



Office of Health, Safety and Security

Monthly Analysis of Electrical Safety Occurrences



April 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 decreased from fourteen in March to eleven in April. There were two reported electrical shocks and six reported lockout/tagout occurrences. There were no occurrences involving an electrical intrusion (i.e., cutting/penetrating, excavating, or vehicle/equipment contact of overhead electrical conductors) in April. In April, workers identified electrical hazards 82 percent of the time, which is an increase in hazards identification from 57 percent in March.

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 two reported electrical shocks in the month of April, which is a decrease from the four shocks reported in March. These occurrences are summarized below.

1. A computer technician felt a jolt in his left thumb when he pushed the power switch on the front of a computer while resting his left hand on the back of the computer. The technician had replaced the power supply prior to the incident. He was evaluated by a medical service provider and released with no restrictions. An electrician conducted testing and inspection and found a small charge on the computer case, but not at a level that would have resulted in any sensation if touched. The power supply was properly grounded. The electrician could find no evidence of stray voltage that might have caused the "jolt". The

computer and power supply as installed were tested with no indication of problems. Static shock was discussed as a possible contributor to the sensation the technician experienced and as a potential source of damage to the electronics during maintenance. Technicians now use anti-static wrist straps when computer equipment is opened for maintenance. A voltmeter has been ordered to allow them to check for stray voltage before and after maintenance on the computer equipment.

2. A facilities employee felt a slight tingling in both hands when the plumbing pipe he was holding touched a light fixture housing while installing pipes. He was not sure if it was an electric shock and did not stop work or report the event to his supervisor. Electricians discovered that the exterior housing of the light fixture was energized at 277 volts. Facilities personnel have since disconnected and removed all the electrical wiring to that light fixture. The light fixtures in this building were installed and energized in 1989. This particular fixture was not properly installed as evidenced by the discovery of a missing component from the raceway assembly and by the three junction box extensions used to accommodate several circuits of wiring for various 277-volt lighting functions. The wires were stuffed into this electrical junction box assembly before the covers were installed.

