



Office of Health, Safety and Security

Monthly Analysis of Electrical Safety Occurrences



March 2013

Purpose

This analysis resource provides the Department of Energy's (DOE) electrical safety community with a compilation of, and informal observations on, electrical safety occurrences reported through the Occurrence Reporting and Processing System (ORPS). The topics addressed in this analysis resource are responsive to requests for this information by the electrical safety community, who utilizes this information through monthly conference calls to foster information exchange and continual learning regarding electrical safety occurrences and their prevention across the DOE complex.

Key Observations

The number of electrical safety occurrences increased from thirteen in February to fourteen in March. There were four reported electrical shocks, one electrical intrusion occurrence, and three reported lockout/tagout occurrences. In March, workers identified electrical hazards 57 percent of the time, which is an increase in hazards identification from 38 percent in February.

Electrical Safety Occurrences

The following sections provide a summary of selected occurrences based upon specific areas of concern regarding electrical safety (e.g., bad outcomes or prevention/barrier failures). The complete list and full report of the occurrence reports is provided in Attachment 2.

Electrical Shock

There were four reported electrical shocks in the month of March, which is the same number as reported in February. These occurrences are summarized below.

1. A maintenance engineer received a mild shock to the hand while performing preventative maintenance on a 480-volt air conditioner while visually inspecting the unit. When he leaned over the top of the unit to verify the filter size, he received the shock when he placed his hand on top of the exterior casing. The engineer was not doing electrical work and was wearing the proper personal protective equipment for completing the preventative maintenance. The unit was tested and 220-volts AC was found to ground. An inspection revealed that the wire feeding the crankcase heater had shorted to ground and there was no bonding wire between the electrical disconnect and the unit.

2. An employee felt a tingling sensation in his right hand when he operated a light switch after operating the same switch and hearing a pop from an arc in an overhead light fixture. The employee also felt a rush of air from behind the switch but did not believe he was shocked. The light switch was placed in a safe condition. It is believed that an installation error, in relation to the ground wire on the light ballast, was the likely cause of the arc.
3. An electrical engineer touched an energized terminal while attempting to evaluate a possibly damaged high voltage capacitor at a test bench. He received the shock as he removed the shorting buss between the capacitors. It was determined that the organization and its workers failed to realize there was energy stored in the capacitor between the terminals and the case. Existing procedures and practices address the stored energy of the capacitor and how to dissipate it by installing the grounding hook and then the shorting wire, but don't address the potential energy stored between the terminals and the case.
4. A worker experienced a mild electrical shock to the hand while performing final positioning of a jib hoist load. Electrically qualified individuals measured 120 volts AC and currents of up to 40 milliamperes between the jib hoist load and ground under a variety of hoist operating conditions. The crane was inspected and found to have inadequate ground connections between the control panel and hoist.

Figure 1 shows a 3-year trend of electrical shocks for the DOE complex. During this period, the average number of electrical shocks has remained below three (2.7) shocks per month.

Figure 1 – Three-Year Trend of Electrical Shocks

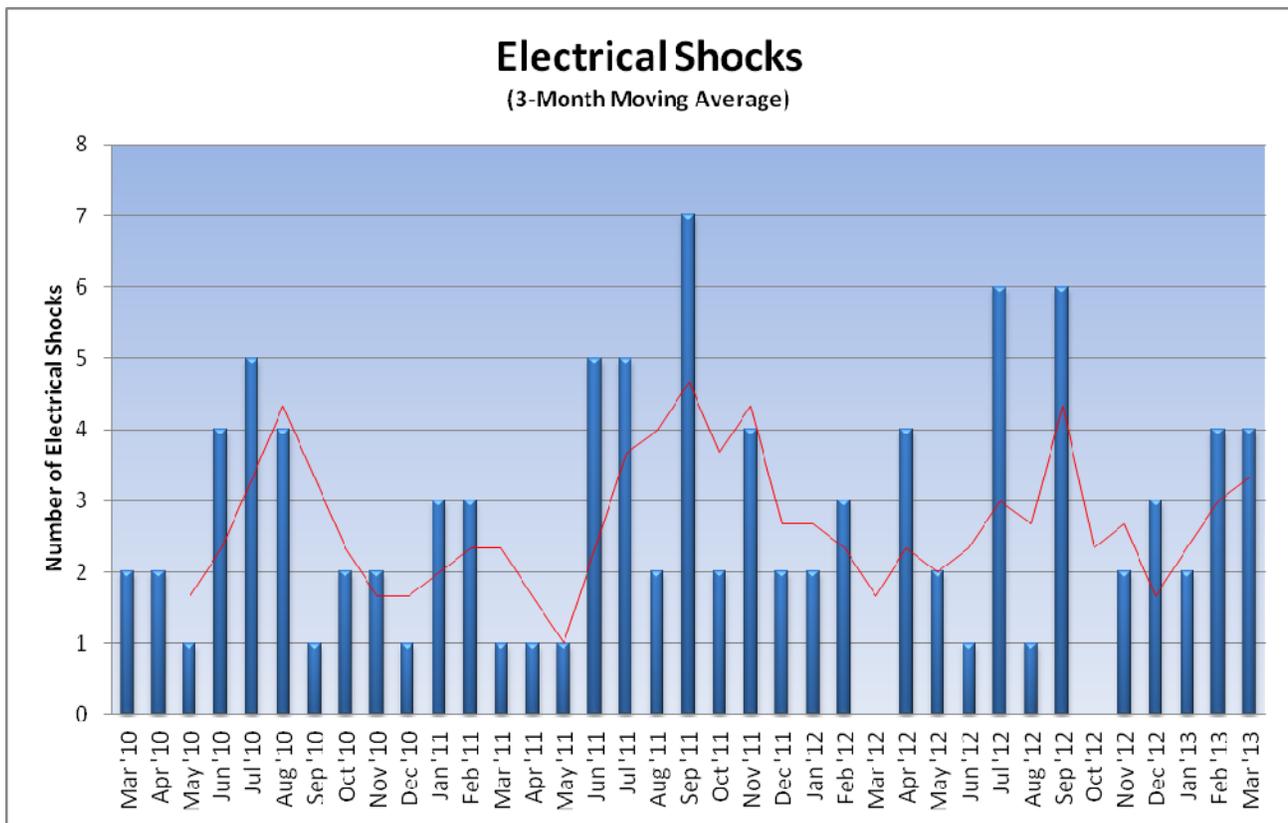


Figure 2 shows electrical shocks by worker type through March 2013. The number of shocks involving electrical workers slowly increased through 2012 and then dropped in 2013, while those involving non-electrical workers decreased after 2011. Since 2008, the majority of shocks (about 73 percent) involve non-electrical workers.

Figure 2 - Electrical Shock by Worker Type

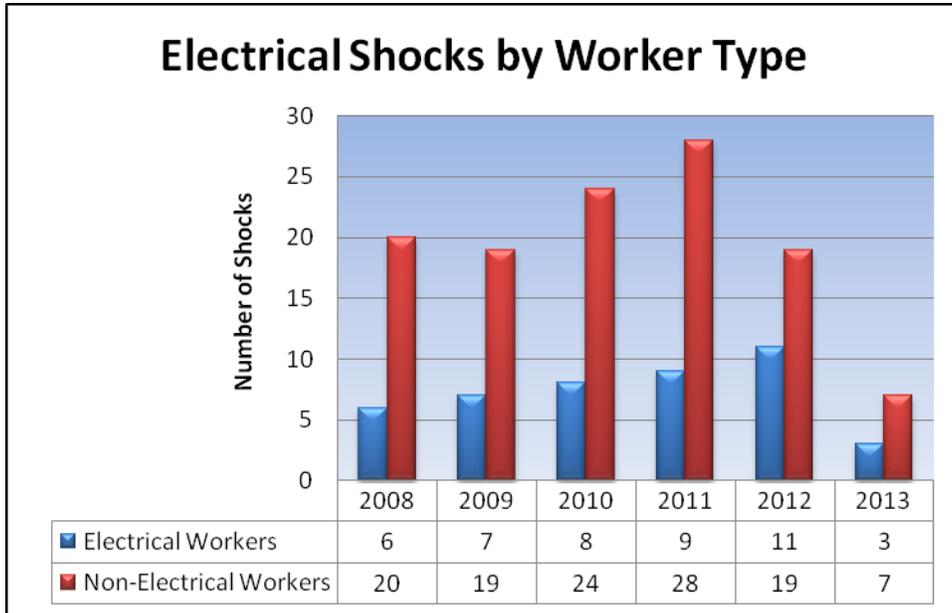
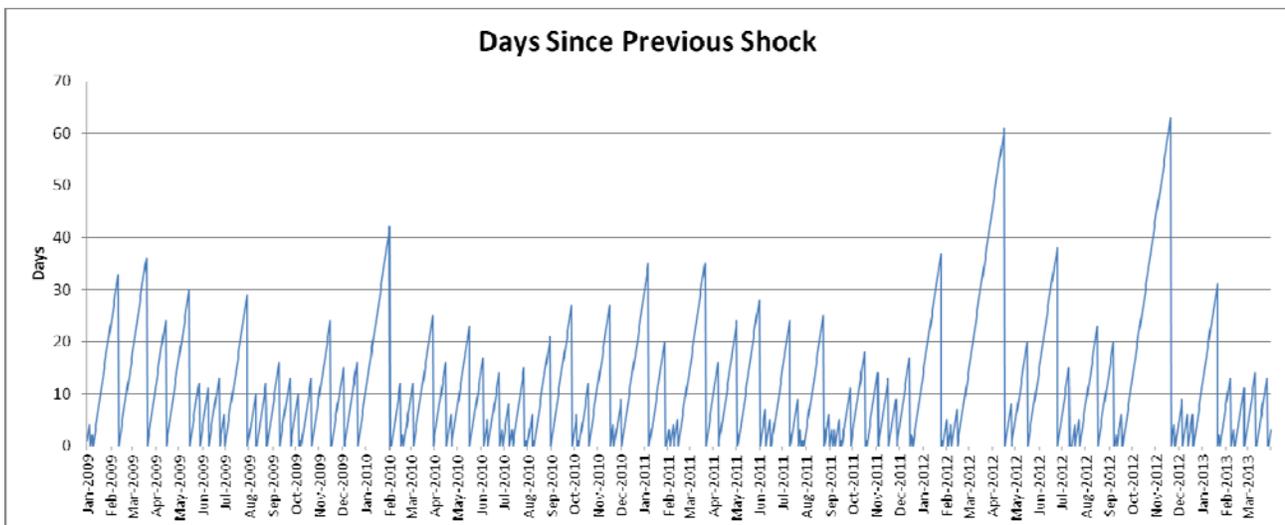


Figure 3 shows the number of days since the previous electrical shock for the DOE complex. The longest interval was 63 days (November 20, 2012) and the present interval is 3 days as of March 31.

Figure 3 - Days since Previous Shock

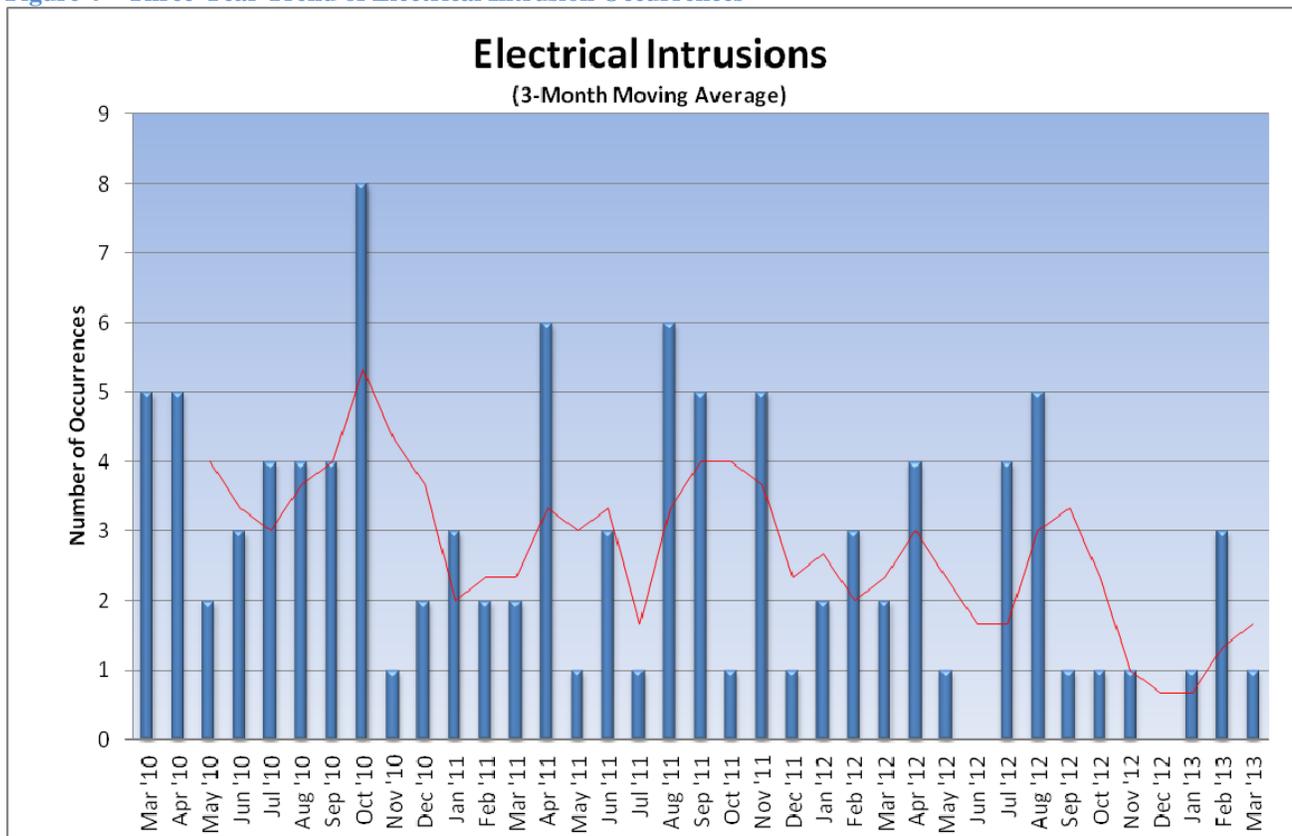


Electrical Intrusion

The number of electrical intrusion occurrences (i.e., cutting/penetrating, excavating, or vehicle/equipment contact of overhead electrical conductors) for March decreased from three in February to one in March. In this occurrence, a backhoe unexpectedly hit a 110-volt direct burial wire and associated neutral wire during excavation to replace underground fire sprinkler supply lines. The circuit supplied power to a street light. The electrical line was not energized because power was controlled by a photocell sensor and the incident occurred during daylight hours. The work was conducted in accordance with an approved maintenance work package and excavation permit. The electrical circuit was placed in a safe condition (locked out). A preliminary evaluation indicates that there was a lack of clarity during the pre-job briefing regarding the planned excavation boundaries, which contributed to this event.

Figure 4 shows a 3-year trend of electrical intrusion occurrences for the DOE complex. During this period we have seen an average of just under 3 occurrences per month (2.7).

Figure 4 – Three-Year Trend of Electrical Intrusion Occurrences



Hazardous Energy Control

In March there were three reported occurrences involving lockout/tagout (LOTO), which is a decrease from the four occurrences reported in February.

