

(See ES&H Manual Chapter 5200 Appendix T1 Event Investigation and Causal Analysis for Instructions)

Click For Word Doc

Notable Event Report

Title of Event							
Event Title:	Event Title: Employee Shocked While Using a JLG Manlift- No Injuries						
Date and Time Occurrence:	e of	08/29/2016 ~ 10:00AM	Notable Event Number:	PHY-16-0829			
Event Locatio	n:	Hall A	Date Notable Event Report is Due*:	09/29/2016			

^{*}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 August 29, 2016 around 10:00 AM a worker in Hall A was using a portable band saw that was plugged into an electrical outlet on the JLG-manlift when he felt a slight shock in his forearm. The employee notified his supervisor and reported to Occupational Medicine. He was determined to be uninjured and was permitted to return to work.

The manlift was tested and it revealed approximately 48 volts AC (VAC) from the structure of the man lift to an earth ground. The connection to the manlift 120 volt circuit was locked and tagged out. There was no indication of damage to the manlift or the electrical system. Facilities Management and Logistics subcontractors inspected the equipment on August 30, 2016 and it was determined by process of elimination using a volt/ohm meter that the internal power cord must be damaged. When the internal power cord was plugged in to 120 volts AC wall power, there was a repeatable 48 VAC between the body of the man lift and earth ground and then when power was removed from the internal power cord the 48VAC disappeared. Discussions with hall staff and the Facilities Management and Logistics subcontractors determined that the internal cord had leakage to the body of the man lift. The internal cord was replaced.

Notes:

The JLG manlift was plugged into an internal wall outlet, not a GFCI receptacle. The electrical outlet that the portable band saw was plugged into within the man lift basket was a GFCI receptacle. The circuit fault appeared on the structure of the JLG manlift, in the circuitry before the GFCI receptacle in the man basket, and therefore no GFCI protection was provided to the worker in this scenario.

A JLab employee visually inspected and tested the bandsaw with a digital ohm meter and there were no shortages or damage noted. This test was performed by a JLab employee as a precautionary measure following the event.

Visual inspection of the equipment prior to use would not have found this failure mode. The JLG manlift is inspected every 6 months and the most recent inspection (3/2016) found no issues with the internal power cord. The semi-annual inspection does not include a specific test of the GFCI receptacle and/or power cord.

Conversation with the JLG manlift manufacturer revealed no record of this specific issue scenario.

Events:

The JLG manlift contractor replaced the integrated 120 volt power cord on the Hall A manlift. The contractor also replaced the internal 120 volt power cord on the Hall C manlift, as a precautionary measure, since this lift was of similar style and age.



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

Following the repair the Hall A personnel checked the manlift using a digital Fluke 77 multimeter and measured approximately 30 VAC to an earth ground.

A check of the Hall C manlift was also checked since the internal power cord was also replaced and it also was exhibiting ~30 VAC to earth ground when the manlift was powered through a 120 volt wall receptacle.

Observing that some voltage issue still appeared, the following subsequent testing took place to determine the source of the voltage:

- 1) The manlift was relocated from outside the Hall A enclosure and then powered by another 120 volt wall receptacle (the thought was possible noise on a ground loop within the Hall enclosure).
- 2) A measurement was taken between the JLG manlift frame and an earth ground separate from the lab electrical grounding system; a metal pipe embedded in the ground, near where the JLG manlift was parked, was used (the thought was to use an even more remote ground point).
- 3) The JLG manlift was powered by a portable generator (the thought was to eliminate any connection to the lab electrical distribution system by using a separately derived source of power).

All of the three test setups above still showed ~30 VAC between the JLG manlift frame and a grounding point. At the time of test measurements different models of multimeters (Amprobe-20 and Fluke 77) were used because of availability. During one of the measurements of the setups above it was noticed that the JLG manlift was no longer recording a voltage reading. This specific voltmeter (Amprobe-20) was then rechecked at the wall power receptacle and it read 120 VAC. Then when used on the JLG manlift again it read 0 VAC again. At this point a second meter (Fluke 77) arrived and it measured ~30 VAC between the JLG manlift and a ground. At this point in time the meter (Amprobe-20) that was reading 0 volts was thought not to be working correctly and all other measurements were taken with the Fluke 77 voltmeter.