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

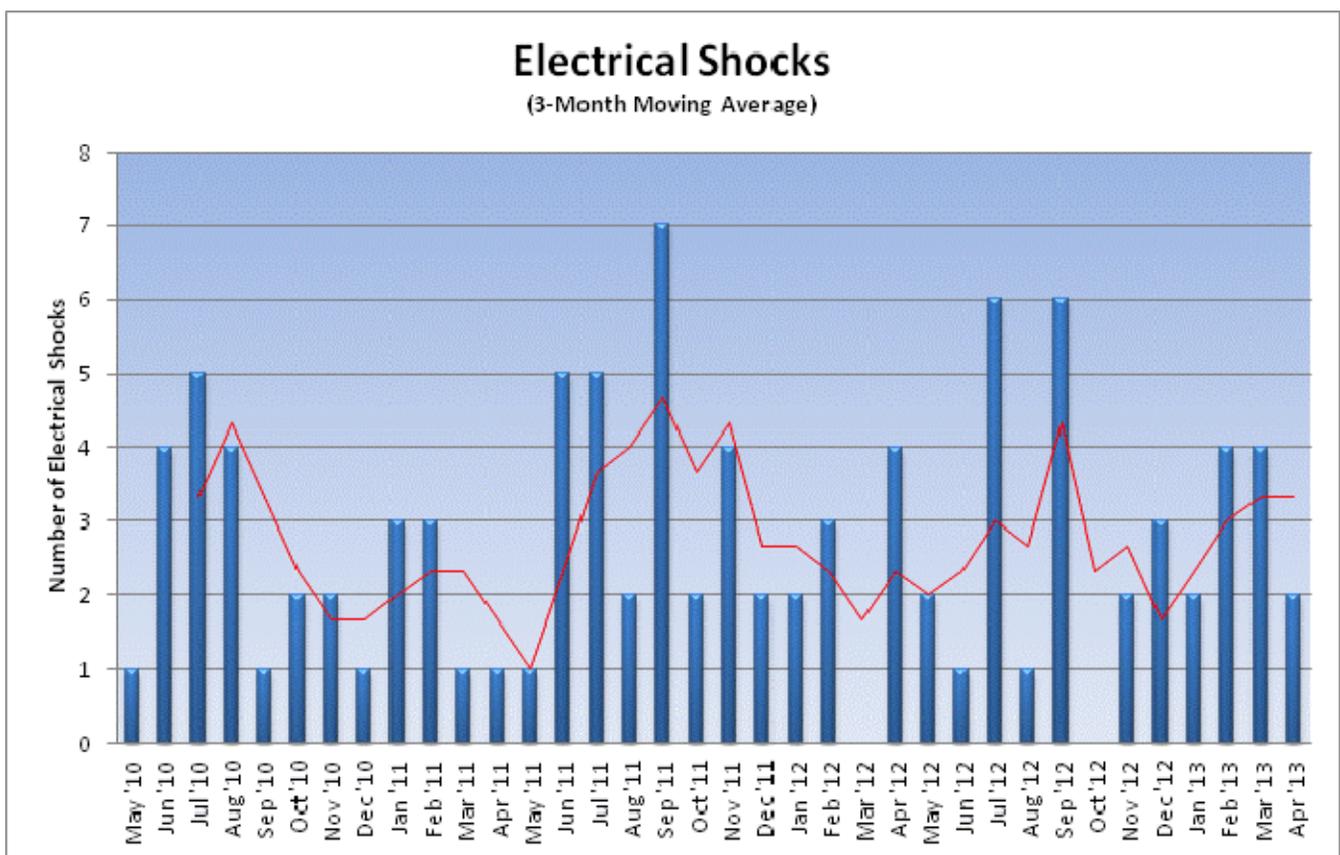


Figure 2 shows electrical shocks by worker type through April 2013. The number of shocks involving electrical