Occurrences Involving Lockout/Tagout

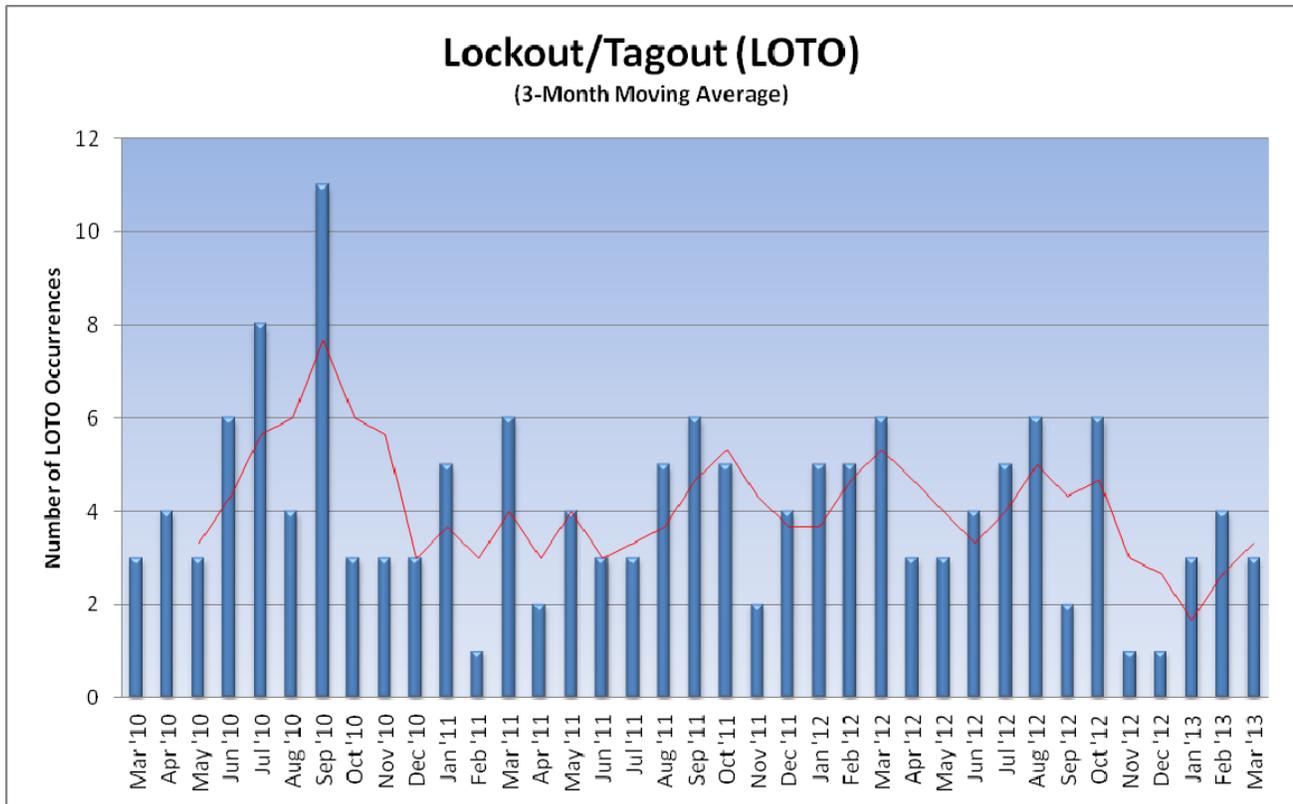
1. A subcontractor electrical inspector touched a de-energized circuit breaker after signing off of the associated LOTO permit during an inspection of an electrical panel, which violated a provision of the site's Hazardous Energy Work Process (HEWP). The inspector touched the de-energized circuit breaker while attempting to resolve a phase labeling issue after work was completed and the individual signed off of the LOTO. The inspector needed to sign back on the LOTO permit in order to touch the circuit. The inspector became distracted, during multiple discussions with an electrical engineer and an electrician at the task and forgot to sign back onto the permit.
2. An incident occurred when an employee accidentally pushed a load of 4X4 poles into an electrical access fitting on the outside of a building wall, pulling out electrical conductors for a vacuum. The employee noticed the exposed wires and thinking to mitigate the immediate hazard went into the building, checked that the vacuum was turned off at the switch, and taped one wire to lessen the immediate hazard. The employee did not wait for an electrician to verify a safe condition and institute a LOTO.
3. Safety personnel observed improper LOTO procedure and equipment by subcontractor personnel performing work on a Motor Control Center (MCC). The subcontractor assumed that the LOTO applied by other contractors was adequate. Zero energy verification was performed improperly relying on a visual check of an analog volt meter attached to a 4.16kV switch outside of the building as a visual verification of zero energy for work within the building. Protective grounds for a 4.16kV line were not installed as part of the LOTO procedure to maintain the "made safe" condition of the system. Proper written group LOTO procedures were not developed or followed.

Occurrences Involving Hazardous Energy Control Procedure Noncompliance

1. An electrical subcontractor violated hazardous energy control procedures by not replacing the cover on an electrical junction box after performing testing and troubleshooting on the metering capabilities of a DC research electrical distribution bus.
2. A subcontractor construction electrician looked inside an open computer room UPS shutdown panel containing exposed energized parts that was labeled "Caution 480V," without proper electrical hazardous energy control authorization.
3. A qualified electrical worker, who was not wearing appropriate PPE, reset a tripped 480-volt breaker for research equipment that initiated an equipment failure downstream and generated a loud noise. He did not receive a shock and was authorized to perform the work.

Figure 5 shows a 3-year trend of LOTO occurrences for the DOE complex. The monthly average is 4.1 occurrences.

Figure 5 – Three-Year Trend of Lockout/Tagout Occurrences



Electrical Near Miss

In March there were three occurrences that were considered to be an electrical near miss, which is a decrease from the four near misses in February. These occurrences are summarized below.

1. Two electricians were troubleshooting a 480-volt heater located in the X-705 facility inside when an arc flash occurred. The heater had been electrically isolated using a LOTO on the circuit breaker. One of the electricians verified the energy isolation at the heater using a multimeter. The electrician then took resistance readings of the heater elements and discovered substantial differences in the resistance values of the heater elements. They then decided to check the voltage supplied to the heater and re-energized the heater. The electrician at the heater proceeded to check the system voltage in the switch by applying the multimeter test leads to two of the three phases present in the switch. When the test leads contacted the switch components, an arc occurred that destroyed the ends of the meter test leads. During the fact finding meeting it was learned that the electrician was not wearing the appropriate electrical personal protective equipment that had been supplied. No injuries occurred. The electricians placed the system in a safe condition and reported the incident to their supervisor. An investigation will be conducted.

2. A maintenance engineer received a mild shock to the hand while performing preventative maintenance on a 480-volt air conditioner while visually inspecting the unit (see occurrence #1 under Electrical Shock).
3. A backhoe unexpectedly hit a 110-volt direct burial wire and associated neutral wire during excavation to replace underground fire sprinkler supply lines (see occurrence under Electrical Intrusion).

Monthly Occurrences Tables

Table 1 shows a breakdown of the outcomes, performance issues, and worker types associated with the electrical safety occurrences for March 2013.

Table 1 - Breakdown of Electrical Occurrences

Number of Occurrences (March)	Involving:	Last Month (February)
4	Electrical Shocks	4
0	Electrical Burns	0
3	Hazardous Energy Control (LOTO)	4
1	Inadequate Job Planning	3
0	Inadvertent Drilling/Cutting of Electrical Conductors	2
1	Excavation of Electrical Conductors	1
0	Vehicle Intrusion of Electrical Conductors or Equipment	0
3	Electrical Near Misses	4
8	Electrical Workers	7
6	Non-Electrical Workers	6
5	Subcontractors	5

NOTE: The numbers in the left-hand column are not intended to total the number of occurrences for the month and are only associated with the items in the center column.

In compiling the monthly totals, the search looked for occurrence discovery dates in this month [excluding Significance Category R (Recurring) reports] and for the following ORPS HQ keywords:

01K – Lockout/Tagout Electrical, 01M – Inadequate Job Planning (Electrical),
 08A – Electrical Shock, 08J – Near Miss (Electrical), 12C – Electrical Safety

Table 2 provides a summary of the electrical safety occurrences for the previous 9 years and CY 2013. The average number of occurrences a year ago (March 2012) was 13.3 per month.

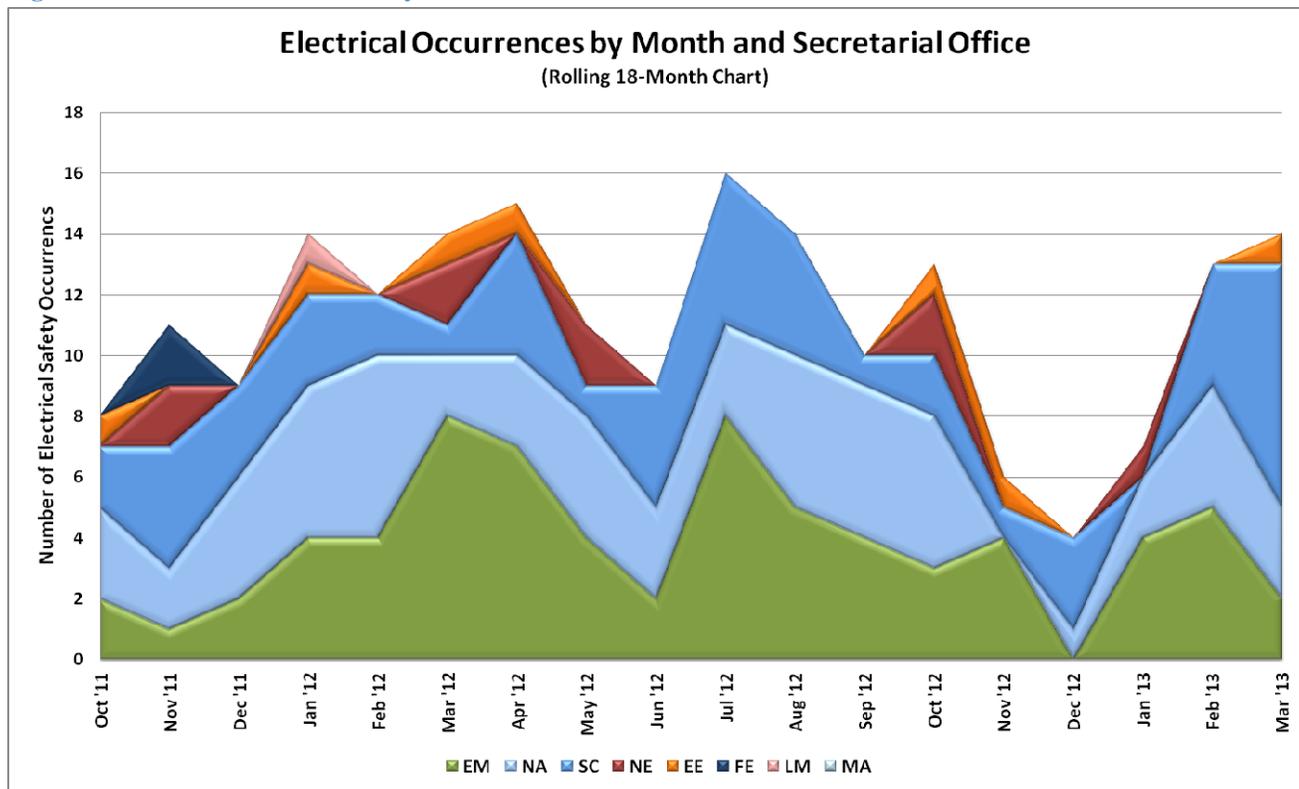
Table 2 - Summary of Electrical Occurrences

Period	Electrical Safety Occurrences	Shocks	Burns	Fatalities
March	14	4	0	0
February	13	4	0	0

Period	Electrical Safety Occurrences	Shocks	Burns	Fatalities
January	7	2	0	0
2013 total	34 (avg. 11.3/month)	10	0	0
2012 total	138 (avg. 11.5/month)	30	1	0
2011 total	136 (avg. 11.3/month)	36	5	0
2010 total	155 (avg. 12.9/month)	28	2	0
2009 total	128 (avg. 10.7/month)	25	3	0
2008 total	113 (avg. 9.4/month)	26	1	0
2007 total	140 (avg. 11.7/month)	25	2	0
2006 total	166 (avg. 13.8/month)	26	3	0
2005 total	165 (avg. 13.8/month)	39	5	0
2004 total	149 (avg. 12.4/month)	25	3	1

Figure 6 shows the distribution of electrical safety occurrences by Secretarial Office. The Office of Science reported the most occurrences. The Office of Nuclear Energy has reported only one occurrence in the last five months.

Figure 6 - Electrical Occurrences by Month and Secretarial Office



Electrical Severity

The electrical severity of an electrical occurrence is based on an evaluation of electrical factors that include: electrical hazard, environment, shock proximity, arc flash proximity, thermal proximity and any resulting injury(s) to affected personnel. Calculating an electrical severity for

an occurrence provides a metric that can be consistently applied to evaluate electrical occurrences across the DOE complex.

Electrical Severity Scores

The electrical severity scores (ES) are calculated using the Electrical Severity Measurement Tool, which can be found on the EFCOG website at http://www.efcog.org/wg/esh_es/docs/Electrical_Severity_Measurement_Tool.pdf. The fourteen occurrences are classified as shown in Table 3. Actual scores are provided in Attachment 1.

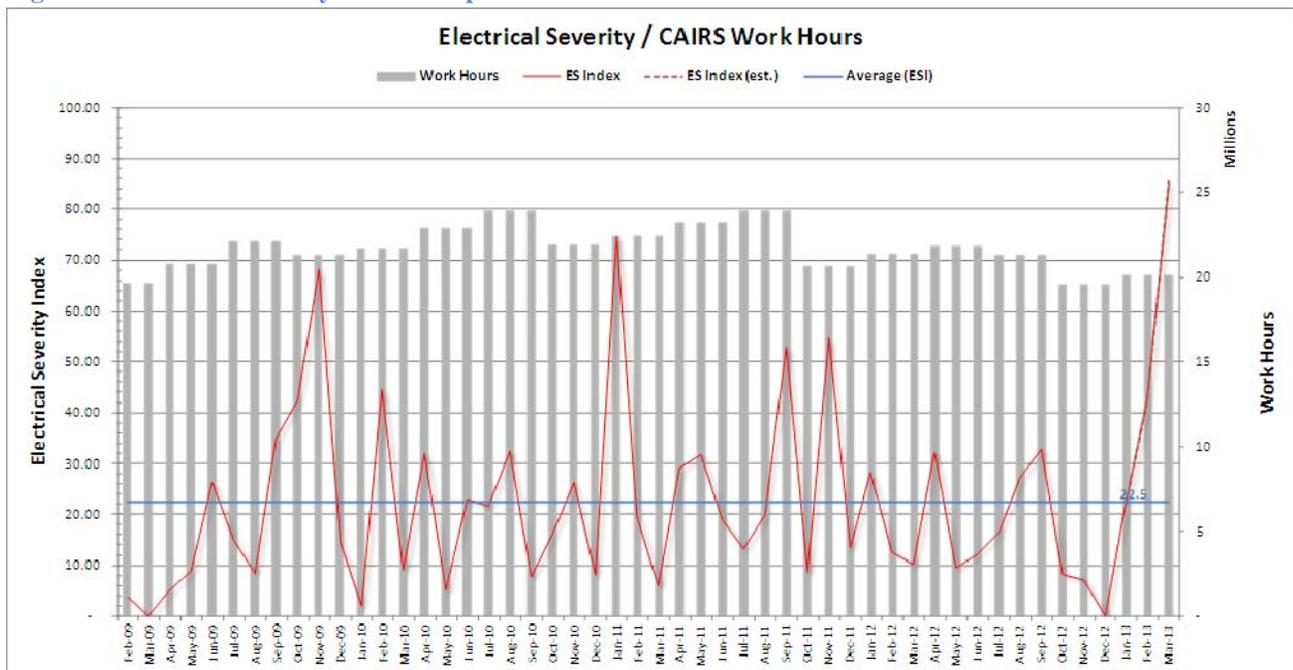
Table 3 – Classification of Electrical Safety Occurrences by ES Score

Occurrence Classification	Electrical Severity Score	Number of Occurrences
HIGH	≥ 1750	1
MEDIUM	31-1749	8
LOW	1-30	1
No Score	0	4

Electrical Severity Index

The Electrical Severity Index (ESI) is a performance metric that was developed to normalize events against organizational work hours. The ESI is calculated monthly and trended. Figure 7 shows a calculated ESI for the DOE complex and Table 4 shows the ESI and how it has changed from the previous month.

Figure 7 - Electrical Severity Index Compared to Work Hours



Note: An estimated ESI is calculated until accurate CAIRS man-hours are available. The chart is updated monthly.

Table 4 - Electrical Severity Index

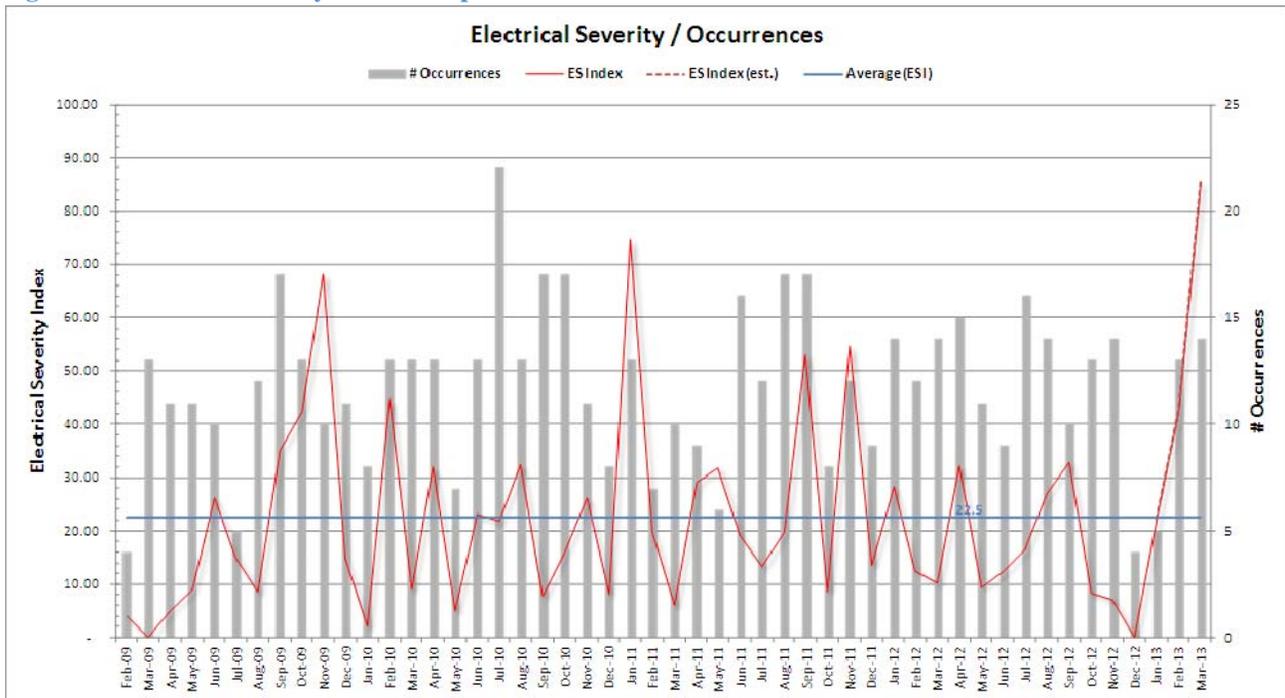
Category	February	March	Δ
Total Occurrences	13	14	+1
Total Electrical Severity	4,260	8,590	+4,330
Estimated Work Hours	20,093,413* (20,093,413)	20,093,413	0
ES Index	42.40* (42.40)	85.50	+43.10
Average ESI	21.2	22.5	+1.3

* These are estimated CAIRS work hours for February and ES Index based on the estimated hours. The estimated hours and ES Index based on the estimated hours (as reported in February) are shown below in parentheses.

$$\text{Electrical Severity Index} = (\Sigma \text{Electrical Severity} / \Sigma \text{Work Hours}) 200,000$$

Figure 8 shows the ESI with the number of Occurrences instead of Work Hours.