After further follow up investigation it was determined that the 30 VAC may be from what the industry refers to as a "Ghost" voltage. Ghost voltages occur from having energized and non-energized wiring located in close proximity to each other, such as in the same conduit or raceway. This condition forms a capacitor and allows capacitive coupling between the energized wiring and the adjacent unused wiring. In the case with the JLG manlift, the 120 volt internal cord is ran alongside and bundled with other cords and hydraulic lines.

Most digital multimeters available and used today have an input impedance that is high enough to show the capacitively coupled voltage, giving a false impression of a voltage measurement. Having a high input impedance means that when the digital multimeter is placed across a circuit for a measurement, it will have little effect on circuit performance. This is the desired effect for most voltage measurement applications and is especially important for sensitive electronics or control circuits. The main advantage of low impedance input test tools is that they are not susceptible to "Ghost" voltage as they do not pick up stray magnetic fields.

With thought of this phenomenon, a new test set up was made using two different styles of multimeters. Meter #1 (Amprobe-18) had a high input impedance of 10 Megohms and meter #2 (Amprobe-20) had a low input impedance of 750 Kilo-ohms. The results of the test were that both meters displayed 120 VAC at the wall outlet but when the JLG manlift was measured with respects to ground the high input impedance meter read 30.* VAC and the low input impedance meter read 0 VAC.

With the suspicion of a "Ghost" voltage being measured, another test was sought out to further verify this new conclusion. A Fluke SV225 "Stray Voltage Eliminator" adapter was purchased and used with the high input impedance meter (meter #1). With the combination of the SV225 and meter #1, 120VAC was measured at the wall outlet, 0.167 VAC (basically 0 VAC) was measured between the JLG manlift and an earth ground, and then 120VAC was measured at the wall outlet a second time. The SV225 Stray Voltage Eliminator is a digital multimeter accessory that allows measurements in circuits which may



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

be subjected to stray voltages encountered from adjacent energized wiring. The adapter provides an approximate 3,000 ohm load to the measured circuit, desensitizing the meter to low energy, spurious sources of interferences.

The final disposition is the ~30 VAC being measured is a "Ghost" voltage that is capacitively coupled from the energized internal power cord and that was being recorded with a high input impedance multimeter. Since the "Ghost" voltage is a physical phenomenon involving very small values of capacitance, it cannot energize a load or cause physiological damage to a person.

Causal Analysis: (Use attachment as necessary)							
I K OUT (BIICO.	Equipment failure- It was initially thought that the JLG manlift's internal power cord failed which presented the shock hazard (~45 VAC).						
Contributing Causes:	Failure to plug the JLG manliftinto a GFCI protected outlet within the Hall. Locating GFCI protection at the beginning of a circuit provides the maximum benefits (a gfci device only protects the downstream circuitry and not any portion of circuitry that is placed before the gfci device).						
(List as many as apply.)	The inspection checklist is LTA and does not cover all the necessary items to consider the equipment fully inspected. Although an inspection of equipment was complete prior to its use, the semi-annual inspections do not involve testing of the GFCI and the function of the internal power cord.						

Extent of Condition Check		JLab CATS Number	Target Date	Action Owner
Check all the other manlifts the similar to this JLG manlift to the built in power cord is in gworking condition. Evidence of completion: Reputhe contractor	ensure tha ood	NE-2016-18	10/30/2016	Manny Nevarez ** Assigned to the SOTR that handled the contract for the maintenance of this equipment.
Does this event involve failed equipment?	Y N	Is there similar equipment in other areas?	Y N	**If yes, assign extent of condition check to the appropriate DSO(s).