workers slowly increased through 2012 and then dropped in 2013, while

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

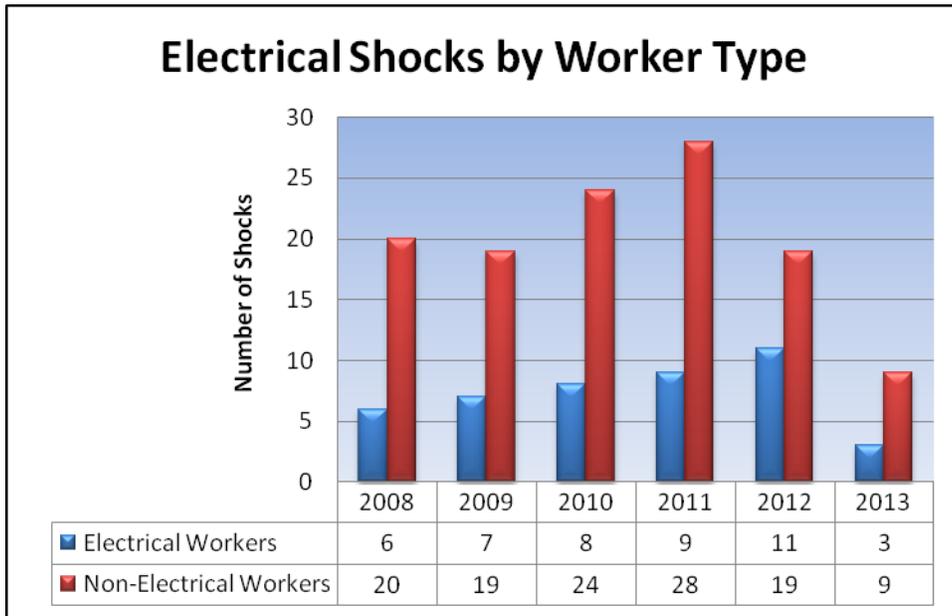
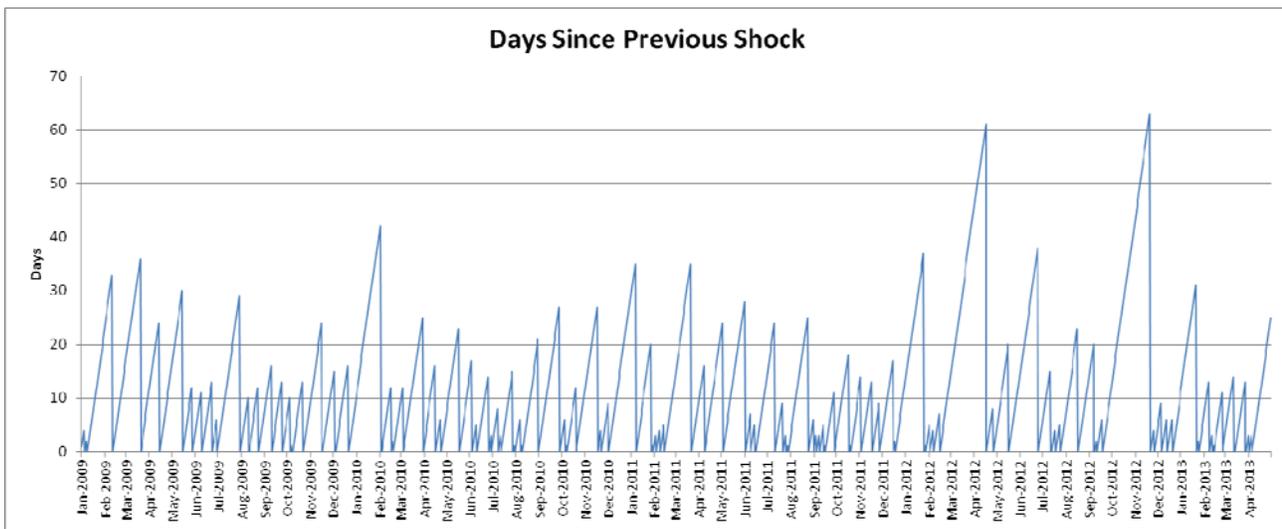