Figure 8 - Electrical Severity Index Compared to Number of Occurrences



The average ESI (22.5) has increased for the last two months. The lowest average ESI was 19.2 in June 2010.

Figure 9 shows the number of days since the previous high severity occurrence. The present interval is 18 days as of March 31. The previous longest interval was 679 days ending March 12, 2013.

Figure 9 - Days since Previous High Severity Occurrence

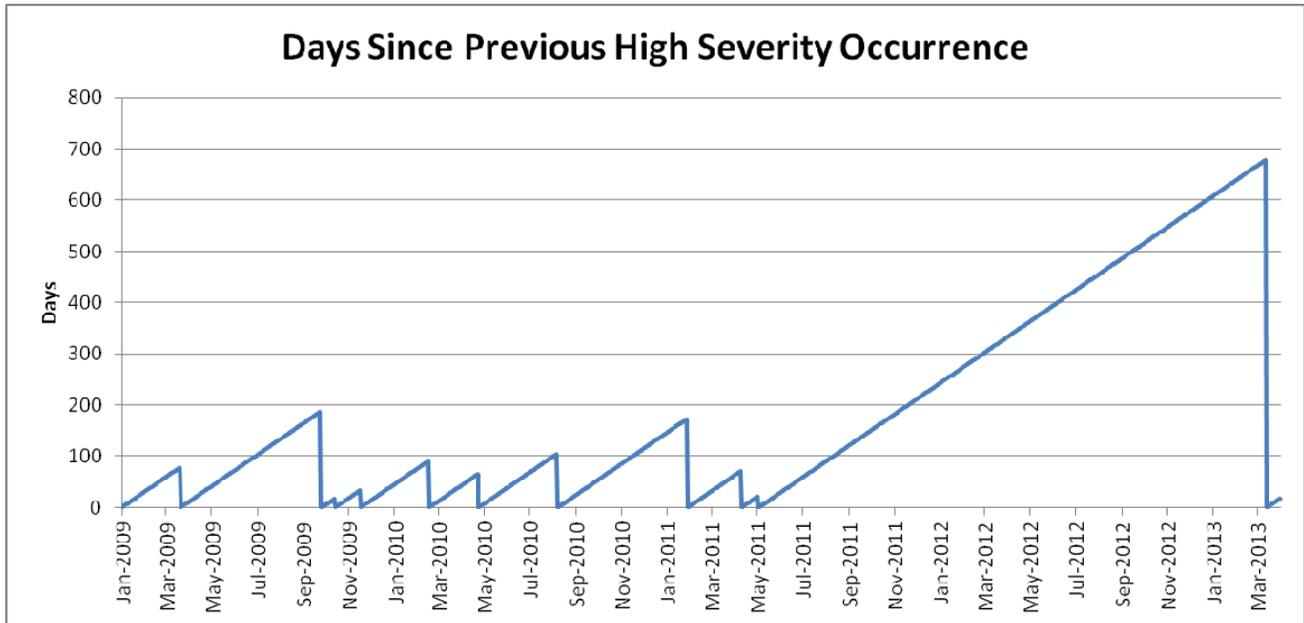
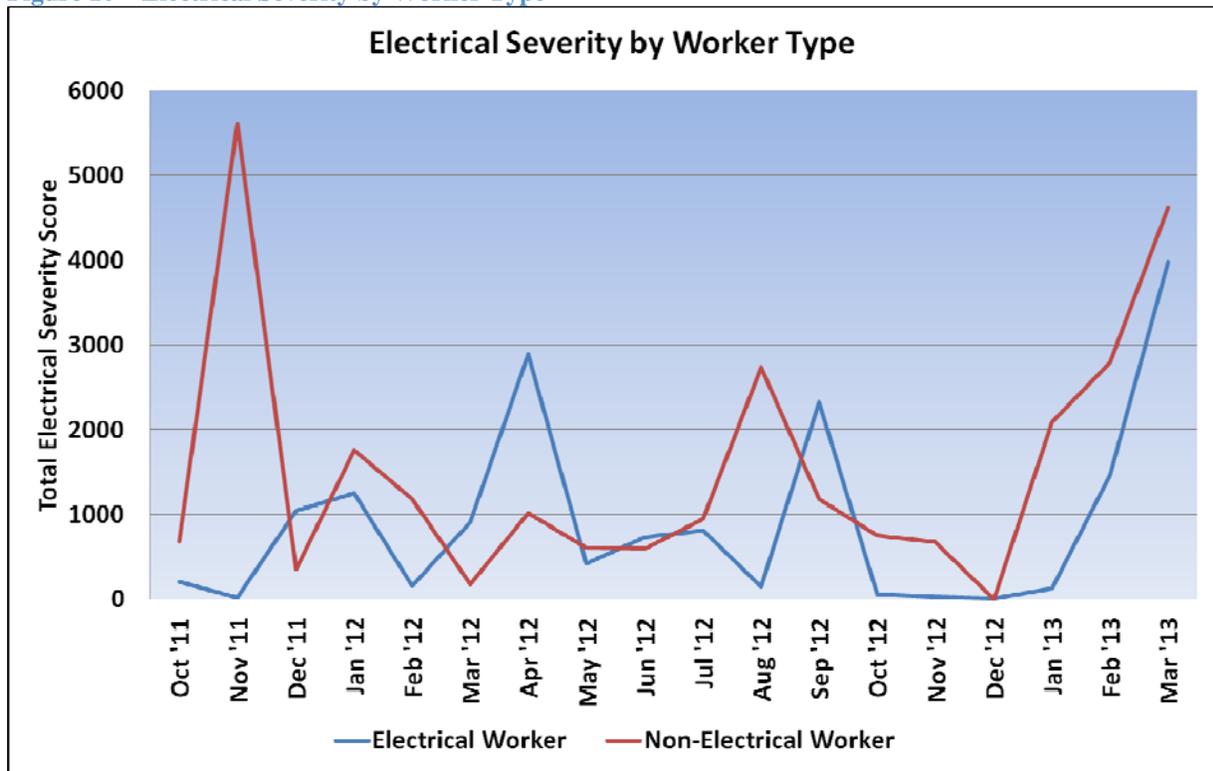


Figure 10 shows the total electrical severity score by worker type for each month.

Figure 10 – Electrical Severity by Worker Type



Following very low numbers in December 2012 for electrical workers (12) and non-electrical workers (6), the ES score for both groups began a steady rise. Electrical workers ES scores are up to 3970 and non-electrical workers ES score are at 4,620. The average ES scores for the 18

month period are 922 for electrical workers and 1,543 for non-electrical workers. The large increase relates to the increased number of occurrences and higher individual event scores.

Summary of Occurrences by Severity Band

For the interval March 2012 through March 2013 (current month and the past 12), Figures 11 and 12 summarize occurrences by severity band and month of discovery date by percentage of total occurrences in month and number of occurrences in month.

Figure 11 - Occurrences by Electrical Severity Band (Percentage)

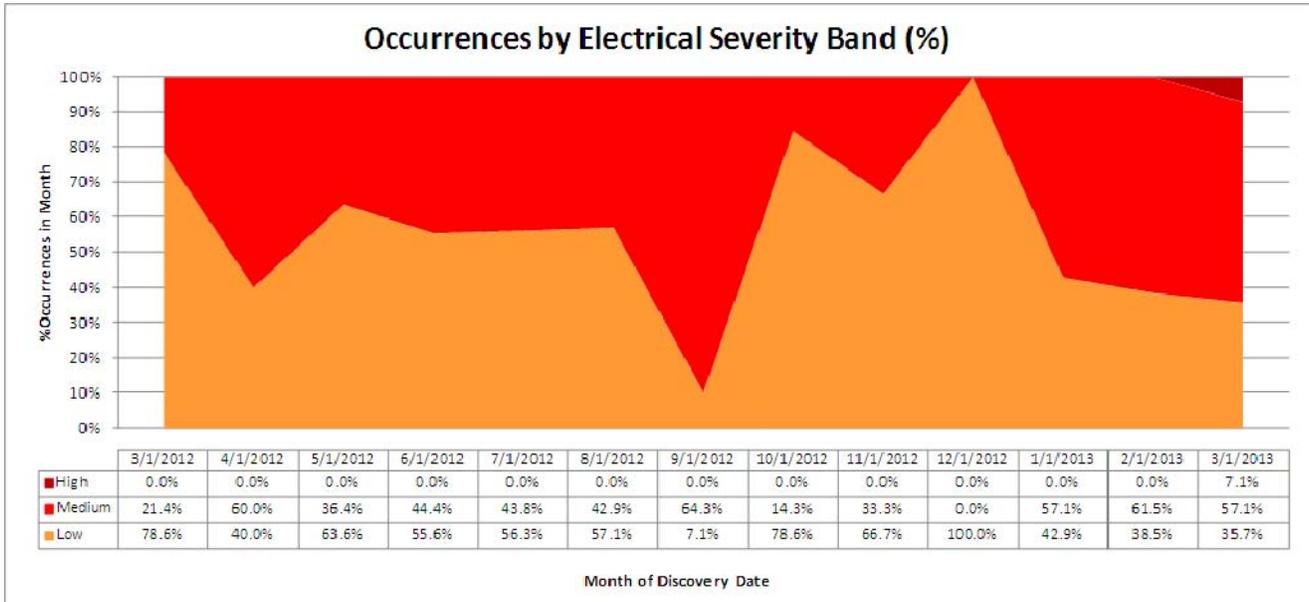
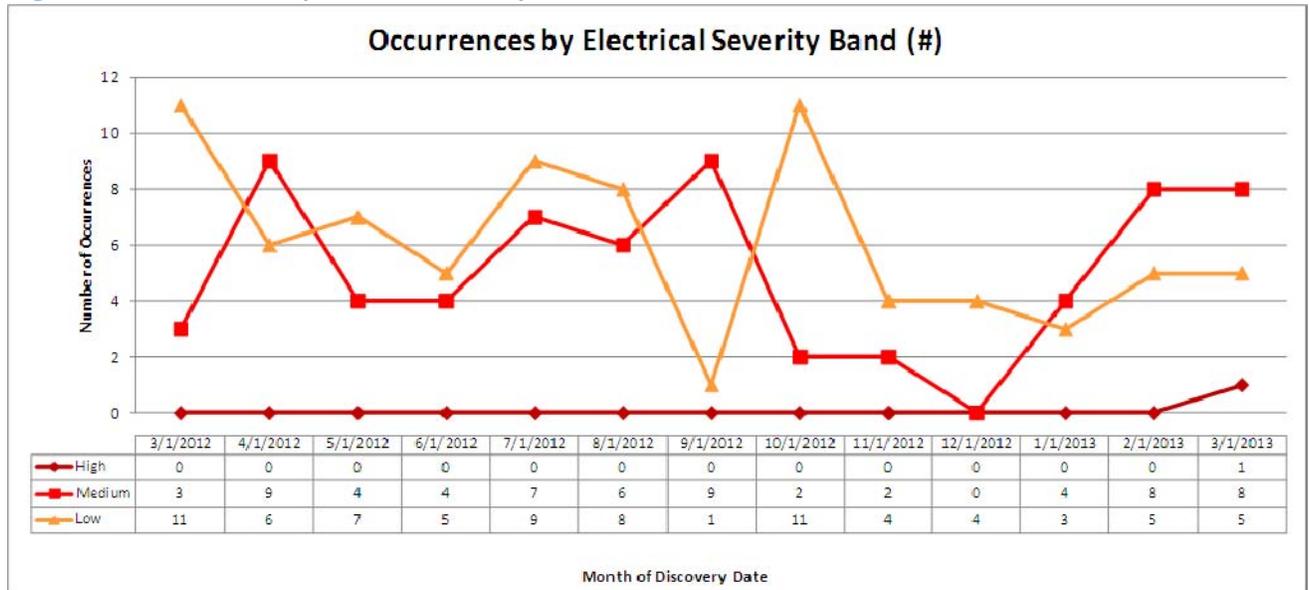


Figure 12 - Occurrences by Electrical Severity Band (Number)

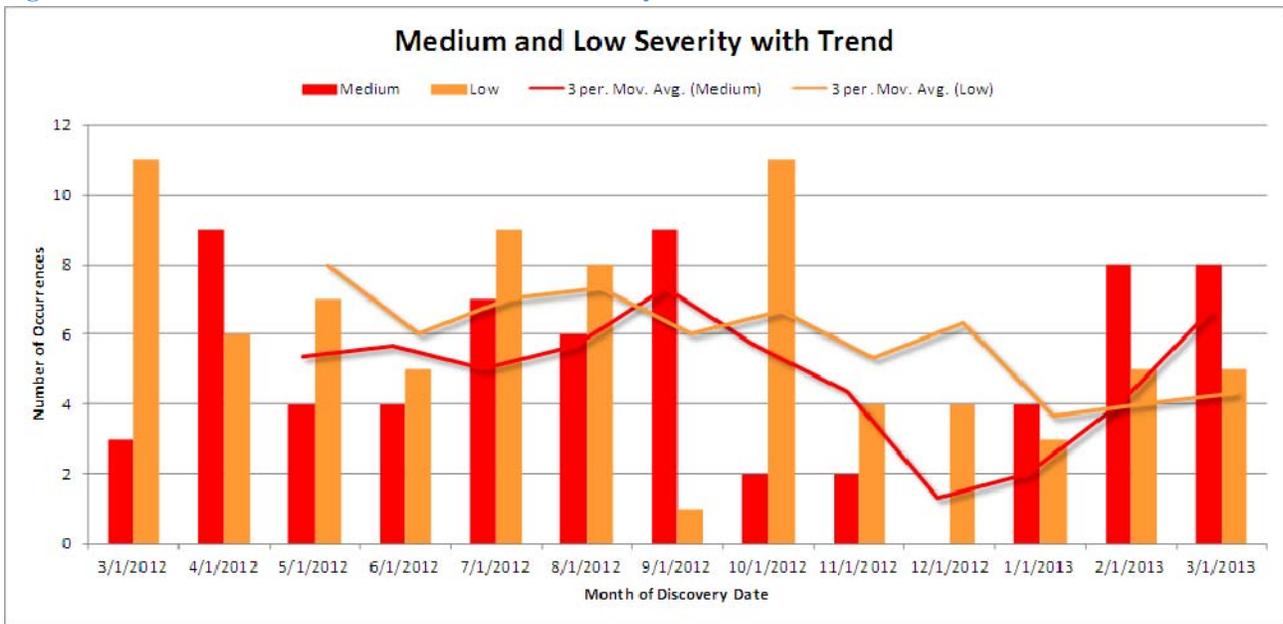


The previous two charts shows that a high electrical severity event occurred in March, ending a 679-day period since the last occurrence in May 2011. The number of occurrences with Medium, Low and zero severity occurrences remained the same from the previous month.

Medium and Low Severity with Trend

Figure 13 focuses on the Medium and Low severity data series for March 2012 through March 2013. Trend lines are included for each, using a 3-month moving average.

Figure 13 - Trend of Medium and Low Electrical Severity Occurrences



The 3-month moving average shows an increasing trend for Medium severity occurrences and a slight increase for Low severity occurrences.