Corrective Action(s)	JLab CATS Number	Target Date	Action Owner
Have the contractors inspect, diagnose and fix the failure in the defective manlift. Evidence of completion: Report or email from contractor with the results	NE-2016-18	10/30/2016	Manny Nevarez
ISM poster to increase awareness of the requirement and proper use of GFCI protection when using extension cords to supply power to equipment used by a worker. Evidence of completion: ISM poster.	NE-2016-18	1/31/2017	M.J. Bailey



Corrective Action(s)	JLab CATS Number	Target Date	Action Owner
Have the contractor add inspection of the 120 volt integrated power cord circuit within their JLG manlift inspection checklist for the lab. At a minimum this should include a visual check of accessible portions of the power cord and an operational check of the 120 volt gfci receptacle in the man basket. The operational check of the receptacle should include a test of the gfci receptacle and verification that the receptacle outlet has the correct polarity and continuity; all to which can be done with a handheld gfci/circuit tester. Evidence of completion: Updated Checklist/ Updated language in their contract	NE-2016-18	1/31/2017	Joe Thomas
Send communication to all JLG/Scissor lift owners that they need to ensure that all lifts are plugged into a GFCI wall outlet. Evidence of completion: A snap shot of the email communication	NE-2016-18	1/31/2017	Todd Kujawa
Retest the electric bandsaw tool with using one of the lab's "CLARE Safe Check 5" safety checkers. This unit will perform the following test -> ground-bound, short-to-case, short-to-line, and a leakage test. Evidence of completion: Email response from the person doing the test to the Reporting Manager.	NE-2016-18	1/31/2017	Todd Kujawa

Lessons Learned (Confer with Lessons Learned Coordinator) (Use attachment as necessary)	<u>Lessons</u> <u>Learned</u> <u>Number</u>
Improper use of GFCI protection may lead to a lessened level of protection from an electrical shock. It was later determined that the wall outlet used to power the JLG 120 volt cord was not powered from a gfci protected circuit. If the JLG manlift was plugged into a GFCI protected receptacle initially, then the employee would have benefitted from both let-go protection and protection against fibrillation because of the 4-6 milli-amp trip limit on a class A GFCI.	978
Technicians need to know whether their test tool has a low input impedance or a high input impedance. Technicians also need to understand the advantages and disadvantages of each.	978



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

A.L. Statement- Email 09/02/2016:

Hello Tina,

I was working on cutting into the LCW water line 15' above ground, using a portable band saw that was plugged into the JLG that I was in. The * extension cord that was plugged into the JLG was fed from the transcontainer. * There is a circuit breaker on the transcontainer and a GFCI on the outlet of the JLG. When I moved the JLG into position, I started cutting on the LCW pipe line. At this point the only contact I had with the basket of the JLG was my shoes. When cutting near the bottom of the LCW pipe, I moved position and rested my arms on the guardrail of the basket. At this point I felt a tingling sensation on my right forearm. I stopped cutting and looked at the guardrail where my arm was resting on. I figured I placed my arm on something sharp like chipped paint or a piece of metal that was protruding out. I felt around the area with one hand and felt nothing, so I assumed it was some chipped paint that flacked off, and went back to start cutting the LCW pipe. As I got back into position (at this point both my forearms were touching the guard rail but have not yet turned on the portable band saw) I felt the same tingling sensation on my right forearm. At this point I knew it was a shock and immediately informed my supervisor who was standing below me. He informed to stop work and come down off the JLG lift.

*This is actually a power cord and it was verified following the meeting that there was not a circuit breaker on the transcontainer