Figure 3 shows the number of days since the previous electrical shock for the DOE complex. The longest interval was 63 days (November 20, 2012) and the present interval is 25 days as of April 30.

Figure 3 - Days since Previous Shock

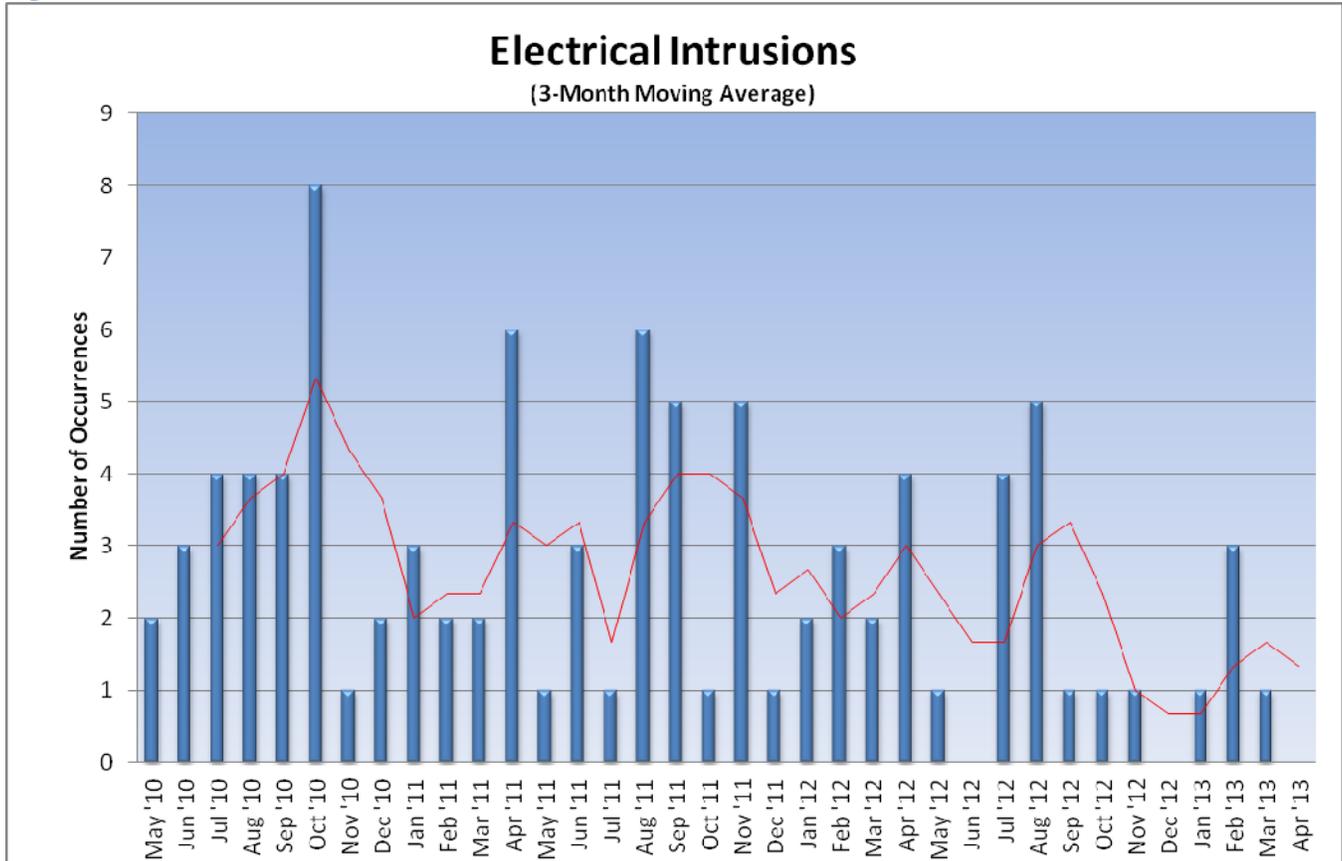


Electrical Intrusion

There were no electrical intrusion occurrences (i.e., cutting/penetrating, excavating, or vehicle/equipment contact of overhead electrical conductors) for April, which is a decrease from the one occurrence in March that involved accidental excavation of a 110-volt line.

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 (2.6). This is the third month during the period in which there were no electrical intrusion occurrences.

Figure 4 – Three-Year Trend of Electrical Intrusion Occurrences



Hazardous Energy Control

In April there were six reported occurrences involving lockout/tagout (LOTO), which is an increase from the three occurrences reported in March. These occurrences are summarized below.

Occurrences Involving Lockout/Tagout

1. A BRADY LOTO device came off a circuit breaker switch when DOE EHS personnel tested the security of the lock hasp during a routine safety walk of a restroom renovation project in. The 120-volt, 20-amp restroom lighting circuit was de-energized at the time. The BRADY LOTO device is widely used and lessons learned have been shared across the DOE complex documenting similar device failures. A new clamp-on device was applied to the lighting circuit breaker.
2. An employee removed the cover from a 480-VAC electrical junction box without a LOTO being issued for personnel protection. Operations personnel secured the area for investigation and the electrical supply was secured and tagged out. An investigation was

initiated employee did not wait for an electrician to verify a safe condition and institute a LOTO.