Additional Resources

Electrical Safety Blog

<http://hsselectricalsafety.wordpress.com/>

Electrical Safety Wiki

<http://electricalsafety.doe-hss.wikispaces.net/home>

EFCOG Electrical Safety Subgroup

http://www.efcog.org/wg/esh_es/index.htm

Center of Excellence for Electrical Safety

<http://www.lanl.gov/safety/electrical/>

Contact

Glenn S. Searfoss

Office of Analysis, HS-24

Phone: 301-903-8085

Email: glenn.searfoss@hq.doe.gov

Attachment 1

Electrical Safety Occurrences – March 2013

No	Report Number	Event Summary	SHOCK	BURN	ARCF ⁽¹⁾	LOTO ⁽²⁾	PLAN ⁽³⁾	EXCAV ⁽⁴⁾	CUT/D ⁽⁵⁾	VEH ⁽⁶⁾	SC ⁽⁷⁾	RC ⁽⁸⁾	ES ⁽⁹⁾
1	EE-GO--NREL-NREL-2013-0007	An electrical subcontractor violated hazardous energy control procedures by not replacing the cover on an electrical J-box.									4	2E(3)	0
2	EM--PPPO-FBP-PORTSDD-2013-0010	Electricians were not wearing PPE while troubleshooting a 480V heater when an arc occurred and destroyed meter test leads.									2	2E(3), 10(3)	1050
3	EM-RP--BNRP-RPPWTP-2013-0004	A subcontractor electrical inspector touched a de-energized circuit breaker in violation of the hazardous energy work process.				X					4	2E(3)	0
4	NA--LSO-LLNL-LLNL-2013-0008	A worker taped an exposed end of a conductor without a LOTO.				X					4	2E(3)	110
5	NA--NVSO-NST-NLV-2013-0002	A maintenance engineer received a mild shock to the hand while performing visual inspection on a 480-volt AC unit.	X								2	2E(1)	3150
6	NA--SS-SNL-1000-2013-0004	A subcontractor worked on an MCC and no protective grounds for the 4.16kV line were installed.				X					4	2E(3)	0
7	SC--ASO-ANLE-ANLECI-2013-0001	An employee felt a tingling sensation in his right hand when he operated a light switch.	X								2	2E(1)	330
8	SC--BSO-LBL-MSD-2013-0001	An electrically unsafe homemade power supply was found that had hazardous 120V present when it was in use.									3	2E(2)	20
9	SC--PNSO-PNNL-PNNLBOPER-2013-0005	A subcontractor electrician looked inside a 480V UPS panel with exposed energized parts without hazardous energy control authorization.									4	2E(3)	700
10	SC--SSO-SU-SLAC-2013-0006	An electrical engineer touched an energized terminal while trying to evaluate a damaged high voltage capacitor.	X								2	2E(1)	1650

Attachment 1

No	Report Number	Event Summary	SHOCK	BURN	ARCF ⁽¹⁾	LOTO ⁽²⁾	PLAN ⁽³⁾	EXCAV ⁽⁴⁾	CUT/D ⁽⁵⁾	VEH ⁽⁶⁾	SC ⁽⁷⁾	RC ⁽⁸⁾	ES ⁽⁹⁾
11	SC--TJSO-JSA-TJNAF-2013-0002	A subcontractor opened a 480V panel w/o donning the appropriate PPE.					X				3	10(2)	700
12	SC-ORO--ORNL-X10CHRIDGE-2013-0001	A worker experienced a mild electrical shock (120V) to the hand while positioning a jib hoist load.	X								2	2E(1)	330
13	SC-ORO--ORNL-X10EAST-2013-0003	A staff member who was not wearing appropriate PPE reset a tripped 480V breaker.									4	2E(3)	550
14	SC-ORO--ORNL-X10HFIR-2013-0001	A backhoe hit a 110V line that supplied power to a street light controlled by a photocell.						X			3	2E(2)	0
	TOTAL		4	0	0	3	1	1	0	0			

Key

(1) ARCF = significant arc flash, (2) LOTO = lockout/tagout, (3) PLAN = job planning, (4) EXCAV = excavation/penetration, (5) CUT/D = cutting or drilling, (6) VEH = vehicle or equipment intrusion, (7) SC = ORPS significance category, (8) RC = ORPS reporting criteria, (9) ES = electrical severity

ES Scores: High is ≥ 1750 , Medium is 31-1749, and Low is 1-30

Attachment 1

Electrical Safety Occurrences – March 2013

No	Report Number	Event Summary	EW ⁽¹⁾	N-EW ⁽²⁾	SUB ⁽³⁾	HFW ⁽⁴⁾	WFH ⁽⁵⁾	PPE ⁽⁶⁾	70E ⁽⁷⁾	VOLT ⁽⁸⁾		C/T ⁽⁹⁾	NEUT ⁽¹⁰⁾	NM ⁽¹¹⁾
										H	L			
1	EE-GO--NREL-NREL-2013-0007	An electrical subcontractor violated hazardous energy control procedures by not replacing the cover on an electrical J-box.	X		X						X			
2	EM--PPPO-FBP-PORTSDD-2013-0010	Electricians were not wearing PPE while troubleshooting a 480V heater when an arc occurred and destroyed meter test leads.	X			X X		X	X		X			X
3	EM-RP--BNRP-RPPWTP-2013-0004	A subcontractor electrical inspector touched a de-energized circuit breaker in violation of the hazardous energy work process.	X		X						X			
4	NA--LSO-LLNL-LLNL-2013-0008	A worker taped an exposed end of a conductor without a LOTO.				X					X			
5	NA--NVSO-NST-NLV-2013-0002	A maintenance engineer received a mild shock to the hand while performing visual inspection on a 480-volt AC unit.	X			X					X			X
6	NA--SS-SNL-1000-2013-0004	A subcontractor worked on an MCC and no protective grounds for the 4.16kV line were installed.	X		X				X	X				
7	SC--ASO-ANLE-ANLECIS-2013-0001	An employee felt a tingling sensation in his right hand when he operated a light switch.		X		X					X			
8	SC--BSO-LBL-MSD-2013-0001	An electrically unsafe homemade power supply was found that had hazardous 120V present when it was in use.	X								X			
9	SC--PNSO-PNNL-PNNLBOPER-2013-0005	A subcontractor electrician looked inside a 480V UPS panel with exposed energized parts without hazardous energy control authorization.	X		X	X					X			
10	SC--SSO-SU-SLAC-2013-0006	An electrical engineer touched an energized terminal while trying to evaluate a damaged high voltage capacitor.	X			X X					X			

Attachment 1

No	Report Number	Event Summary	EW ⁽¹⁾	N-EW ⁽²⁾	SUB ⁽³⁾	HFW ⁽⁴⁾	WFH ⁽⁵⁾	PPE ⁽⁶⁾	70E ⁽⁷⁾	VOLT ⁽⁸⁾		C/I ⁽⁹⁾	NEUT ⁽¹⁰⁾	NM ⁽¹¹⁾
										H	L			
11	SC--TJSO-JSA-TJNAF-2013-0002	A subcontractor opened a 480V panel w/o donning the appropriate PPE.		X	X			X	X		X			
12	SC-ORO--ORNL-X10CHRIDGE-2013-0001	A worker experienced a mild electrical shock (120V) to the hand while positioning a jib hoist load.				X X					X			
13	SC-ORO--ORNL-X10EAST-2013-0003	A staff member who was not wearing appropriate PPE reset a tripped 480V breaker.	X X					X	X		X			
14	SC-ORO--ORNL-X10HFIR-2013-0001	A backhoe hit a 110V line that supplied power to a street light controlled by a photocell.		X		X X					X			X
	TOTAL		8	6	5	6	8	3	4	1	13	0	0	3

Key

(1) EW = electrical worker, (2) N-EW = non-electrical worker, (3) SUB = subcontractor, (4) HFW = hazard found the worker, (5) WFH = worker found the hazard, (6) PPE = inadequate or no PPE used, (7) 70E = NFPA 70E issues, (8) VOLT = H (>600) L(≤600), (9) C/I = Capacitance/Inductance, (10) NEUT = neutral circuit, (11) NM = near miss

ORPS Operating Experience Report

ORPS contains 56163 OR(s) with 59473 occurrences(s) as of 6/11/2013 2:13:37 PM
 Query selected 14 OR(s) with 14 occurrences(s) as of 6/11/2013 2:14:08 PM

Download this report in Microsoft Word format. 

1)Report Number: [EE-GO--NREL-NREL-2013-0007](#) **After 2003 Redesign**
Secretarial Office: Energy Efficiency and Renewable Energy
Lab/Site/Org: National Renewable Energy Laboratory
Facility Name: National Renewable Energy Laboratory
Subject/Title: Electrical subcontractor failed to follow prescribed hazardous energy control process

Date/Time Discovered: 03/25/2013 07:00 (MTZ)

Date/Time Categorized: 03/26/2013 08:00 (MTZ)

Report Type: Notification/Final

Report Dates:

Notification	03/28/2013	13:24 (ETZ)
Initial Update	03/28/2013	13:24 (ETZ)
Latest Update	03/28/2013	13:24 (ETZ)
Final	03/28/2013	13:24 (ETZ)

Significance Category: 4

Reporting Criteria: 2E(3) - Any failure to follow a prescribed hazardous energy control process (e.g., lockout/tagout, hazardous energy control program).

Cause Codes:

ISM: 4) Perform Work Within Controls

Subcontractor Involved: Yes
Encore Electric

Occurrence Description: On Saturday, March 23, 2013, a lower-tiered electrical subcontractor was performing testing and troubleshooting on the metering capabilities of the DC research electrical distribution bus (REDB), located in NREL's Energy Systems Integration Facility (ESIF) Energy Systems Laboratory (ESL). The work involved programming the AV-900 (a DC power supply) to the lowest voltage and amperage needed to perform the troubleshooting activities (1 Volt and 0.1 Amp) and taking measurements at an electrical junction box (JBOX) in the lab. Testing activities were completed the same day.

On Monday, March 25, 2013, NREL Environment, Health, and Safety (EHS) staff observed that the cover panel to the JBOX that had been accessed on Saturday was not affixed in place. Upon further investigation, it was discovered that, while the AV-900 and its adjacent

disconnect were in the off/open position, the system had not been locked or tagged out. The AV-900 was the only power source available to the distribution bus. Either locking and tagging out the disconnect or replacing the JBOX cover would have achieved a compliant electrically safe condition. Leaving the JBOX in an unsafe condition violates NREL's and the subcontractor's hazardous energy control procedures.

No exposure to hazardous energy and no injuries resulted from this occurrence. Multiple steps would have been required in order to energize the JBOX, including powering on the disconnect, powering on the equipment, and programming a power output. Risk was further reduced by limited access to this construction work area. The first-tier subcontractor responsible for ESIF construction has initiated an incident investigation.

Cause Description:

Operating Conditions:

Installation/testing in ESIF Energy Systems Laboratory

Activity Category:

Facility/System/Equipment Testing

Immediate Action(s):

1. NREL EHS met with the subcontractor supervisor who performed the testing activities.
2. The cover of the JBOX was immediately reinstalled.
3. NREL's first-tier subcontractor responsible for ESIF construction initiated an incident investigation.

FM Evaluation:

No impact to facility or operations. No injuries or property damage resulted from this occurrence.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

Site Operations

Plant Area:

South Table Mountain

System/Building/Equipment: Energy Systems Integration Facility

Facility Function:

Balance of Plant - Infrastructure (Other Functions not specifically listed in this Category)

Corrective Action:

Lessons(s) Learned:

HQ Keywords:

- 01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
- 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
- 11G--Other - Subcontractor
- 12C--EH Categories - Electrical Safety
- 14E--Quality Assurance - Work Process Deficiency

14G--Quality Assurance - Procurement Deficiency

HQ Summary:

On March 23, 2013, an electrical subcontractor violated hazardous energy control procedures by not replacing the cover on an electrical junction box after performing testing and troubleshooting on the metering capabilities of the DC research electrical distribution bus (REDB), located in NREL's Energy Systems Integration Facility (ESIF) Energy Systems Laboratory (ESL). NREL Environment, Health, and Safety (EHS) staff observed and investigated the discrepant condition. There were no exposures to hazardous energy and no injuries. The subcontractor responsible for ESIF construction initiated an incident investigation.

Similar OR Report Number:

Facility Manager:

Name	JORDAN, MAUREEN Y
Phone	(303) 275-3248
Title	EHS OFFICE DIRECTOR

Originator:

Name	LITTRELL, BOBBIJO R.
Phone	(303) 275-3230
Title	COMPLIANCE ASSURANCE SPECIALIST

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/26/2013	08:32 (MTZ)	Event Distribution	DOE/NREL

Authorized Classifier(AC):

2)Report Number:

[EM--PPPO-FBP-PORTSDD-2013-0010](#) After 2003 Redesign

Secretarial Office:

Environmental Management

Lab/Site/Org:

Portsmouth Gaseous Diffusion Plant

Facility Name:

Portsmouth Decontamination and Decommissioning

Subject/Title:

Near Miss -- Arc Flash Damages Equipment, a Noncontributing LOTO Violation Noted

Date/Time Discovered:

03/12/2013 13:00 (ETZ)

Date/Time Categorized:

03/13/2013 13:57 (ETZ)

Report Type:

Update

Report Dates:

Notification	03/13/2013	17:26 (ETZ)
Initial Update	04/23/2013	12:55 (ETZ)
Latest Update	05/23/2013	11:54 (ETZ)
Final		

Significance Category:

2

Reporting Criteria:

2E(3) - Any failure to follow a prescribed hazardous energy control process (e.g., lockout/tagout, hazardous energy control program).

10(3) - A near miss to an otherwise ORPS reportable event, where something physically happened that was unexpected or unintended, or where no or only one barrier prevented an event from having a reportable consequence.

The significance category assigned to the near miss must be based on an evaluation of the potential risks and extent of personnel exposure to the hazard. (1 of 3 criteria - This is a SC 2 occurrence)

Cause Codes:

ISM:

- 2) Analyze the Hazards
- 3) Develop and Implement Hazard Controls
- 4) Perform Work Within Controls

Subcontractor Involved:

No

Occurrence Description:

On 3/12/2013 at approximately 12:30, two electricians were troubleshooting a 480V heater located in the X-705 facility inside a series of contamination boundaries. They isolated the equipment electrically using a single source lockout-tagout. Both electricians applied their personal locks to the appropriate breaker, which is not in the immediate area of the heater. One of the electricians entered the contamination boundary and verified the energy isolation at the heater using a multimeter. The electrician took resistance readings of the heater elements to determine if they were functional and discovered substantial differences in the resistance values of the heater elements. They then decided to check the voltage supplied to the heater. One electrician exited the area and removed both personal locks on the breaker and switched the breaker back on. After he returned to the area, the electrician that had remained in the contamination boundary proceeded to check the system voltage in the switch by applying the multimeter test leads to two of the three phases present in the switch. When the test leads contacted the switch components, an arc occurred that destroyed the ends of the meter test leads. It was discovered during the fact finding meeting that the electrician was wearing the correct anti-contamination personal protective equipment, but was not wearing the appropriate electrical personal protective equipment that had been supplied. No injuries occurred; the electricians placed the system in a safe condition, exited the boundary, and reported the incident to their supervisor. The electrician that was holding the leads when the incident occurred reported to the medical facility as a precaution and was released without treatment.

After the Fact Finding meeting was held on 3/13/2013, this event was

determined to be an ORPS reportable.

Cause Description:

Operating Conditions: Normal Operations

Activity Category: Maintenance

Immediate Action(s):

- Employee was sent to Plant Medical as a precaution and was released without treatment and no restrictions.
- Operations secured the area for investigation.
- FBP Management, Plant Shift Superintendent, Performance Assurance and on-site DOE notified.
- Operations locked out the system and boundaried off the area
- A Problem Report was submitted.
- A Fact Finding meeting was conducted.
- An Occurrence Report was initiated.
- All work being performed under a work package was suspended until a review of the work documents can be conducted by a responsible manager.

FM Evaluation: 05/22/2013 -- Due to restrictions on accessing and evaluating event related equipment, additional time is required to adequately complete the event investigation, causal analysis, and corrective action development. A final report and corrective action plan will be issued by July 18, 2013.

04/22/2013 -- The final investigation report and corrective action plan is still being finalized and approved. A final report and associated corrective actions will be issued by May 24, 2013.

3/13/2013 -- Yes, an investigation will be conducted.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: Yes.
Before Further Operation? Yes
By Whom: Greg Wilkett
By When: 07/18/2013

Division or Project: Site Maintenance, Infrastructure, D&D

Plant Area: F4

System/Building/Equipment: X-705, Hand Table Heater

Facility Function: Environmental Restoration Operations

Corrective Action:

Lessons(s) Learned:

HQ Keywords: 01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
01K--Inadequate Conduct of Operations - Lockout/Tagout

Noncompliance (Electrical)
 07D--Electrical Systems - Electrical Wiring
 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
 08J--OSHA Reportable/Industrial Hygiene - Near Miss (Electrical)
 12K--EH Categories - Near Miss (Could have been a serious injury or fatality)
 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On March 12, 2013, two electricians were troubleshooting a 480-volt heater located in the X-705 facility inside when an arc flash occurred. The heater had been electrically isolated using a lockout-tagout on the circuit breaker. One of the electricians verified the energy isolation at the heater using a multimeter. The electrician then took resistance readings of the heater elements and discovered substantial differences in the resistance values of the heater elements. They then decided to check the voltage supplied to the heater and re-energized the heater. The electrician at the heater proceeded to check the system voltage in the switch by applying the multimeter test leads to two of the three phases present in the switch. When the test leads contacted the switch components, an arc occurred that destroyed the ends of the meter test leads. During the fact finding meeting it was learned that the electrician was not wearing the appropriate electrical personal protective equipment that had been supplied. No injuries occurred. The electricians placed the system in a safe condition and reported the incident to their supervisor. An investigation will be conducted.

Similar OR Report Number:

Facility Manager:

Name	Dennis Carr
Phone	(740) 897-3532
Title	Fluor-B&W/Portsmouth Site Project Director

Originator:

Name	Cade, Mark D.
Phone	(740) 897-4062
Title	SENIOR QUALITY ASSURANCE SPECIALIST

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/13/2013	15:48 (ETZ)	Dee Powell	DOEPORTS
03/13/2013	15:53 (ETZ)	Dennis Carr	PORTSFBP
03/13/2013	15:55 (ETZ)	Fred Hughes	PORTSFBP

Authorized Classifier(AC): Doug Fogel Date: 05/23/2013

3)Report Number: [EM-RP--BNRP-RPPWTP-2013-0004](#) After 2003 Redesign

Secretarial Office: Environmental Management
Lab/Site/Org: Hanford Site
Facility Name: RPP Waste Treatment Plant
Subject/Title: Subcontract Electrical Inspector (EI) to the Department of Energy violated a provision of the Waste Treatment Project (WTP) Hazardous Energy
Date/Time Discovered: 03/27/2013 08:41 (PTZ)
Date/Time Categorized: 03/27/2013 08:42 (PTZ)
Report Type: Notification/Final

Report Dates:

Notification	04/01/2013	17:26 (ETZ)
Initial Update	04/01/2013	17:26 (ETZ)
Latest Update	04/01/2013	17:26 (ETZ)
Final	04/01/2013	17:26 (ETZ)

Significance Category: 4
Reporting Criteria: 2E(3) - Any failure to follow a prescribed hazardous energy control process (e.g., lockout/tagout, hazardous energy control program).

Cause Codes: A3B1C02 - Human Performance Less Than Adequate (LTA); Skill Based Errors; Step was omitted due to distraction
 -->couplet - NA

ISM: 4) Perform Work Within Controls

Subcontractor Involved: Yes
 Lucas Engineering & Management Services, Inc.

Occurrence Description: On 3/26/2013, an Electrical Inspector (EI) working under a subcontract to the Department of Energy violated a provision of the Waste Treatment Projects (WTP) Hazardous Energy Work Process (HEWP).