HF Statement: Email 09/01/2016

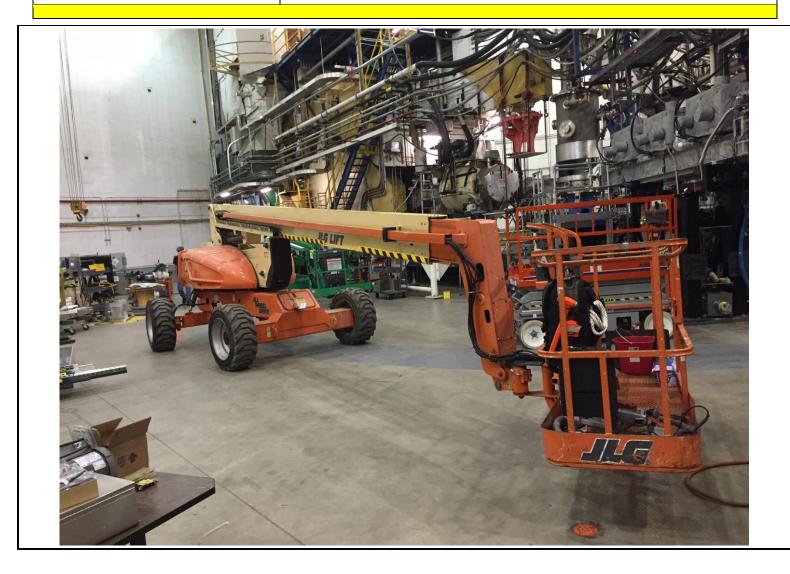
Andrew approached me and said he "thought" he got shocked, but he wasn't sure. I asked him how did it happened i.e. where was he working, what was he working on. He said he was using a band saw to cut a metal line, while working in the man lift. When I approached the man lift I noted he was using the outlet in the basket, so I checked the lift first. I measured 45 VAC between the lift and ground. The remote outlet was the most obvious culprit, so we unplugged the ** extension cord and the voltage went away. We checked the circuit a second time, and found the same results. We locked out the circuit, then Jessie Butler him to medical. ** actually power cord

Heidi called me on 9/1/2016 to inform me that she had visually inspected and tested the band saw as a precautionary measure with an OHM instrument (same tool used to test the power cord) and there were no shortages or damage noted.

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

the same revision as the current on line file. This copy was printed on 11/29/2016.