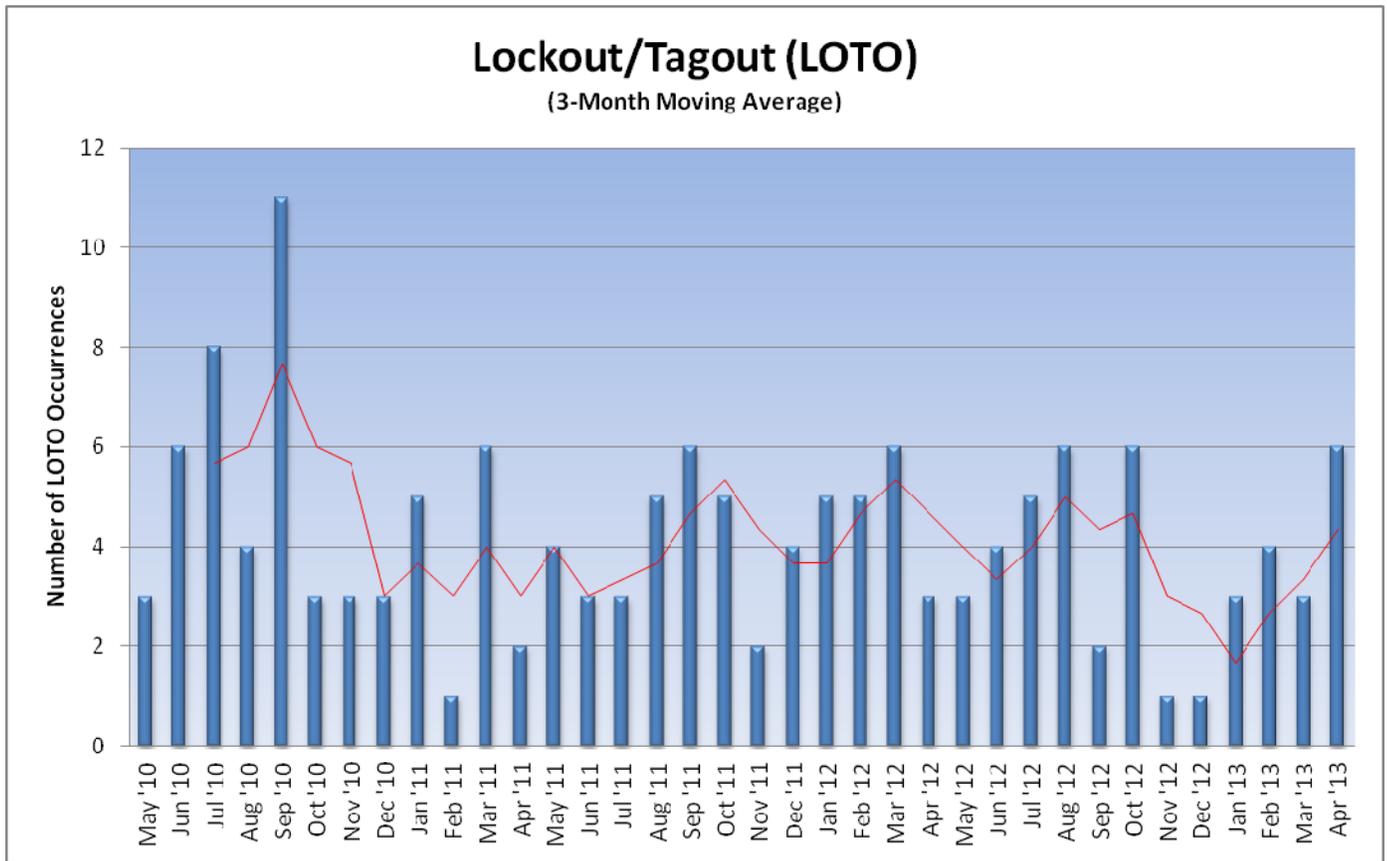
3. Electricians incorrectly performed a safe condition check on the incorrect side of electrical disconnect equipment during the execution of a LOTO. The electrical equipment that the safe condition check needed to be completed on was the 480-volt disconnects that are fused for emergency fire pumps. The electricians that were tasked with completing the required safe condition check were not familiar with the equipment located in this building. The equipment configuration is unique because these disconnects are bottom feed units which is not an industry norm, and the electricians had never worked on this equipment and did not know which part of the disconnect cabinet needed to be opened up to complete the Safe Condition check. The expected normal configuration of an electrical disconnect is that the line side feed (incoming power) comes in from the top of the unit and the bottom part of the unit is the load side feed (power to pumping equipment).
4. A worker was repairing a circuit card or adjacent component on a klystron modulator test stand. Although the circuit breaker for servicing the modulator was in the open position (disconnected) and a LOTO was applied in accordance with the Integrated Work Document, it is unknown if the worker hung his own lock or performed zero voltage verification per the procedural requirements. It is believed that as the worker was performing the repair with an insulated tool, an unexpected spark occurred.
5. Personnel discovered that a LOTO for a sand filter pump was performed on the wrong 480-volt, 3-phase Motor Control Center (MCC). An electrician had performed a LOTO on MCC #1 and a zero energy check in accordance with the work permit and then removed the electrical leads from the pump in preparation for the pump change out. Investigators determined that the LOTO should have been on MCC #2. The source of power had been recently changed to a different MCC, with the bucket labeling and documentation not changed. The electrician performed the zero-energy testing using the correct gloves and PPE at the motor field terminal enclosure. No energy was found because the first upstream element from the motor was a control panel with an open overload (motor failure caused it to trip) and contactor.
6. A worker assigned to replace a feedback transformer in an RF power amplifier failed to LOTO the circuit breakers as required by procedure. The worker had opened the correct circuit breakers to de-energize the RF power amplifier but failed to follow the hazardous energy control process. Investigators determined that there was a lack of a clear written procedure for performing LOTO of RF power amplifiers and a lack of clear expectations on what is required for supervisors to conduct effective on-the-job training for specific equipment LOTO. This event would have been prevented had there been a specific complex LOTO procedure.