The EI was involved in the pre-job meeting for the installation of electrical panel L1.2A in the WTP medical facility. At approximately 0830 hrs the superintendent notified the LOTO department to come and hang locks. The construction staff and the EI witnessed the installation of the Lockout/Tagout on circuits 22, 24, and 26 in panel L1, then performed the zero energy check. After the zero energy check, the electricians, EI, and superintendent signed on to the LOTO permit.

Upon completion of the work, per the work package, the EI was asked to inspect the panel. The EI took pictures, completed the inspection, and signed off of the LOTO permit. She returned to her desk to print the images. During a review of the images, the EI found a phase labeling issue and initiated a discussion with construction to confirm the proper color coding of the phases.

While visually reviewing the phase labeling issue with several personnel, the EI touched a de-energized circuit breaker on the panel. Since the EI was no longer signed on to the LOTO permit, a violation of the HEWP had occurred.

At no time was the EI exposed to an energized electrical circuit.

Cause Description:

A3B1C02 - Step was omitted due to distraction.

Rationale - The EI had already signed off of the LOTO permit prior to evaluating the pictures making her an affected employee. For the EI to physically touch the circuit breaker as an authorized employee, she needed to sign back on the LOTO permit. The EI became distracted, during multiple discussions with an electrical engineer and the electrician at the task and forgot to sign back onto the permit.

Operating Conditions:

Construction

Activity Category:

Construction

Immediate Action(s):

The work was already completed, therefore, no hazards to contain.

FM Evaluation:

N/A

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

Waste Treatment Project

Plant Area:

600

System/Building/Equipment:

T-1

Facility Function:

Nuclear Waste Operations/Disposal

Corrective Action:

Lessons(s) Learned:

N/A

HQ Keywords:

01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)
08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
11G--Other - Subcontractor
12I--EH Categories - Lockout/Tagout (Electrical or Mechanical)
14E--Quality Assurance - Work Process Deficiency
14G--Quality Assurance - Procurement Deficiency

HQ Summary:

On March 26, 2013, a subcontractor electrical inspector touched a de-energized circuit breaker after signing off of the associated lockout/tagout (LOTO) permit during an inspection of an electrical panel in the WTP medical facility, which violated a provision of the Waste Treatment Projects (WTP) Hazardous Energy Work Process (HEWP). The inspector touched the de-energized circuit breaker while attempting to resolve a phase labeling issue after work was completed and the

individual signed off of the LOTO.

Similar OR Report Number: 1. N/A

Facility Manager:

Name	Steve Overton
Phone	(509) 373-8268
Title	Manager of Construction

Originator:

Name	MEAGHER, THOMAS S.
Phone	(509) 373-8467
Title	SAFETY ASSURANCE

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/27/2013	08:43 (PTZ)	Tucker Campbell	BNI
03/27/2013	08:44 (PTZ)	Paul Schroder	DOE
03/27/2013	09:11 (PTZ)	Terry Woodford	EOC

Authorized Classifier(AC):

4)Report Number:

[NA--LSO-LLNL-LLNL-2013-0008](#) After 2003 Redesign

Secretarial Office:

National Nuclear Security Administration

Lab/Site/Org:

Lawrence Livermore National Lab.

Facility Name:

Lawrence Livermore Nat. Lab. (BOP)

Subject/Title:

Failure to follow a prescribed energy control process at Building 411

Date/Time Discovered:

03/12/2013 06:30 (PTZ)

Date/Time Categorized:

03/12/2013 13:30 (PTZ)

Report Type:

Notification/Final

Report Dates:

Notification	03/14/2013	16:28 (ETZ)
Initial Update	03/14/2013	16:28 (ETZ)
Latest Update	03/14/2013	16:28 (ETZ)
Final	03/14/2013	16:28 (ETZ)

Significance Category:

4

Reporting Criteria:

2E(3) - Any failure to follow a prescribed hazardous energy control process (e.g., lockout/tagout, hazardous energy control program).

Cause Codes:

ISM:

- 1) Define the Scope of Work
- 2) Analyze the Hazards
- 3) Develop and Implement Hazard Controls

4) Perform Work Within Controls

Subcontractor Involved:

No

Occurrence Description:

On Tuesday, 03/12/2013, at approximately 06:30am an incident occurred when an employee accidentally pushed a load of 4X4 poles into an electrical access fitting on the outside building south wall. The access was damaged and caused conductors to be pulled out. The electrical service is for a wood dust accumulation system used to remove saw dust when personnel are building pallets/wooden loading containers. The vacuum system was not in use at the time.

The employee noticed the exposed wires and thinking to mitigate the immediate hazard went into the building and ensured the vacuum was turned off from the on-off switch. He then called and left a message with the B411 FPOC requesting assistance. While waiting for the FPCO response, he went back outside and taped one wire that in his judgment lessened the immediate hazard. The employee turned over responsibility to the FPOC upon their response. FPOC personnel arranged to have an electrician lock out/tag out (LOTO) the circuit. The immediate area was secured. No injuries or electrical shock resulted from this event. There was minor damage to the conduit.

This occurrence report is being tracked in LLNL's Issues Tracking System, reference Assessment No. 35803.

Cause Description:

Operating Conditions:

Normal

Activity Category:

Normal Operations (other than Activities specifically listed in this Category)

Immediate Action(s):

The employee called his supervisor and an electrician was called out to LOTO the circuit and safe the conductors.
The immediate area was secured.

FM Evaluation:

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

O&B

Plant Area:

Site 200

System/Building/Equipment: Building 411 electrical access fitting

Facility Function:

Laboratory - Research & Development

Corrective Action:

Lessons(s) Learned:

HQ Keywords: 01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)
 07D--Electrical Systems - Electrical Wiring
 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
 12I--EH Categories - Lockout/Tagout (Electrical or Mechanical)
 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On March 12, 2013, an incident occurred when an employee accidentally pushed a load of 4X4 poles into an electrical access fitting on the outside building south wall pulling out electrical conductors for a vacuum. The employee noticed the exposed wires and thinking to mitigate the immediate hazard went into the building and ensured the vacuum was turned off from the on-off switch. He then called and left a message requesting assistance. While waiting for the Facility Point of Contact (FPOC) response, he went back outside and taped one wire that in his judgment lessened the immediate hazard. The employee turned over responsibility to the FPOC upon their response. FPOC personnel arranged to have an electrician lock out/tag out the circuit. The immediate area was secured. No injuries or electrical shock resulted from this event. There was minor damage to the conduit.

Similar OR Report Number:

Facility Manager:

Name	Michael G. Payne
Phone	(925) 422-0661
Title	Business Directorate, Associate Director

Originator:

Name	LUDWIG, MARK E.
Phone	(925) 422-6964
Title	OCCURRENCE REPORTING OFFICER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/12/2013	16:33 (PTZ)	Barbara Quivey	LEDO
03/12/2013	16:35 (PTZ)	Tracey Simpson	ES&H TL
03/12/2013	16:38 (PTZ)	Lois Marik	NNSA LFO

Authorized Classifier(AC): Tom Miller Date: 03/13/2013

5)Report Number: [NA--NVSO-NST-NLV-2013-0002](#) After 2003 Redesign
Secretarial Office: National Nuclear Security Administration
Lab/Site/Org: Las Vegas Office
Facility Name: North Las Vegas

Subject/Title: Employee Receives Minor Shock to Hand

Date/Time Discovered: 03/13/2013 09:45 (PTZ)

Date/Time Categorized: 03/13/2013 10:45 (PTZ)

Report Type: Final

Report Dates:

Notification	03/14/2013	11:52 (ETZ)
Initial Update	03/28/2013	18:45 (ETZ)
Latest Update	03/28/2013	18:45 (ETZ)
Final	04/03/2013	16:52 (ETZ)

Significance Category: 2

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

Cause Codes: A2B6C01 - Equipment/ material problem; Defective, Failed or Contaminated; Defective or failed part

ISM: 6) N/A (Not applicable to ISM Core Functions as determined by management review.)

Subcontractor Involved: No

Occurrence Description: On Wednesday, March 13, 2013, National Security Technologies, LLC (NSTec) a Maintenance Engineer receive a mild shock to the hand. The employee was prepping for a HVAC (heating, ventilation, and air conditioning) preventative maintenance on a 480-volt air conditioner by visually inspecting the unit. He leaned over the top of the HVAC unit (AC-ACU-026), to verify the filter size, by placing his hand on top of the exterior casing where he received a mild shock. He was not doing electrical work and was wearing the proper personal protective equipment for completing the HVAC preventative maintenance.

The unit was tested to ground and found 220-volts AC. Immediately, the AC unit was locked out/tagged out (LOTO), barriers put in place, and a repair order generated. The employee was transported to NSTec Occupational Medicine for evaluation. Medical determined that the employee was fit for duty and returned to work.

NOTE: This is preliminary notification information and is subject to change upon completion of the investigation.

Cause Description: One Root Cause was identified has defective or failed part (A2B6C01) as the plastic tie which had mounted two electrical wires to the compressor's wiring harness failed over time, increasing vulnerability of electrical wires to vibration and heat.

INVESTIGATION RESULTS: The HVAC system is a Carrier Package

4-ton Heat Pump AC, Model #50QQ-048-660, Serial #1289C38758, Manufacturer Date 1988. The Carrier HVAC system is on a quarterly Preventive Maintenance which was last completed on December 17, 2012. On March 19, 2013 the Carrier HVAC system each electrical connection was tested with a meter to ground. It was discovered that one leg was going to ground. That conductor was routed to the opposite side of the unit. The west side of the HVAC was opened up and it was noted right away that the wire feeding the crankcase heater had shorted to ground. The manufacture's insulated crimp on the black wire had melted. Underneath the black wire was a burn mark. That particular wire was located near the exterior fan enclosure and a horizontal bracket. The other half of the previously crimped wire was laying near the black burned wire. It is suspected that the crimp was burnt off and the wire arced. It did not cause the chasis ground to trip the breaker because of the low amperage generated. The voltage was 220-volts, resistance was 750-ohms, thus the amperage was .29 amps. It was also determined that there was no bonding wire between the disconnect and the unit other than 3 screws that mounted the disconnect to the unit. This also attributed to the breaker not tripping.

EXTENT of CONDITION: An EOC was performed during this root cause evaluation and determined that similar HVAC safety issues may exist within other RSL-N facilities. A work request was submitted on March 21, 2013 with the following scope of work: 'Inspect all wiring on RSL-N package AC units throughout the facility. Secure any loose wires so that they cannot come in contact with the frame of the unit. Check all grounding and bonding connections. If corrections are needed, install where required. Determine if corrective maintenance is needed. Generate a report of deficiencies when complete.' Additionally an internal lessons learned will be generated for other NSTec locations that might have Carrier HVAC units.

ISM SUMMARY: There was no ISM failure associated with this event. The work activity was performed in accordance with all NSTec procedures and appropriate precautions were taken when the presence of utilities was suspected.

ECFOG ELECTRICAL SEVERITY MEASUREMENT TOOL: The NSTec Electrical SME has calculated the electrical severity of this event using guidance developed by the EFCOG/DOE Electrical Safety Subgroup. The calculated severity for this event is 3150 and deemed this as a high hazard.

The event scores as follows:

Electrical Hazard: 50 (220V, 2000 kVA 12,470/480V transformer);

Environmental Factor: 0 (dry); Shock Proximity Factor: 10; Arc Flash:

10(2000 kVA 12,470/480V transformer, Normal system-480V 30A fused disconnect fed from 30A breaker fed from 480V 200A main. = 10; As failed condition- 220V phase protected by 30A fuse fed from 30A breaker = 10); Thermal Factor: 0; PPE mitigations for shock and arc (N/A- this did not occur during electrical work and had appropriate PPE/Equipment for non-electrical work) Injury Factor: 3 (shock (no fibrillation))
ES=(50)*(1+0+10+10+0)*3=3150

INVESTIGATION METHODOLOGY: This cause analysis was done in accordance with CCD-QA03.001, Issues Management, a NSTec approved system was used to objectively look at the facts and identify the causes using Why-staircase. The DOE Causal Analysis Tree as described in DOE-STD-1197-2011 was used to identify the causal factor(s) for the event. An apparent cause is the most probable cause(s) that explains why the event happened, that can be reasonably identified, that local or facility management has the control to fix and for which effective recommendations for corrective action(s) to remedy the problem can be generated, if necessary.

Operating Conditions:

Does Not Apply

Activity Category:

Maintenance

Immediate Action(s):

HVAC placed in safe condition with LOTO and barriers.

Employee transported to NSTec Occupational Medicine for evaluation.

Notification made to NSTec and NNSA/Nevada Field Office line management.

FM Evaluation:

There were no impact to either facilities or any projects due to this event. All corrective actions taken will help prevent this type of situation from occurring again.

DOE Facility Representative Input:

Reviewed the RCA on 4/1/2013 which had identified two Extent of Condition actions. The Extent of Condition identified four corrective actions. As the FR, I reviewed the two corrective actions that are closed (#3 and #4), the briefing of the incident to RSL-Nellis staff members and the distributed LL 2013-490. The two remaining open corrective actions have appropriate due dates. The FR will provide follow-up to ensure these actions are closed by the due date.

Entered by: HAEBERLIN, JEFFREY M 04/03/2013

DOE Program Manager Input:

Further Evaluation is Required:

No

Division or Project: RSL-N Maintenance
Plant Area: RSL-N
System/Building/Equipment: HVAC Unit AC-ACU-026
Facility Function: Balance of Plant - Infrastructure (Other Functions not specifically listed in this Category)

Corrective Action 01: **Target Completion Date:**04/15/2013 **Tracking ID:**23187-20011

Troubleshoot and repair air conditioning unit (AC-026).

Responsible Manager: RSL-N Maintenance

Corrective Action 02: **Target Completion Date:**05/15/2013 **Tracking ID:**23187-20012

Inspect wiring on all Package AC units at RSLN. Secure any loose wires so that they cannot come in contact with the frame of the unit. Check grounding and bonding connections. If corrections are needed, install where required. Generate a report of the findings upon completion of this corrective maintenance.

Responsible Manager: RSL-N Maintenance

Corrective Action 03: **Target Completion Date:**03/29/2013 **Tracking ID:**23187-20013

Submit a Lessons Learned in accordance with procedure CCD-QA03.003, Lessons Learned/Operating Experience.

Responsible Manager: RSL-N Safety

Corrective Action 04: **Target Completion Date:**03/29/2013 **Tracking ID:**23187-20014

Brief the RSL-N facility maintenance personnel on lessons learned from the electrical shock incident as well as a reminder to obtain immediate medical attention after these types of incidents.

Responsible Manager: RSL-N Safety

Lessons(s) Learned: NSTec Identifier: 2013-490
Title: Employee Receives Minor Electrical Shock to Hand
Date: March 26, 2013

LL Statement: As a safety precaution, HVAC system grounding and bonding connections should be thoroughly inspected and brought up to current code requirements.

HQ Keywords: 07D--Electrical Systems - Electrical Wiring
08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
08J--OSHA Reportable/Industrial Hygiene - Near Miss (Electrical)
12C--EH Categories - Electrical Safety
14L--Quality Assurance - No QA Deficiency

HQ Summary: On March 13, 2013, a maintenance engineer received a mild shock to the hand while performing preventative maintenance on a 480-volt air

conditioner by visually inspecting the unit. When he leaned over the top of the unit to verify the filter size, he received the shock when he placed his hand on top of the exterior casing. The engineer was not doing electrical work and was wearing the proper personal protective equipment for completing the preventative maintenance. The unit was tested and 220-volts AC was found to ground. Immediately, the unit was locked out/tagged out, barriers put in place, and a repair order generated. Medical personnel determined that the engineer was fit for duty and returned to work.

Similar OR Report Number: 1. None

Facility Manager:

Name	John Nelson
Phone	(702) 295-8693
Title	Alternate Facility Manager

Originator:

Name	GILE, ANDREA L
Phone	(702) 295-7438
Title	PROJECT OPERATIONS SPEC.

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/13/2013	09:45 (PTZ)	Duty Manager	NNSS
03/13/2013	11:00 (PTZ)	Ruston Eleogram	NFO/FR

Authorized Classifier(AC): Ronda Fulkerson Date: 03/28/2013

6)Report Number:

[NA--SS-SNL-1000-2013-0004](#) **After 2003 Redesign**

Secretarial Office:

National Nuclear Security Administration

Lab/Site/Org:

Sandia National Laboratories - SS

Facility Name:

SNL Division 1000

Subject/Title:

Improper Lockout Tagout Procedure Performed

Date/Time Discovered:

03/27/2013 11:40 (MTZ)

Date/Time Categorized:

03/28/2013 10:30 (MTZ)

Report Type:

Notification/Final

Report Dates:

Notification	04/01/2013	19:12 (ETZ)
Initial Update	04/01/2013	19:12 (ETZ)
Latest Update	04/01/2013	19:12 (ETZ)
Final	04/01/2013	19:12 (ETZ)

Significance Category:

4

Reporting Criteria:

2E(3) - Any failure to follow a prescribed hazardous energy control

process (e.g., lockout/tagout, hazardous energy control program).

Cause Codes:

- ISM:**
- 2) Analyze the Hazards
 - 3) Develop and Implement Hazard Controls
 - 4) Perform Work Within Controls

Subcontractor Involved: Yes
Rocky Mountain Hydrostatics

Occurrence Description: SNL Safety personnel observed improper LO/TO procedure and equipment by Rocky Mountain Hydrostatics (RMH) personnel at the 1534 Centrifuge Complex. RMH personnel were performing work on the Motor Control Center (MCC), located inside the pump house of the Centrifuge Complex. RMH personnel made the assumption that the LO/TO applied by other contractors and 1534 personnel was adequate. Zero Energy Verification was performed improperly. The site had relied on a visual check of an analog volt meter attached to a 4.16kV switch outside of building 6523B as a visual verification of zero energy for work within the building. Protective grounds for the 4.16kV line were not installed as part of the LO/TO procedure to maintain the "made safe" condition of the system. Proper written group LO/TO procedures were not developed or followed. The RMH (Sandia approved) Contract Specific Safety Plan (CSSP) specifically excluded all electrical work and LO/TO. The plan was not modified and resubmitted prior to work starting.