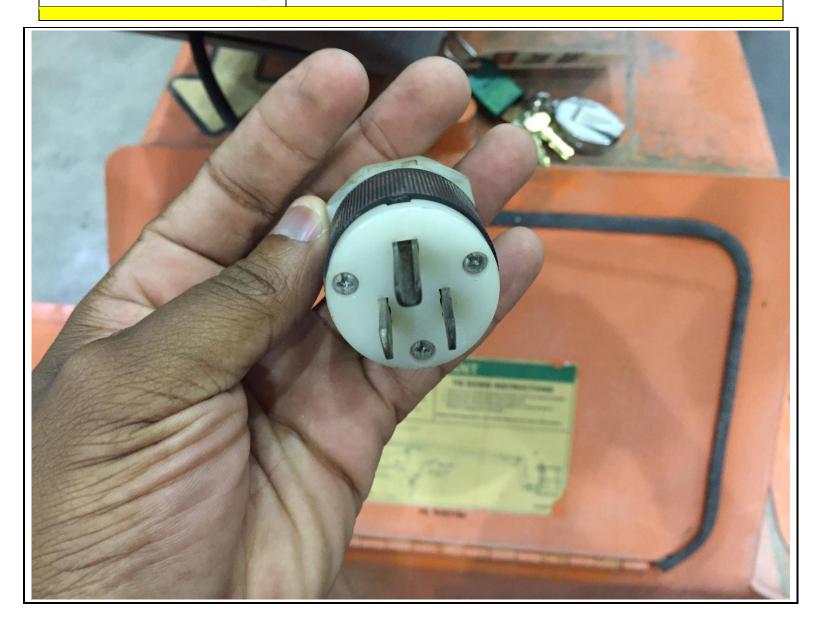




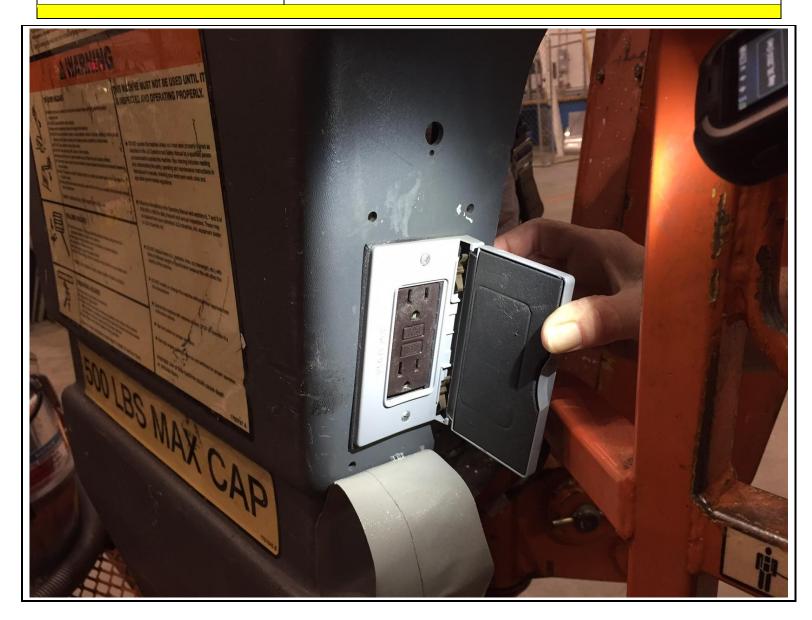




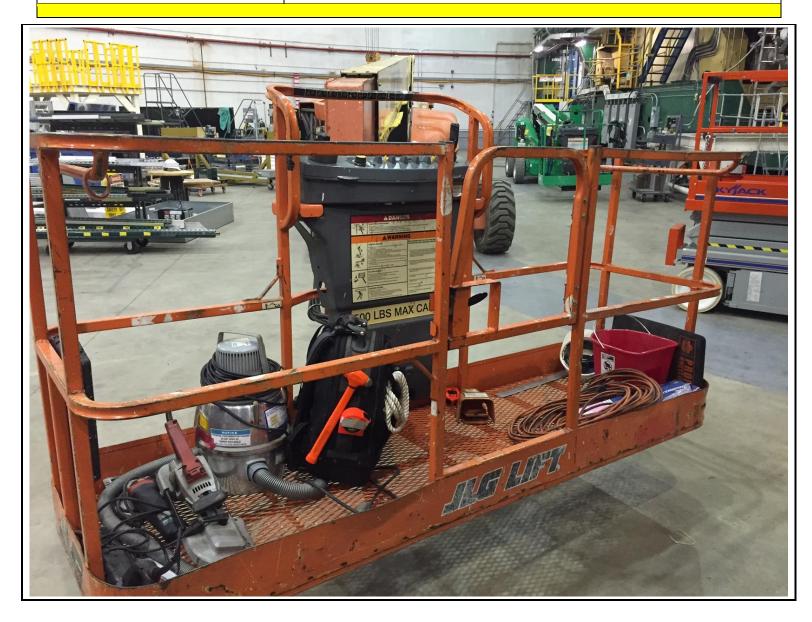














Witness Accounts: (Use attachments as necessary. Box will expand as necessary)