Occurrences Involving Discovery of Uncontrolled Hazardous Energy Control

Three laborers discovered two unsecured flex conduits that contained two 120-volt conductors in the ceiling space above a laboratory room while removing fiberglass insulation. The laborers immediately stopped work and notified their supervisor. Electricians determined that the conductors in the flex conduit were energized and they implemented a LOTO.

Figure 5 shows a 3-year trend of LOTO occurrences for the DOE complex. The monthly average is 4.2 occurrences.

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



Electrical Near Miss

There were no electrical near miss occurrences reported in April.

Monthly Occurrences Tables

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

Table 1 - Breakdown of Electrical Occurrences

Number of Occurrences (April)	Involving:	Last Month (March)
2	Electrical Shocks	4
0	Electrical Burns	0
6	Hazardous Energy Control (LOTO)	3
2	Inadequate Job Planning	1
0	Inadvertent Drilling/Cutting of	0

Number of Occurrences (April)	Involving:	Last Month (March)
	Electrical Conductors	
0	Excavation of Electrical Conductors	1
0	Vehicle Intrusion of Electrical Conductors or Equipment	0
0	Electrical Near Misses	3
8	Electrical Workers	8
3	Non-Electrical Workers	6
1	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

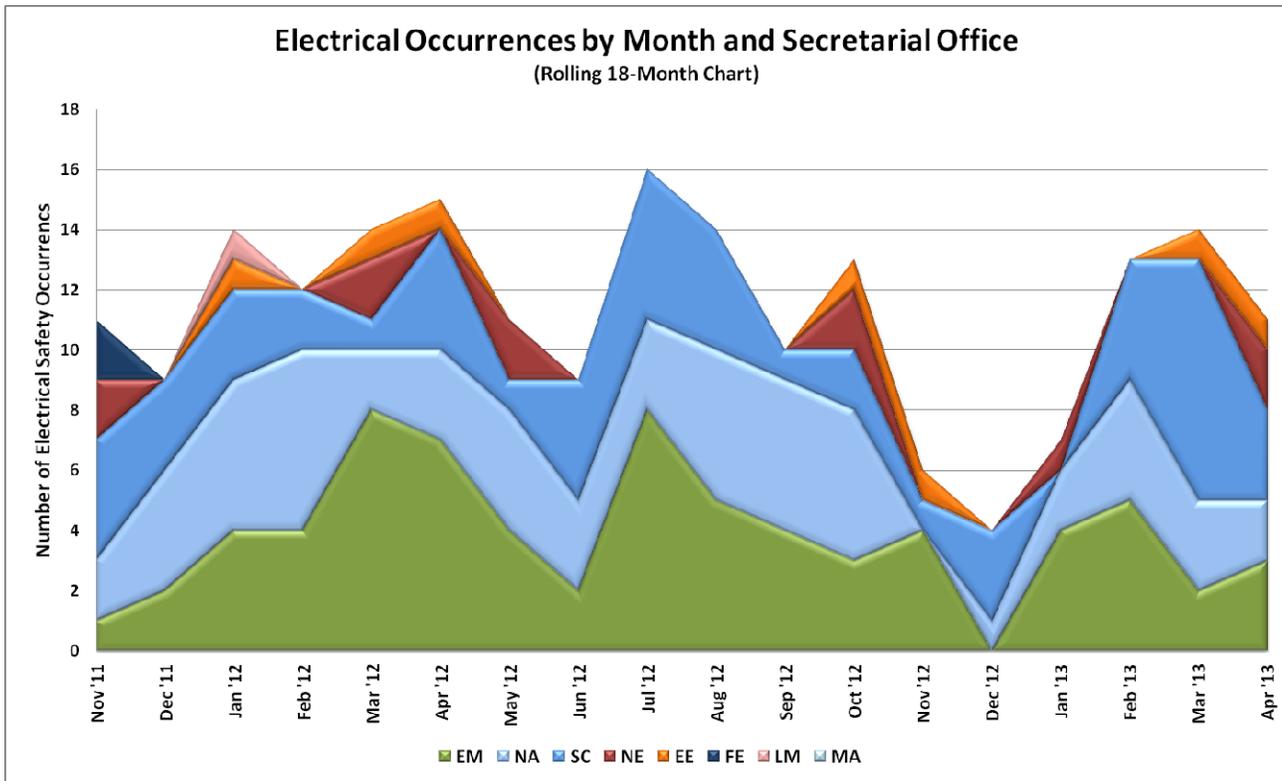
Table 2 provides a summary of the electrical safety occurrences for the previous 9 years and CY 2013. The average number of occurrences a year ago (April 2012) was 13.8 per month.