Cause Description: Critique/Fact Finding Performed: 3/28/2013

Operating Conditions: Undergoing renovation

Activity Category: Maintenance

Immediate Action(s): The 1534 manager suspended electrical work by the sub-contractor until further investigation, including causal analysis and resolution of corrective actions.

FM Evaluation: EOC #28721

DOE Facility Representative Input:

DOE Program Manager Input:

Further Evaluation is Required: No

Division or Project: 1000/Centrifuge Complex Hydraulic Drive System Rec

Plant Area: Tech Area III

System/Building/Equipment: Motor Control Unit/Bldg 6523B/Centrifuge Pump House

Facility Function: Laboratory - Research & Development

Corrective Action:

Lessons(s) Learned:

HQ Keywords: 01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)
 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
 11G--Other - Subcontractor
 12I--EH Categories - Lockout/Tagout (Electrical or Mechanical)
 14E--Quality Assurance - Work Process Deficiency
 14G--Quality Assurance - Procurement Deficiency

HQ Summary: On March 27, 2013, a SNL safety individual observed a subcontractor commit multiple lockout/tagout (LOTO) violations while performing work on the Motor Control Center located inside the pump house of the Centrifuge Complex. The subcontractor assumed the LOTO applied by others was adequate. Zero energy verification was performed improperly and protective grounds for the 4.16kV line were not installed. The Centrifuge Complex manager suspended electrical work by the subcontractor.

Similar OR Report Number:

Facility Manager:

Name	Wayne McKenna
Phone	(505) 284-4145
Title	1510 Environmental Safety & Health Coordinator

Originator:

Name	ROGERS, JESSICA
Phone	(505) 845-4727
Title	OCCURRENCE REPORTING ADMINISTRATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/27/2013	11:40 (MTZ)	EOC	4236
03/28/2013	10:50 (MTZ)	Veronica Martinez	DOE/SFO
03/28/2013	11:01 (MTZ)	Dennis Miller	1530
03/28/2013	11:01 (MTZ)	Justine Johannes	1500
03/28/2013	11:01 (MTZ)	Mike Hessheimer	1534
03/28/2013	11:01 (MTZ)	Carolyn Childress	1001
03/28/2013	11:01 (MTZ)	Craig Dickensheets	1001
03/28/2013	11:01 (MTZ)	Duane Dimos	1000
03/28/2013	11:01 (MTZ)	Hazel Barclay	1001

Authorized Classifier(AC): Michael Hessheimer Date: 03/28/2013

7)Report Number: [SC--ASO-ANLE-ANLECIS-2013-0001](#) After 2003 Redesign

Secretarial Office: Science
Lab/Site/Org: Argonne National Laboratory East
Facility Name: Computing Information Systems
Subject/Title: Employee Exposed to Electrical Hazardous Energy While Operating an Office Light Switch
Date/Time Discovered: 03/28/2013 12:15 (CTZ)
Date/Time Categorized: 03/28/2013 12:50 (CTZ)
Report Type: Final

Report Dates:

Notification	03/29/2013	16:32 (ETZ)
Initial Update	05/13/2013	18:56 (ETZ)
Latest Update	05/13/2013	18:56 (ETZ)
Final	05/15/2013	16:45 (ETZ)

Significance Category: 2
Reporting Criteria: 2E(1) - Any unexpected or unintended personal contact (burn, injury, etc.) with an electrical hazardous energy source (e.g., live electrical power circuit, etc.).

Cause Codes: A3B4C02 - Human Performance Less Than Adequate (LTA); Work Practices LTA; Deliberate violation
 -->couplet - A4B1C01 - Management Problem; Management Methods Less Than Adequate (LTA); Management policy guidance / expectations not well-defined, understood or enforced
 A4B1C01 - Management Problem; Management Methods Less Than Adequate (LTA); Management policy guidance / expectations not well-defined, understood or enforced

ISM:
 2) Analyze the Hazards
 3) Develop and Implement Hazard Controls
 4) Perform Work Within Controls

Subcontractor Involved: No

Occurrence Description: On March 27, 2013 at approximately 2:00 pm an Argonne employee was exposed to electrical hazardous energy while operating an office light switch in Room 3113 of Building 240, the Theory and Computational Sciences (TCS) building. Building 240 is leased by Argonne; the landlord operates the facility and supervises the maintenance and operation of the building. A maintenance worker, contracted by the landlord, was performing diagnostics and repairs on a light switch within Room 3113. The occupant of the office space is an Argonne employee, and was present in the office while the maintenance worker was engaged in the repair activities.

Upon completion of the repairs by the maintenance worker, the Argonne employee operated the light switch and heard a pop from an arc in the

overhead light fixture. The Argonne employee also felt a rush of air from behind the cover, but did not believe that he experienced a shock. Twenty minutes after the incident, the employee experienced a tingling sensation on the fourth and fifth digit of his right hand which was used to operate the light switch.

The employee was evaluated by the Argonne Medical Department on the morning of March 28, 2013. There were no indications of injury or illness as a result of the incident; however the treating physician could not rule out that the employee may have received a minor shock from the event, and that the tingling sensation the employee experienced were not symptoms from the arc that occurred.

Cause Description:

It was determined through the contractor investigation and communicated to Argonne that proper safety procedures were not followed by the electrical worker. His lack of following proper safety precautions and common sense were unacceptable, and the company has a "zero tolerance" for this type of behavior, and took proper disciplinary action with the employee.

A management problem was also identified with the contractor program, as the written policy had a soft requirement to schedule work on off hours if possible, and to avoid working in areas populated by Argonne personnel. It was also determined through the Argonne portion of the investigation by the ESQ Electrical Safety program manager, that an installation error, in relation to the ground wire on the ballast, was the likely cause of the arc flash that occurred. He further concluded that the potential for actual exposure to electrical energy or current was highly unlikely, if not impossible.

NOTE: It is imperative in this ORPS report to keep in mind that the causes above were the result of a contractor employee to the landlord of the facility, not contracted or affiliated with Argonne. That contractor does not fall under 10CFR 851, nor are they obligated to follow or adhere to the site specific 10CFR 851 Health and Safety Plan, and/or existing Argonne policies and procedures.

An apparent causal analysis was performed for this incident due to the exposure of electrical hazardous energy, due to the fact that the only act performed was the operation of a light switch by an Argonne employee. It was determined that a similar issue with management policy existed for Computing & Information Systems (CIS) employee. There was no written or communicated rule, expectation or policy, nor direction given to CIS employees to ensure separation of themselves and work areas of the maintenance contractor at the time of the incident. See corrective

actions 1 and 2 for actions taken to rectify this cause.

Operating Conditions: Non-functioning light switch
Activity Category: Normal Operations (other than Activities specifically listed in this Category)
Immediate Action(s): The incident scene was investigated by the Environmental Safety and Health Coordinator. Pictures of the switch plate and light fixtures were taken. The light switch has been placed in a safe condition.

The company that the maintenance employee worked for was contacted by the Environment, Safety, & Quality Assurance (ESQ) Division Director through the landlord contact. A meeting was scheduled between ESQ division management, and corporate managers from the contractor of the landlord to discuss the incident, and devise a path moving forward.

The ESQ Electrical Safety program manager was dispatched to perform an investigation for Argonne, to include inspection of the ballast and light switch. Similarly, the contractor performed their own investigation and shared their results with Argonne.

FM Evaluation: Operations at the TCS facility present unique challenges due to the various management structures and the organizations that occupy it. It is important to recognize the different entities, and ensure appropriate controls are in place to ensure safe operations between the Argonne personnel as occupants, and those work tasks performed by other organizations that are within the facility.

DOE Facility Representative Input: ASO has reviewed the ORPS report and approves it.

Entered by: SCHUMANN, CRAIG A 05/15/2013

DOE Program Manager Input:

Further Evaluation is Required: No

Division or Project: Computing and Information Services

Plant Area: 200 Area

System/Building/Equipment: Building 240, Room 3113 light switch

Facility Function: Balance of Plant - Infrastructure (Other Functions not specifically listed in this Category)

Corrective Action 01:

Target Completion Date: 04/05/2013	Actual Completion Date: 04/01/2013
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Communicate the expectation that CIS employees are not to be within TCS maintenance work areas, nor shall they participate in any ongoing activities being performed by those employees.

Corrective Action 02:

Target Completion Date:05/30/2013	Actual Completion Date:05/30/2013
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Produce a lessons learned for distribution by the Argonne lessons learned coordinator. The minimum target audience list should consist of lessons learned point of contacts, and those ESH Coordinators with Argonne personnel within the TCS facility.

Lessons(s) Learned:

In this instance, a non-Argonne contracted employee decision to perform a non-compliant act during the course of a common maintenance activity, ended up affecting an Argonne employee through participation. The CIS employee engaged in a very common and low risked act (e.g. turning on a light switch). The missing barrier of an Argonne policy, written or otherwise to segregate tasks, work areas, and forbidding participation in work performed by outside entities was the prominent failure and caused the incident.

HQ Keywords:

- 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
- 01R--Inadequate Conduct of Operations - Management issues
- 01S--Inadequate Conduct of Operations - Incorrect/Inadequate Installation
- 07D--Electrical Systems - Electrical Wiring
- 08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
- 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
- 08K--OSHA Reportable/Industrial Hygiene - Near Miss (Other)
- 12C--EH Categories - Electrical Safety
- 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On March 27, 2013, an Argonne employee felt a tingling sensation in his right hand when he operated a light switch approximately 20 minutes after operating the same switch and hearing a pop from an arc in an overhead light fixture in Room 3113 of Building 240. The employee also felt a rush of air from behind the switch cover at the same time he heard the pop, but did not believe he was shocked. An Argonne Medical Department physician evaluated the employee and determined there was no injury, but could not rule out a minor shock. The light switch was placed in a safe condition.

Similar OR Report Number: 1. SC--ASO-ANLE-ANLECIS-2007-0001

Facility Manager:

Name	CLARKE, CHARLES J
Phone	(630) 252-5100
Title	ESQ SAFETY MANAGER - OPS/OTD, ESH/QA

Originator:

Name	CLARKE, CHARLES J
Phone	(630) 252-5100
Title	ESQ SAFETY MANAGER - OPS/OTD, ESH/QA

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/28/2013	13:00 (CTZ)	R. Enge	ANL-ESQ
03/28/2013	13:35 (CTZ)	R. Colglazier	ANL-PMA
03/28/2013	13:40 (CTZ)	C. Schumann	DOE-ASO

Authorized Classifier(AC):

8)Report Number:

[SC--BSO-LBL-MSD-2013-0001](#) After 2003 Redesign

Secretarial Office:

Science

Lab/Site/Org:

Lawrence Berkeley National Laboratory

Facility Name:

Material Sciences Division

Subject/Title:

Unsafe Homemade Electrical Apparatus In a Research Laboratory - No Injuries

Date/Time Discovered:

03/20/2013 13:00 (PTZ)

Date/Time Categorized:

03/20/2013 16:30 (PTZ)

Report Type:

Update

Report Dates:

Notification	03/22/2013	15:03 (ETZ)
Initial Update	05/06/2013	12:03 (ETZ)
Latest Update	05/06/2013	12:03 (ETZ)
Final		

Significance Category:

3

Reporting Criteria:

2E(2) - Any unexpected discovery of an uncontrolled electrical hazardous energy source (e.g., live electrical power circuit, etc.). This criterion does not include discoveries made by zero-energy checks and other precautionary investigations made before work is authorized to begin.

Cause Codes:

ISM:

3) Develop and Implement Hazard Controls

Subcontractor Involved:

No

Occurrence Description:

On 03/20/2013 at around 1300 hours, during a laser audit follow-up inspection in Building 66 room 411, the Materials Sciences Division(MSD) safety manager noticed what appeared to be an electrically unsafe homemade power supply which also served as a UV light source. He immediately unplugged the apparatus and discussed the issue with the student who was working in the laboratory at the time, with the instruction that the apparatus was not to be used until it could be inspected and rebuilt.

The safety manager then contacted the Lab's Electrical Safety Program manager who inspected the apparatus and determined that hazardous voltage (120 VAC) was present when it was in use. The apparatus had not been entered into LBNL's electrical equipment inspection database and had not been approved for use by the Authority Having Jurisdiction(AHJ). The Program manager removed the apparatus and took it back to his office for further evaluation.

Cause Description:

Operating Conditions: Indoors, Lighted, Dry

Activity Category: Research

Immediate Action(s): - The safety manager immediately unplugged the apparatus.

- The safety manager notified the electrical safety program manager who inspected and determined that the apparatus was unsafe as fabricated.

FM Evaluation:

05/06/2013 UPDATE:

Due to scheduling difficulties, the final interview for this investigation was completed on 05/02/2013. Additional time is required to evaluate the findings and prepare the report. LBNL is requesting a 45-day extension to submit the ORPS final report on 06/20/2013.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

Yes.
Before Further Operation? No
By Whom: MSD and EH&S
By When:

Division or Project:

Materials Sciences Division (MSD)

Plant Area:

B66-411

System/Building/Equipment:

Building 66 Room 411 UV Light

Facility Function:

Laboratory - Research & Development

Corrective Action:

Lessons(s) Learned:

HQ Keywords:

01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
11I--Other - Visiting Scientist/Researcher or Student Employee
12C--EH Categories - Electrical Safety
14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On March 20, 2013, the Materials Sciences Division (MSD) safety manager noticed an apparently homemade power supply which also served as a UV light source during a laser audit follow-up inspection in Room 411, Building 66. The Lab's Electrical Safety Program manager

inspected the 120-VAC device and determined it was not in LBNL's electrical equipment inspection database and was not approved for use by the Authority Having Jurisdiction (AHJ).

Similar OR Report Number:

Facility Manager:

Name	Jeffrey Neaton
Phone	(510) 486-4527
Title	Acting Division Director

Originator:

Name	MOU, FLORENCE P.
Phone	(510) 486-7872
Title	SENIOR ADMINISTRATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/20/2013	18:36 (PTZ)	Kevin Hartnett	BSO
03/20/2013	18:36 (PTZ)	Mary Gross	BSO

Authorized Classifier(AC):

9)Report Number:

[SC--PNSO-PNNL-PNNLBOPER-2013-0005](#) After 2003 Redesign

Secretarial Office:

Science

Lab/Site/Org:

Pacific Northwest National Laboratory

Facility Name:

Energy Research Programs (PNNL)

Subject/Title:

Subcontractor Electrician Fails to Follow Prescribed Hazardous Electrical Energy Control Process

Date/Time Discovered:

03/20/2013 12:30 (PTZ)

Date/Time Categorized:

03/20/2013 15:11 (PTZ)

Report Type:

Notification/Final

Report Dates:

Notification	03/22/2013	15:19 (ETZ)
Initial Update	03/22/2013	15:19 (ETZ)
Latest Update	03/22/2013	15:19 (ETZ)
Final	03/22/2013	15:19 (ETZ)

Significance Category:

4

Reporting Criteria:

2E(3) - Any failure to follow a prescribed hazardous energy control process (e.g., lockout/tagout, hazardous energy control program).

Cause Codes:

ISM:

4) Perform Work Within Controls

Subcontractor Involved: Yes
McKinstry

Occurrence Description: At approximately 1100 hours, an EMSL employee observed a subcontractor construction electrician in room 1141A looking inside an open panel. The panel was labeled as Computer Room UPS Shutdown Panel, "Caution 480V," and there were exposed energized parts inside. The electrician was in the process of tracing electrical conduit from room 1119 to the panel in room 1141A. As the electrician was tracing the conduit, the door of the panel opened a few inches unexpectedly. The electrician opened the door a few inches more to look in, but did not reach inside. Opening the panel door without proper authorization meets the reporting criteria for 2E(3).

Cause Description:

Operating Conditions: Indoors; dry

Activity Category: Construction

Immediate Action(s): The EMSL employee informed the electrician that he could not access the panel without authorization. The electrician was not harmed, the panel door was closed and the electrician left the room. The EMSL employee then called the PNNL construction manager (CM) to inform him of what the electrician had done. The CM arrived at the job site and after gathering information; paused work, convened the subcontractor electricians, and refreshed them on instructions for accessing electrical equipment/boxes. This briefing was completed at about 1115 hours. A critique was conducted Thursday, March 21, 2013.

FM Evaluation:

DOE Facility Representative Input:

DOE Program Manager Input:

Further Evaluation is Required: No

Division or Project: Operational Systems Directorate

Plant Area: RCHN Area

System/Building/Equipment: EMSL / Room 1141A

Facility Function: Laboratory - Research & Development

Corrective Action:

Lessons(s) Learned:

HQ Keywords: 01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
11G--Other - Subcontractor
12C--EH Categories - Electrical Safety
14E--Quality Assurance - Work Process Deficiency

14G--Quality Assurance - Procurement Deficiency

HQ Summary:

On March 20, 2013, an EMSL employee observed a subcontractor construction electrician looking inside an open Computer Room UPS Shutdown Panel in Room 1141A with exposed energized parts that was labeled "Caution 480V," without proper electrical hazardous energy control authorization. The door of the panel opened a few inches unexpectedly as the electrician traced an electrical conduit. The electrician opened the door a few more inches to look but did not reach inside. The EMSL employee stopped the subcontractor, closed the panel door, and informed the PNNL construction manager.

