (invited)
Supervisor of involved persons(s):	Jim Follkie	<u>Subject Matter Expert(s)</u>, Facility/Equipment Owner as applicable:	
Involved or impacted person(s):	Teena Harris	Johnie Banks	
		Jim Follkie	
Witness(es):	Ashley Anderson		

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. Summary of Event and/or Injuries 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 – Subject-Matter Expert (SME) confirms work conditions.	✓
6. Stop Work or the Tag Out Required? If “Yes” – establish the restart criteria and inform the affected Management chain.	N/A
7. Compensatory Actions Required? If “Yes” determine responsibility and include confirmation documentation.	N/A
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.	✓

Step 2 Investigation Team:		Date Convened: (Within 24 hours of Fact Finding Meeting.)	Followed Fact Finding	
Role	Name	Department/Group	Phone	
Lead Investigator	Harry Fanning	Accel/ACCMGT	7619	
SRFOPS SME	Kirk Davis	Accel/SRFOPS	6086	
ESH&Q	Tina Johnson	ESH/ESHDIV	7611	
TJSO Observer	Steve Neilson	TJSO	7215	

Environmental Aspects			
Type of Material Released:		Quantity:	
n/a		n/a	
Source:		Time Flow was Halted or Controlled:	
n/a		n/a	
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)

ORPS Determination:	Date: 03/14/2016	Time: ~1:30 pm
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CAIRS/ORPS/NTS Determination: Accelerator Ops Incident Notification

From : Tina Johnson <cjohnson@jlab.org> Mon, Mar 14, 2016 02:09 PM
Subject : CAIRS/ORPS/NTS Determination: Accelerator Ops Incident Notification 1 attachment
To : Steve Neilson <sneilson@jlab.org>
Cc : Harry Fanning <fanning@jlab.org>, Mary Logue <logue@jlab.org>

All:

OSHA Recordkeeping Evaluation: Based on the information below, this case is recordable (DART).

Which work-related injuries and illnesses should you record?

Record those work-related injuries and illnesses that result in:

- ▼ death,
- ▼ loss of consciousness,
- ▼ days away from work,
- ▼ restricted work activity or job transfer, or
- ▼ medical treatment beyond first aid.

Based on information obtained so far, we do not believe the event meets ORPS reportable criteria.

We will follow the Notable Event Process and we will complete the CAIRS entry within the 7 day time limit. Please call me with any questions or concerns.

Thank you,
 Tina

On 3/14/2016 4:37 PM, Tina Johnson wrote:

10 CFR 851 Screen:	Date: 03/14/2016	Time: ~1:30 pm
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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	Tina Johnson	02/22/16	02/22/19	1.6

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