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





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

Double click on the image to the left and it will open the 2 page document

Colonial Powerlift, Ind 3.5 118

1594G Penniman Road, Williemsburg, VA 23185 Phone 877-220-0400 Fax 757-220-9241

MAINTENANCE INSPECTION REPORT

AREA OF INSPECTION ATFORMS AND BOOMS	Y	N	R	AREA OF INSPECTION	7 T Y	Ñ	R
Dil II	-	·· ··	-:: -	TURNTABLE CONTINUED	+		Ë
Platform	X	···-		Swing Break			_
Plettom: Gate	137			Swing Hub	一块		_
Platform Rotator	X	Τ.	-	CHASSIS	· T "	`-	_
Footswitch	×	ļ		Wheel & Tire Assembly	一大		
Controllers	- X	l≪.	20	Drive Motors	''TX		
Switches	12.	X,	7	Drive Torque Hubs	甘纸	-	
Lift Up/Platform Down Disable Switch	₩	ĮΥ	A	Drive Brakes	- 1 3%		
Placards and Decals	138	Ħ		Steer Cylinders	X		
Control Tags	130	17	Ŧ	Steer Components	一区		
Valves	18	Г	-	Lockout Cylinders (If Equipped)	-1×	П	
Carrier (Hases & Cables)	স		\Box	Rydraulic Hoses	文		
Lockout Cylinders (If Equipped)	17.	17	·A	Placards and Decale	十枚		Т
Pins	\times			Wheel Bearings	``F	1	
Bushings	3			Swing Bearing/Worm Gear	田菜	•	
Wear Pads	X		i	MISCELLANEOUS			
Cy/Inde/s	-7			Operator Manuals	ᇽ		-
Drift Test	×			•			
JRNTABLE	\top			Parts Installed			
Ground Controls	- W			Description Part No.		Qty	
Main Hydraulic Pump	λ		-	4-2-11-8			<u> </u>
AuxiSary Power Pump	1×		1	anticolor		ड	,
Valves	「文		İ	150 8 500 30V		0	
Hydraulic Filters	İХ			[
Hydraulic Hoses and Tubling	×			l l			
Hydraulic Oli Tank	文			į			
Breather Hydraullo Tank	13						
Batteries	文						
Cylindera	17			Parts Needed			
Doors	হ		 	Description Part No		0	ty
Turntable Locking Pin	X		1	Fritz Stexis			7
Horizontal Limit Switch	文		Τ.	1			
	18		T				
Placards and Decels	TX.	-	_				

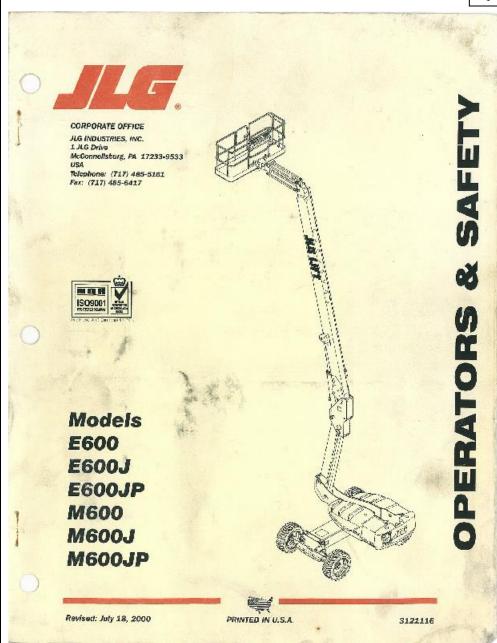
Colonial Powerlift, Inc. is not responsible or liable for the above listed aerial work platform. The inspection performed on the above listed aerial work platform is to ascertain that the machine does as of this date, meet the Manufacture's and ANSI standards.

E600 Scries



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

Double click on the image to the left and it will open the 2 page document



Section 2-1 is the beginning of the inspection guidance.



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



Measurement taken from JLG manlift to earth ground without the Fluke SV225 "Stray Voltage Eliminator" adapter (30.8 VAC / Ghost voltage)



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



*Measurement taken from JLG manlift to earth ground with the Fluke SV225 "Stray Voltage Eliminator" adapter (0.167 VAC / True voltage).



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



*Measurement taken from JLG manlift to earth ground with the Fluke SV225 "Stray Voltage Eliminator" adapter (0.167 VAC / True voltage).



Emergency Notifications Made (Subsequent to the Event):	Date	Time	
Fire, Rescue & Emergency Medical: (9-911)			
Guard Post: x5822; 269-5822			
Occupational Medicine 269-7539	08/29/2016	~12:37	
ESH&Q Reporting Officer: 876-1750	08/29/2016	~12:37	
Crew Chief 630-7050			
Industrial Hygiene: 269-7863:			
Other: TJSO	08/29/2016	~1400	

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.

Investigation	Team	Confirmat	ion:
THITCOMEMUL	T CMIII	Committee	10110

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	Tina Johnson	INO S DOME	11/22/14
SME/Co-Lead	Todd Kujawa	E full XIII	11/22/16
DSO	Ed Folts	El Fela	11/28/16

Acceptance/Acknowledgement of Facts

Associate Director/ Department Manger

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: PHY-16-0829

CATS Number: NE-2016- 18

Lessons Learned Number: 978

ORPS Number: SC--TJSO-JSA-TJNAF-2016-0006

NTS Number: N/A

CAIRS Entry: N/A



A2B6C01 Defective or failed part, A2B3C02 Inspection/testing LTA, A3B2C01 Strong rule incorrectly chosen over other rules.