Similar OR Report Number:

Facility Manager:

Name	Cunningham, J. A.
Phone	(509) 371-7948
Title	Manager, Project Management

Originator:

Name	TANO, DANIEL K.
Phone	(509) 375-2921
Title	SPECIALIST, ASSURANCE SYSTEMS

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/20/2013	12:30 (PTZ)	Carlson, J. L.	PNSO

Authorized Classifier(AC): Pollari, R. A. Date: 03/22/2013

10)Report Number: [SC--SSO-SU-SLAC-2013-0006](#) After 2003 Redesign

Secretarial Office: Science

Lab/Site/Org: Stanford Linear Accelerator Center

Facility Name: SLAC National Accelerator Laboratory

Subject/Title: Employee Contacts Energized Terminal During Capacitor Testing at Test Bench- No Injury

Date/Time Discovered: 03/27/2013 10:50 (PTZ)

Date/Time Categorized: 03/27/2013 14:00 (PTZ)

Report Type: Final

Report Dates:

Notification	03/28/2013	19:39 (ETZ)
Initial Update	05/10/2013	21:00 (ETZ)
Latest Update	05/10/2013	21:00 (ETZ)
Final	05/13/2013	10:44 (ETZ)

Significance Category: 2

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

Cause Codes: A3B2C05 - Human Performance Less Than Adequate (LTA); Rule Based Error; Situation incorrectly identified or represented results in wrong rule used
-->couplet - A4B3C08 - Management Problem; Work Organization & Planning LTA; Job scoping did not identify special circumstances and/or conditions
A3B3C06 - Human Performance Less Than Adequate (LTA); Knowledge Based Error; Individual underestimated the problem by using past events as basis
-->couplet - NA
A3B2C04 - Human Performance Less Than Adequate (LTA); Rule Based Error; Previous success in use of rule reinforces continued use of rule
-->couplet - A2B4C07 - Equipment/ material problem; Material control LTA; Marking/labeling LTA

ISM: 2) Analyze the Hazards
3) Develop and Implement Hazard Controls

Subcontractor Involved: No

Occurrence Description: A worker received two electrical shocks while bench-testing a Klystron Radio Frequency (RF) Modulator High Voltage (HV) Filter Capacitor (30 kV, 4.7 uF) that had been removed from service for evaluation. The capacitor was presumed to be de-energized and was not connected to a power source during the event.

Two HV filter capacitors installed in a Klystron RF Modulator were removed from service on the morning of March 27, 2013, by an Accelerator Power Systems (APS) Technician to inspect for possible damage, as approximately six months earlier one of the HV filter capacitors in this modulator was observed to be visibly bulging. To remove all stored energy from the capacitors, the technician discharged both capacitors with a grounding hook prior to removing them from the modulator, then installed a shorting wire between the two terminals on each capacitor. The capacitors were then transported to Building 015 for bench testing to determine if they could be put back into service.

At approximately 10:45am that day in Building 015, an APS System Manager proceeded with bench testing of the two capacitors. The worker first tested the bulging capacitor by verifying 0V between the terminals, removing the shorting wire between the terminals, measuring the capacitance between the terminals, and then reinstalling the shorting wire. The bulging capacitor was found to be out of tolerance, indicating a failure. The worker then repeated this procedure on the second, non-

bulging capacitor. After measuring 0V across the terminals, the worker proceeded with removing the shorting wire between the terminals and received a shock to his left hand during this step. It is believed that this shock occurred when one of the worker's hands was on the shorting wire and the other hand was in contact with the capacitor terminal from which the shorting wire had been removed. The worker continued on and fully removed the shorting wire, then measured the capacitance between the terminals. The capacitance of the non-bulging capacitor measured out of tolerance, indicating a failure.

The second shock occurred when the worker was reinstalling the shorting wire after testing the capacitor. The worker experienced the shock to his left hand when his left hand brushed up against the capacitor case while the wrench he was holding was still connected to one of the capacitor terminals.

The worker experienced a numb sensation in the last two digits of his left hand and reported to SLAC Occupational Health Center for evaluation. He was examined and immediately released to return to work with no restrictions.

Cause Description:

The APS organization and its workers failed to realize there was energy stored in the capacitor between the terminals and the case. The APS organization's procedures and practices address the stored energy of the capacitor and how to dissipate that stored energy by installing the grounding hook and then the shorting wire, but they do not address the potential energy stored between the terminals and the case. This is partially because there is no record or memory of this type of event within the organization, and its workers had previously performed the same procedure and had never experienced a shock incident due to stored energy between capacitor terminals and the case.

The small amount of stored energy between the capacitor terminals and the case is likely because of the configuration within the Klystron RF Modulator system and static charge. The capacitor is constructed with the terminals isolated ("floating") from the case; therefore the case is not grounded. When the capacitor was removed from service the terminals were shorted to each other but not bonded to the case. While this dissipated energy between the terminals, it allowed a capacitance to exist between the shorted terminals and the case. Laboratory measurement of the capacitance between terminals and case of this capacitor confirmed a small but measurable capacitance (5 nF).

Causal Factors:

1. The Accelerator Power Systems organization did not recognize the possibility for stored potential to be present between the terminals and the case on HV filter capacitors where the terminals are isolated from the

case, and therefore had not developed controls for its workers to utilize to either remove the stored potential or to protect against this hazard. [A3 Human Performance, B2 Rule-based error, C05 Situation incorrectly identified or represented resulting in wrong rule used; A4 Management Problem, B3 Work Organization and Planning LTA, C08 Job scoping did not identify special circumstances and/or conditions]

2. The worker underestimated the ability of the capacitor to hold a charge between terminal and case. The worker had just bench tested a similar capacitor without receiving a shock. Because of this and the existing department practice of only shorting the capacitor terminals to each other, he did not ground the capacitor case, which led to the shock. [A3 Human Performance LTA, B3 Knowledge Based Error, C06 Individual underestimated the problem by using past event as basis]

3. The worker did not anticipate the potential for shock due to stored energy between the capacitor terminals and case because he did not receive a shock during previous bench testing of capacitors or with the bulged capacitor that was testing immediately before the capacitor involved in the incident. Common handling practices of capacitors within the APS organization is to short the terminals together if they are being stored or transported. This is an adequate safety practice provided that the capacitor is constructed (as many are) with one terminal continuous with the case. For these capacitors shorting the terminals also binds the terminals to the case. However, some capacitors (including the one involved in this incident) have the terminals "floating" and not connected with the case. In these situations the case is provided with a separate grounding/bonding lug. If the terminals are not bonded to the case through a wire connection then a voltage potential can exist between the terminals and the case. Department practice is to only electrically connect the terminals together, not connect the terminals to the case or ground the case. [A3 Human Performance LTA, B2 Rule Based Error, C04 Previous success in use of rule reinforced continued use of rule]

4. The capacitor that was involved in the incident has an unlabeled grounding lug that can be used to ground the terminals to the case, but was not in use at the time of the incident, and none of the individuals involved in this incident recognized that the terminals needed to be wired to this lug to assure full discharge. A survey of individuals in the department confirms that standard practices up to that time included shorting the terminals, but did not include grounding the terminals to the case. [A2 Equipment/Material Problem, B4 Material Control, C07 Marking/labeling LTA]

Operating Conditions:

Indoors, Normal Conditions

Activity Category:

Facility/System/Equipment Testing

Immediate Action(s): SLAC internal incident notification hotline, Extension 5555, was called to report a non-emergency incident. Employee went to SLAC Occupational Health Center for evaluation. Physician evaluated and released with no work restrictions, and the employee returned to work. SLAC AD Power Electronics initiated an immediate procedure review and suspended analytical work on that class of capacitors pending analysis of the incident and determination of corrective actions.

FM Evaluation: Actions by the APS group to update procedures for handling HV filter capacitors is expected to prevent recurrence of this type of incident at SLAC.

DOE Facility Representative Input: SSO will monitor to verify that the Corrective Actions are completed on schedule.

Entered by: WENHOLZ, SCOTT 05/13/2013

DOE Program Manager Input:

Further Evaluation is Required: No

Division or Project: Accelerator Directorate

Plant Area: Bdg 015

System/Building/Equipment: Capacitor

Facility Function: Accelerators

Corrective Action 01:

Target Completion Date: 05/31/2013	Actual Completion Date:
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Finalize recommended handling procedures for HV filter capacitors and train APS personnel on the new procedures.

Corrective Action 02:

Target Completion Date: 05/31/2013	Actual Completion Date:
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Inspect all HV filter capacitors during periodic planned maintenance days to identify list of capacitors with unlabeled or missing grounding lugs.

Corrective Action 03:

Target Completion Date: 09/30/2013	Actual Completion Date:
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Label and install grounding lugs on all deficient HV filter capacitors (identified in Corrective Action #2) during periodic planned maintenance days.

Lessons(s) Learned: Stored energy may exist in capacitors between the capacitor terminals and the capacitor case when the capacitor case is not bonded to one of the capacitor terminals (case is "floating"). Controls should be implemented to discharge or protect against this stored energy.

HQ Keywords: 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
01B--Inadequate Conduct of Operations - Loss of Configuration Management/Control

01M--Inadequate Conduct of Operations - Inadequate Job Planning (Electrical)
 01Q--Inadequate Conduct of Operations - Personnel error
 08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
 12C--EH Categories - Electrical Safety
 14D--Quality Assurance - Documents and Records Deficiency
 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On March 27, 2013 an electrical engineer contacted an energized terminal while attempting to evaluate a possibly damaged high voltage capacitor at a test bench. The engineer was uninjured and returned to work that day. The engineer removed two capacitors following standard procedures: discharge the capacitor, perform zero-voltage verification, and apply a shorting buss between the capacitor terminals, prior to handling. He received the shock as he removed the shorting buss between the capacitors. SLAC is investigating how the shorted capacitor was able to retain residual energy and how to prevent recurrence.

Similar OR Report Number: 1. None.

Facility Manager:

Name	Jim Healy
Phone	(650) 926-4989
Title	Facility Manager Designee

Originator:

Name	WEIBEL, MARC A.
Phone	(650) 926-4264
Title	WPC/EHS ASSURANCE MANAGER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/27/2013	11:55 (PTZ)	John Saidi	SSO

Authorized Classifier(AC):

11)Report Number: [SC--TJSO-JSA-TJNAF-2013-0002](#) After 2003 Redesign
Secretarial Office: Science
Lab/Site/Org: Thomas Jefferson National Accelerator Site
Facility Name: Thomas Jefferson Nat'l Accelerator
Subject/Title: TEDF-13-0313 Start-up and Troubleshooting of Test Lab Air Handling Unit Raises Management Concern
Date/Time Discovered: 03/08/2013 11:00 (ETZ)
Date/Time Categorized: 03/14/2013 16:33 (ETZ)
Report Type: Final

Report Dates:

Notification	03/18/2013	15:56 (ETZ)
Initial Update	04/26/2013	09:58 (ETZ)
Latest Update	04/26/2013	09:58 (ETZ)
Final	04/26/2013	09:58 (ETZ)

Significance Category:

3

Reporting Criteria:

10(2) - An event, condition, or series of events that does not meet any of the other reporting criteria, but is determined by the Facility Manager or line management to be of safety significance or of concern for that facility or other facilities or activities in the DOE complex. The significance category assigned to the management concern should be based on an evaluation of the potential risks and impact on safe operations. (1 of 4 criteria - This is a SC 3 occurrence)

Cause Codes:

A4B3C08 - Management Problem; Work Organization & Planning LTA; Job scoping did not identify special circumstances and/or conditions

ISM:

- 1) Define the Scope of Work
- 2) Analyze the Hazards
- 3) Develop and Implement Hazard Controls
- 4) Perform Work Within Controls

Subcontractor Involved:

Yes
Mortenson

Occurrence Description:

On 3/8/2013, at approximately 11:00 am, a lower-tier subcontractor (ACES) was on site to conduct training for Jefferson Lab staff on a large Air Handling Unit (AHU) in the Test Lab. This was part of the Technology Engineering Development Facility (TEDF) project. The planned activity also included start-up of the unit. All of this was being performed to effect operational turnover.

At the start of the training, there was no electrical power to the AHU. While the training was on going, subcontractor electricians established electrical power to the panel that fed the AHU. At that point, the lower-tier subcontractor proceeded with his start-up procedures. This included taking voltage readings within the energized 480-volt panel prior to starting up the AHU.

One of the Jefferson Lab staff present for the training observed that the lower-tier employee was not wearing the appropriate personal protective equipment (PPE) for the work. He requested the lower-tier subcontractor to suspend his work and to re-assess the PPE requirements before continuing. At this point the next higher-tier subcontractor (Warwick), assigned a NFPA-70E trained employee who obtained the appropriate PPE and proceeded with the equipment start-up procedures, which include checking the panel voltage readings. It should be noted that although the work was performed safely, a subsequent review of the

Activity Hazard Analysis submitted by the subcontractor did not include the equipment start-up procedures.

This was initially documented in the Jefferson Lab Safety Observation database. Information received from the Jefferson Lab staff indicated that the event was not as significant as initially portrayed. It was not until additional questioning of the contractor and subcontractors that the significance of the event became clear. The event was then categorized as a Notable Event per Jefferson lab procedure on 3/13/2013. After the formal fact-finding meeting on 3/14/13, the event was then categorized as a Management Concern reportable to DOE through the Occurrence Reporting and Processing System.

Cause Description:

Changing site conditions with no specific Activity Hazard Analysis (AHA) to cover the start-up activities being performed.

Contributing Causes:

At the start of the activity, it was determined that the AHU did not have power for the training and start-up activities. It was reviewed by the subcontractors and Jefferson Lab staff and determined that the start-up activities would not be conducted. This was acceptable because Jefferson Lab staff were experienced with this type of equipment. Rather only the training would take place. This appropriate stop and re-assessment for differing site conditions was handled in an effective way.

Conditions changed when power was restored to the AHU. At that time, a stop and reassessment of the site conditions should have occurred. Proper training and PPE should have been discussed for the activities associated with a cold start up of the unit.

Operating Conditions:

Normal Indoor working conditions

Activity Category:

Startup

Immediate Action(s):

1. A Jefferson Lab employee requested that the subcontractor suspend their work and reassess the PPE requirements associated hazards before continuing with the start up task.
2. Mortenson held a safety stand down meeting on 03/11/2013 with the associated subcontractors to discuss the event.
3. It was determined that an appropriate Activity Hazard Analysis (AHA) had not been prepared for this task, or prior to work resumption that day. Subsequently, an AHA has been prepared and submitted to Mortenson before similar work could continue.

FM Evaluation:

The Facility Manager believes that the Corrective Actions identified following this investigation will reduce the likelihood of a reoccurrence.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No
Division or Project: Technical Engineering Development Facility (TEDF)
Plant Area: Test Lab- High Bay
System/Building/Equipment: Test Lab's Air Handling Unit
Facility Function: Laboratory - Research & Development

Corrective Action 01:	Target Completion Date: 04/26/2013	Tracking ID: NE-2013-03-01-02
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Warwick Plumbing and Heating will create a specific AHA for startup activities.

Corrective Action 02:	Target Completion Date: 04/26/2016	Tracking ID: NE-2013-03-01-03
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Create a Mortenson site specific Lockout Tagout program.

Corrective Action 03:	Target Completion Date: 04/26/2013	Tracking ID: NE-2013-03-01-04
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Startup technicians must review and sign the approved AHA prior to starting work on their activity.

Corrective Action 04:	Target Completion Date: 04/26/2013	Tracking ID: NE-2013-03-01-05
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Mortenson will submit corrective action plan to the Jefferson Lab Subcontracting Officer's Technical Representatives (SOTRs).

Corrective Action 05:	Target Completion Date: 04/26/2013	Tracking ID: NE-2013-03-01-06
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Jefferson Lab will formally re-emphasize its safety requirements and expectations to Mortenson. This letter will specifically address NFPA 70E and ARC Flash Training requirements along with an emphasis on Personal Protective Equipment (PPE).

Lessons(s) Learned:

1. Changing site conditions require reassessment of the activities and the proper mitigations.
2. Activity specific AHA's are required when doing any hazardous activity where potential risk of injury can occur.

HQ Keywords:

01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
 01G--Inadequate Conduct of Operations - Inadequate Procedure
 01M--Inadequate Conduct of Operations - Inadequate Job Planning (Electrical)
 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
 11G--Other - Subcontractor
 12B--EH Categories - Conduct of Operations

- 14D--Quality Assurance - Documents and Records Deficiency
- 14E--Quality Assurance - Work Process Deficiency
- 14G--Quality Assurance - Procurement Deficiency

HQ Summary:

On March 8, 2013, a lower tier subcontractor was on-site to conduct training on a large Air Handling Unit (AHU) in the Test Laboratory for Jefferson Laboratory staff for operational turnover, during this training the subcontractor proceeded to open up the 480-volt panel without donning the appropriate Personal Protective Equipment (PPE). It was the intent of the subcontractor to take voltage readings within the energized 480-volt panel prior to starting up the AHU. At the start of the training, there was no electrical power to the AHU panel, while the training was on-going electricians established power to the panel. Jefferson Laboratory staff requested the subcontractor suspend their work and to re-assess PPE requirements before continuing. The subcontractor obtained the appropriate PPE and proceeded with their equipment start-up procedures which included checking the panel voltage readings. It was determined that an appropriate Activity Hazard Analysis had not been prepared for this task.

Similar OR Report Number: 1. SC--TJSO-SURA-TJNAF-2005-0003

Facility Manager:

Name	JOHNSON, CHRISTINA J.
Phone	(757) 269-7611
Title	REPORTING OFFICER

Originator:

Name	JOHNSON, CHRISTINA J.
Phone	(757) 269-7611
Title	REPORTING OFFICER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/13/2013	13:30 (ETZ)	Steve Neilson	TJSO

Authorized Classifier(AC): Christina Johnson Date: 03/14/2013

12)Report Number: [SC-ORO--ORNL-X10CHRIDGE-2013-0001](#) After 2003 Redesign
Secretarial Office: Science
Lab/Site/Org: Oak Ridge National Laboratory
Facility Name: Chestnut Ridge
Subject/Title: Worker Receives Mild Electrical Shock to Hand While Performing Final Positioning of a Jib Hoist Load
Date/Time Discovered: 03/12/2013 10:46 (ETZ)
Date/Time Categorized: 03/12/2013 16:00 (ETZ)

Report Type: Update/Final

Report Dates:

Notification	03/13/2013	17:05 (ETZ)
Initial Update	04/15/2013	09:40 (ETZ)
Latest Update	06/04/2013	13:38 (ETZ)
Final		

Significance Category: 2

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

Cause Codes: A1B3C01 - Design/Engineering Problem; Design / documentation LTA; Design/documentation not complete
 A2B3C02 - Equipment/ material problem; Inspection/ testing LTA; Inspection/ testing LTA
 A4B1C01 - Management Problem; Management Methods Less Than Adequate (LTA); Management policy guidance / expectations not well-defined, understood or enforced
 A5B2C08 - Communications Less Than Adequate (LTA); Written Communication Content LTA; Incomplete / situation not covered

ISM: 1) Define the Scope of Work

Subcontractor Involved: No

Occurrence Description: On March 12, 2013, at approximately 1046 hours, a worker experienced a mild electrical shock to the hand while performing final positioning of a jib hoist load. The workers immediately stopped work, controlled access to the immediate area and notified their supervisor. The involved worker declined any medical treatment and remained at work.

Electrically qualified individuals measured voltage and current between the jib hoist load and ground under a variety of hoist operating conditions. Measurements indicated voltages of up to 120 Volts AC and currents of up to 40 milliamperes. The initial investigation indicated a potentially defective ground in the jib hoist internal wiring system. The jib hoist was removed from service pending an in-depth investigation.

Line management notified the Laboratory Shift Superintendent and the event was categorized as a SC(2), 2E(1), "Hazardous Electrical Energy Control."

There were no injuries to personnel, or environment, health and safety impacts as a result of this event.

UPDATE:
 April 15, 2013

See Section 23, "Evaluation (by Facility Manager/Designee)" for a description of the extension for the ORPS Final Report.

FINAL:
June 4, 2013

The crane was inspected and found to have inadequate ground connections between the control panel and hoist. The ground cables in the festoon cabling were not properly terminated, causing a difference in potential between the crane system and the ground system in the building. This resulted in a mild shock to an employee's hand while moving a load.

Additional discrepancies were found in the wiring of the crane assembly, but were not a contributing factor to the shock incident.

Initial functional check of the crane controls was completed by the installer. The ORNL service group had begun the initial examination of the crane and provided the owner a punchlist of items to complete before placing into service. The punchlist items were completed, but the initial acceptance of the crane was not completed prior to placing it into service.

Cause Description:

Causal factors for this event were determined using two industry-accepted methodologies; events and causal factors charting, and barrier analysis. Direct, contributing, and root causes were determined using Barrier Analysis, TapRoot, and the DOE Causal Analysis Tree techniques.

Direct Cause:

The direct cause of this event was "Less than adequate electrical equipment installation and checkout." The jib hoist crane was assembled with components from three manufacturers. The hoist and trolley was from one manufacturer, the jib crane with motorized pivot was from another manufacturer, and the pendant control station from a third manufacturer. The components were field wired by the installer. The respective manufacturers provided electrical connection diagrams for each major component, but there was no guidance provided for the interconnections. The controls for the crane were functionally tested post-installation; however, the improper grounding was not detected. The crane can function with an inadequate ground.

Causal Factors:

- A1B3C01 - Design/Engineering Problem - Design Documentation LTA - Design/Documentation not complete.
- A2B3C02 - Equipment/Material Problem - Inspection/Testing LTA

A4B1C01 - Management Problem - Management methods LTA - Management policy guidance/expectations not well-defined, understood or enforced.

Corrective Actions 1, 2, and 6 address this cause.

Two contributing causes were identified:

1. - Lack of a firm hold point to ensure that needed inspections/tests took place before commissioning the crane for service.
2. - Less than adequate communication between crane owners and service providers regarding what is required for crane acceptance.

Initial test and inspection of cranes and hoists that is required by the DOE hoisting and rigging standard may be conducted by the internal ORNL inspection organization or the installer, as long as the documentation is retained by ORNL. In this case, the crane was functionally tested by the installer and the ORNL qualified inspectors began the process, but did not complete before the crane was put into service.

Causal Factors:

A5B2C08 - Communication LTA - written communication content LTA - incomplete/situation not covered.

A4B1C01 - Management Problem - Management methods LTA - Management policy guidance/expectations not well defined, understood or enforced.

Corrective Actions 1, 2, and 3 address these causes.

Root Cause:

The root cause of this event was "Lack of adequate detail in instructions for the electrical installation and for initial electrical inspection/testing of the crane prior to placing it into service." The crane and hoist initial inspection checklist contains instructions to "Inspect Pedant: Grounding" and "check electrical components". The "check electrical components" may or may not be interpreted as checking grounding.

Causal Factors:

A5B2C08 - Communication LTA - written communication content LTA - incomplete/situation not covered.

Corrective Action 6 addresses this cause.

Operating Conditions:

Normal

Activity Category:

Normal Operations (other than Activities specifically listed in this Category)

Immediate Action(s):

The jib hoist was removed from service pending an in-depth

investigation.

FM Evaluation:

ORNL management is evaluating the circumstances around the event, will implement actions as appropriate, and share any resulting lessons learned.

UPDATE:
April 15, 2013

The Final Report is being extended to 6/4/2013. This extension is required to provide a thorough analysis of the event, provide for further management review, and development of a comprehensive issue management response.

FINAL:

Improvements in detail of inspection instructions and in communication of inspection/acceptance status between equipment owners and service providers are needed. These improvements will be incorporated into processes and implemented.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: Research Accelerator Division

Plant Area: Building 8330

System/Building/Equipment: Over-head Jib Hoist

Facility Function: Accelerators

Corrective Action 01:

Target Completion Date: 07/29/2013	Actual Completion Date: 05/31/2013
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Add to SAP program for procurement an automatic notification to the Hoisting and Rigging Items Manager when items defined as "hoisting and rigging equipment" (Group 39) are ordered. ACTS No. 0.28249.5

Corrective Action 02:

Target Completion Date: 09/30/2013	Actual Completion Date:
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Evaluate and determine opportunities for improving communications engagement between purchasers and H&R Program manager to ensure proper specification, installation and initial inspection planning. ACTS No. 0.28249.6

Corrective Action 03:

Target Completion Date: 07/29/2013	Actual Completion Date:
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Revise crane inspection procedures to require a formal documentation of initial "acceptance" for use to the crane owner. The initial acceptance for

use shall also be documented in the ORNL DataStream. ACTS No. 0.28249.7

Corrective Action 04:

Target Completion Date: 05/31/2013	Actual Completion Date: 05/31/2013
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Revise FORM SNS-24 "Monthly Inspection for Overhead and Gantry Cranes" to include a check that the ORNL annual inspection is current. ACTS No. 0.28249.8

Corrective Action 05:

Target Completion Date: 08/30/2013	Actual Completion Date:
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Revise SBMS "Inspection and Maintenance of Hoisting and Rigging Equipment" exhibits for pre-operational and monthly inspections of hoists, cranes and rigging accessories to include a check for currency of the annual inspections. ACTS No. 0.28249.9

Corrective Action 06:

Target Completion Date: 07/29/2013	Actual Completion Date:
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Revise inspection checklists for initial crane inspection and for annual inspection to require a check of grounding for all powered components. ACTS No. 0.28249.10

Corrective Action 07:

Target Completion Date: 07/29/2013	Actual Completion Date:
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Issue a Lessons Learned. ACTS No. 0.28249.11

Corrective Action 08:

Target Completion Date: 08/29/2014	Actual Completion Date:
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Evaluate the effectiveness of the actions taken to address this issue. ACTS No. 0.28249.12

Corrective Action 09:

Target Completion Date: 06/14/2013	Actual Completion Date:
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Evaluate and repair electrical deficiencies associated with this crane. ACTS No. 0.28249.13

Lessons(s) Learned:

Required inspections should be fully documented and acceptance status communicated prior to placing equipment into service.

HQ Keywords:

07D--Electrical Systems - Electrical Wiring
 08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
 12C--EH Categories - Electrical Safety
 14L--Quality Assurance - No QA Deficiency

HQ Summary:

On March 12, 2013, a worker experienced a mild electrical shock to the hand while performing final positioning of a jib hoist load. The workers immediately stopped work, controlled access to the immediate area and notified their supervisor. The involved worker declined any medical treatment and remained at work. Electrically qualified individuals measured 120 volts AC and currents of up to 40 milliamperes between the jib hoist load and ground under a variety of hoist operating conditions. The initial investigation indicated a potentially defective ground in the jib hoist internal wiring system. The jib hoist was removed from service pending an in-depth investigation.

Similar OR Report Number: 1. None

Facility Manager:

Name	Kevin W. Jones
Phone	(865) 241-6794
Title	Research Accelerator Division Dir.

Originator:

Name	PEHRSON, PAUL B.
Phone	(865) 576-7929
Title	OCCURRENCE REPORTING MANAGER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/12/2013	16:00 (ETZ)	Lab Shift Superintendent	ORNL LSS
03/12/2013	17:05 (ETZ)	Johnny Moore	DOE ORNL
03/12/2013	17:05 (ETZ)	Michele Branton	DOE ORNL

Authorized Classifier(AC):

13)Report Number:

[SC-ORO--ORNL-X10EAST-2013-0003](#) After 2003 Redesign

Secretarial Office:

Science

Lab/Site/Org:

Oak Ridge National Laboratory

Facility Name:

ORNL East Complex

Subject/Title:

Failure to Follow a Prescribed Hazardous Electrical Energy Control Process

Date/Time Discovered:

03/20/2013 09:00 (ETZ)

Date/Time Categorized:

03/20/2013 15:15 (ETZ)

Report Type:

Notification/Final

Report Dates:

Notification	03/22/2013	12:13 (ETZ)
Initial Update	03/22/2013	12:13 (ETZ)
Latest Update	03/22/2013	12:13 (ETZ)
Final	03/22/2013	12:13 (ETZ)

Significance Category:

4

Reporting Criteria:

2E(3) - Any failure to follow a prescribed hazardous energy control process (e.g., lockout/tagout, hazardous energy control program).

Cause Codes:

ISM:

4) Perform Work Within Controls

Subcontractor Involved:

No

Occurrence Description:

On March 20, 2013, a staff member reset a tripped 480 volt breaker for

research equipment. The resetting of the breaker initiated an equipment failure downstream of the breaker which generated a loud noise. The staff member did not receive any shock from the failure of the electrical equipment.

Management initiated an evaluation of the circumstances surrounding resetting of the breaker. The evaluation determined that the staff member was a qualified electrical worker and was authorized to perform the work; however, the staff member reset the breaker without wearing the appropriate PPE. This was in violation of UT-Battelle procedures. The staff member was evaluated for noise exposure by the UT-Battelle Health Services organization and returned to work without any restrictions.

Line management notified the Laboratory Shift Superintendent and the event was categorized as an SC4, 2E(3)"Hazardous Electrical Energy Control" occurrence. There were no injuries to personnel, or environment, health and safety impacts as a result of this event.

Cause Description:

Operating Conditions:

Normal

Activity Category:

Research

Immediate Action(s):

- The power feed to the impacted equipment was locked out.
- On March 20, 2013, all hazardous energy operations in Building 7625 were suspended pending further evaluation.
- On March 21, 2013, all hazardous energy operations, with the exception of research electrical activities, were reinstated.

FM Evaluation:

Management will evaluate the safety requirements of the research procedures with regard to work control.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

Fusion & Materials for Nuclear Systems Div.

Plant Area:

Building 7625

System/Building/Equipment:

Building 7625

Facility Function:

Laboratory - Research & Development

Corrective Action:

Lessons(s) Learned:

HQ Keywords:

01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance

12C--EH Categories - Electrical Safety
 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On March 20, 2013, a staff member who was not wearing appropriate PPE reset a tripped 480-volt breaker for research equipment which initiated an equipment failure downstream and generated a loud noise. The staff member did not receive a shock. He was a qualified electrical worker and was authorized to perform the work. He was evaluated for noise exposure by the UT-Battelle Health Services organization and returned to work without any restrictions.

Similar OR Report Number:

Facility Manager:

Name	Stanley L. Milora
Phone	(865) 574-0988
Title	Interim Dir. Fusion & Materials Nuclear Syst. Div.

Originator:

Name	PEHRSON, PAUL B.
Phone	(865) 576-7929
Title	OCCURRENCE REPORTING MANAGER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/20/2013	15:25 (ETZ)	Lab Shift Superintendent	ORNL LSS
03/20/2013	16:01 (ETZ)	Michele Branton	ORNL LSS
03/20/2013	16:01 (ETZ)	Johnny Moore	ORNL LSS

Authorized Classifier(AC):

14)Report Number:

[SC-ORO--ORNL-X10HFIR-2013-0001](#) After 2003 Redesign

Secretarial Office:

Science

Lab/Site/Org:

Oak Ridge National Laboratory

Facility Name:

High Flux Isotope Reactor

Subject/Title:

Non-energized Electrical Line Severed during Excavation

Date/Time Discovered:

03/23/2013 09:40 (ETZ)

Date/Time Categorized:

03/23/2013 12:05 (ETZ)

Report Type:

Update

Report Dates:

Notification	03/26/2013	16:06 (ETZ)
Initial Update	04/29/2013	10:25 (ETZ)
Latest Update	05/28/2013	09:11 (ETZ)
Final		

Significance Category:

3

Reporting Criteria: 2E(2) - Any unexpected discovery of an uncontrolled electrical hazardous energy source (e.g., live electrical power circuit, etc.). This criterion does not include discoveries made by zero-energy checks and other precautionary investigations made before work is authorized to begin.

Cause Codes:

ISM:

Subcontractor Involved: No

Occurrence Description: On March 23, 2013, maintenance activities were in progress to replace underground fire sprinkler supply lines. The work was being conducted in accordance with an approved maintenance work package, which included an approved excavation permit.

During excavation, the depth and sloughing of the trench wall required benching (terracing). During the benching operations, the backhoe unexpectedly contacted a 110V direct burial wire and associated neutral wire. This wiring supplied a street light, which was controlled by a photocell sensor. The excavation activities were conducted during daylight hours, so the electrical line was not energized.

Line management notified the Laboratory Shift Superintendent and the event was categorized as a Group 2E2, SC3 occurrence "Hazardous Electrical Energy Source."

There were no injuries to personnel, or environmental, safety, or health impacts as a result of this event.

Cause Description:

Operating Conditions: Normal

Activity Category: Maintenance

Immediate Action(s):

- Excavation activities were stopped.
- The electrical circuit was placed in a safe condition (locked out).
- Investigation was initiated.
- Critique was held on 03/23/2013

FM Evaluation: ORNL Management is evaluating the circumstances around the event, will implement actions as appropriate, and share any resulting lessons learned. Preliminary evaluation indicates a lack of clarity during the prejob briefing regarding the planned excavation boundaries, contributed to this event.

UPDATE: April 29, 2013

The Final Report date for this occurrence is being extended to 06/12/2013 to match the NTS reporting date. This provides time for the

development of corrective actions; and the Corrective Action Review Board's review of the Corrective Action Plan.

UPDATE: May 27, 2013

The Final Report date for this occurrence is being extended to 06/14/2013 to match the NTS reporting date. Final report date needed to be extended to complete the causal analysis.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: Yes.
Before Further Operation? No
By Whom: Ron Crone
By When: 06/14/2013

Division or Project: Research Reactors Division

Plant Area: Building 7900

System/Building/Equipment: Building 7900

Facility Function: Balance of Plant - Infrastructure (Other Functions not specifically listed in this Category)

Corrective Action:

Lessons(s) Learned:

HQ Keywords: 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
01B--Inadequate Conduct of Operations - Loss of Configuration Management/Control
01R--Inadequate Conduct of Operations - Management issues
07D--Electrical Systems - Electrical Wiring
08F--OSHA Reportable/Industrial Hygiene - Industrial Operations Issues
08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
08J--OSHA Reportable/Industrial Hygiene - Near Miss (Electrical)
12G--EH Categories - Industrial Operations
14D--Quality Assurance - Documents and Records Deficiency
14E--Quality Assurance - Work Process Deficiency

HQ Summary: On March 23, 2013, a backhoe unexpectedly contacted a 110-volt line that supplied power to a street light during excavation activities associated with replacing underground fire sprinkler supply lines. The work was conducted in accordance with an approved maintenance work package, which included an approved excavation permit. The electrical line was not energized because power was controlled by a photocell sensor and the incident occurred during daylight hours. The electrical circuit was placed in a safe condition (locked out).

Similar OR Report Number:

Facility Manager:

Name	Ronald Allen Crone
Phone	(865) 576-5563
Title	Research Reactors Division Director

Originator:

Name	PEHRSON, PAUL B.
Phone	(865) 576-7929
Title	OCCURRENCE REPORTING MANAGER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
03/23/2013	12:05 (ETZ)	Lab Shift Superintendent	ORNL LSS
03/23/2013	14:07 (ETZ)	Michele Branton	DOE ORNL
03/23/2013	14:07 (ETZ)	Johnny Moore	DOE ORNL

Authorized Classifier(AC):

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