ISM Code: Provide feedback and Continuous Improvement



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

Step 1 Initial Fa	Step 1 Initial Fact-Finding Meeting (To be held as soon as reasonably possible following event(within 24 hours))									
Date:	08/30/2016	Time:	0900 Location:				CC F227			
Requi			Optional Attendees: (Print Name) Present							
Lead Investigator:	Tina Johnson				Associat Director		Rolf Ent	Notified		
ESH&Q Representative:	Todd Kujawa –	SME			TJSO O	bserver:	Steve Neilson	Present		
Supervisor of involved persons(s): Jessie Butler				Subject applicab		ert(s), Facility/Eq	uipment Owner as			
Involved or impacted person(s): Andrew Lumanog				Ed Folts-	- DSO					
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.	1
b. Conditions and actions preceding the event.	√
c. Chronology (timeline) of the event; and	1
d. Immediate actions taken in response to the event.	1
5. Clarify information – <u>Subject-Matter Expert</u> (SME) confirms work conditions.	1
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.)	09/06/2016 ** Delayed holiday weekend	
Role	Name	Department/Group	Phone
Lead Investigator	Tina Johnson	ESH&Q	7611
DSO	Ed Folts	PHYSICS	7857
SME	Todd Kujawa	ESH&Q	7006
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):				
Reportable Quantity Impact Ground/Soil		Storm Water Channel/Drain 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: 8/30/2016 Time: 1617

ORPS/NTS Determination: PHY-16-0829 Employee Received a Shock while Working in a Manlift - No injuries

From: Tina Johnson <cjohnson@jlab.org>

Tue, Aug 30, 2016 04:17 PM

Subject: ORPS/NTS Determination: PHY-16-0829 Employee Received a Shock while Working in a Manlift - No

injuries

To: Steve Neilson <sneilson@jlab.org>

Cc: Mary Logue < logue@jlab.org>, Ed Folts < folts@jlab.org>, Bert Manzlak < manzlak@jlab.org>, Bill Rainey < wrainey@jlab.org>, Edward Conley < econley@jlab.org>, Jennifer Williams < jennifer@jlab.org>, Paul Collins < paulc@jlab.org>, Tina Menefee < menefee@jlab.org>, Todd Kujawa < kujawa@jlab.org>, George Perry < gperry@jlab.org>

Steve,

On August 29, 2016 around 10:00 am a worker in Hall A was using a portable bandsaw that was plugged into an electrical outlet on the JLG-manlift when he felt a slight shock in his forearm. The employee notified his supervisor and reported to OccMed. He was determined to be uninjured and was permitted to return to work.

Hall A employees tested the manlift and it revealed approximately 48 volts AC shorting from the integrated outlet to the structure of the man lift. The connection to that circuit was locked and tagged out. There were no visual indications for the short. Facilities Management and Logistics subcontractors inspected the equipment this morning and and it was determined to have a defective power cord that is internal to the manlift.

The Lab has determined that this is ORPS reportable:

Significance Category 2 Subgroup E Hazardous Electrical Energy Control.

(1) 2 Any unexpected or unintended personal contact (burn, injury, etc.) with an electrical hazardous energy source (e.g., live electrical power circuit, etc.).

The Lab will complete the ORPS notification and notable event report in the allotted time frame.

In the meantime if you have any questions or concerns, feel free to contact me.

10 CFR 851 Screen: Date: 08/30/2016 **Time:** 1617

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	<u>Tina Johnson</u>	02/22/16	02/22/19	1.6

This document is controlled as an on line file. It may be printed but the print copy is not a controlled document. It is the user's responsibility to ensure that the document is the same revision as the current on line file. This copy was printed on 11/29/2016.