Table 2 - Summary of Electrical Occurrences

Period	Electrical Safety Occurrences	Shocks	Burns	Fatalities
April	11	2	0	0
March	14	4	0	0
February	13	4	0	0
January	7	2	0	0
2013 total	45 (avg. 11.3/month)	12	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 has reported the most occurrences over the past three 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 eleven occurrences are classified as shown in Table 3. Actual scores are provided in Attachment 1.

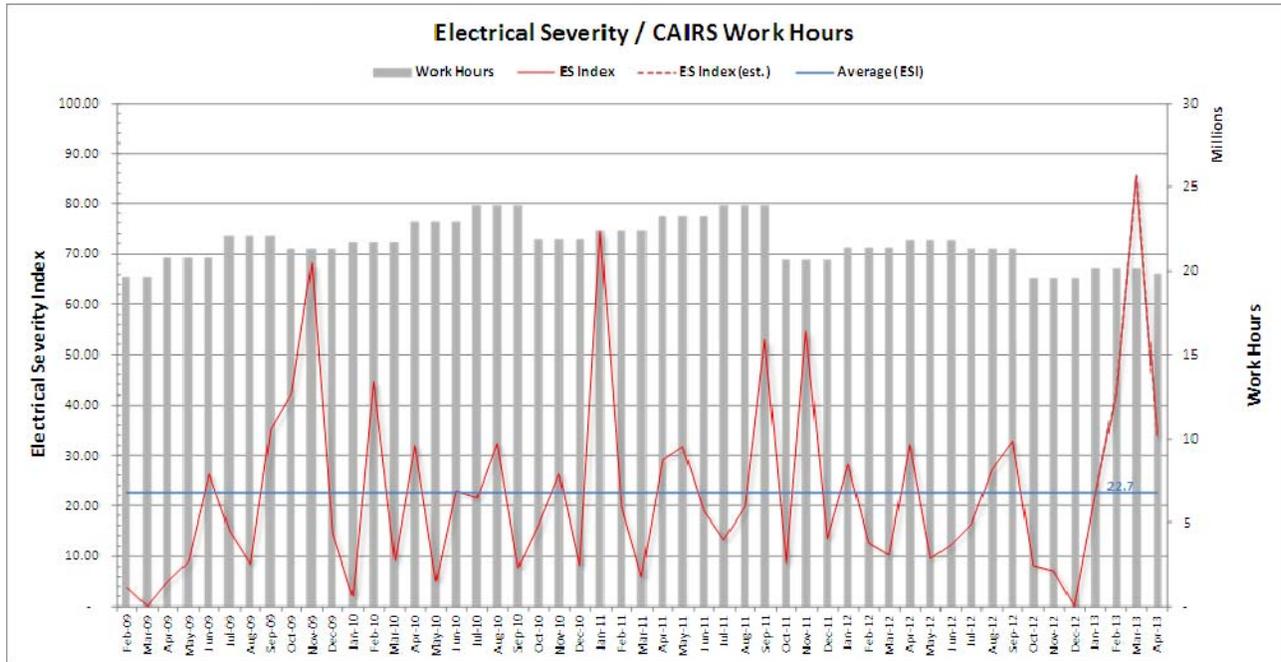
Table 3 – Classification of Electrical Safety Occurrences by ES Score

Occurrence Classification	Electrical Severity Score	Number of Occurrences
HIGH	≥ 1750	1
MEDIUM	31-1749	4
LOW	1-30	4
No Score	0	2

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

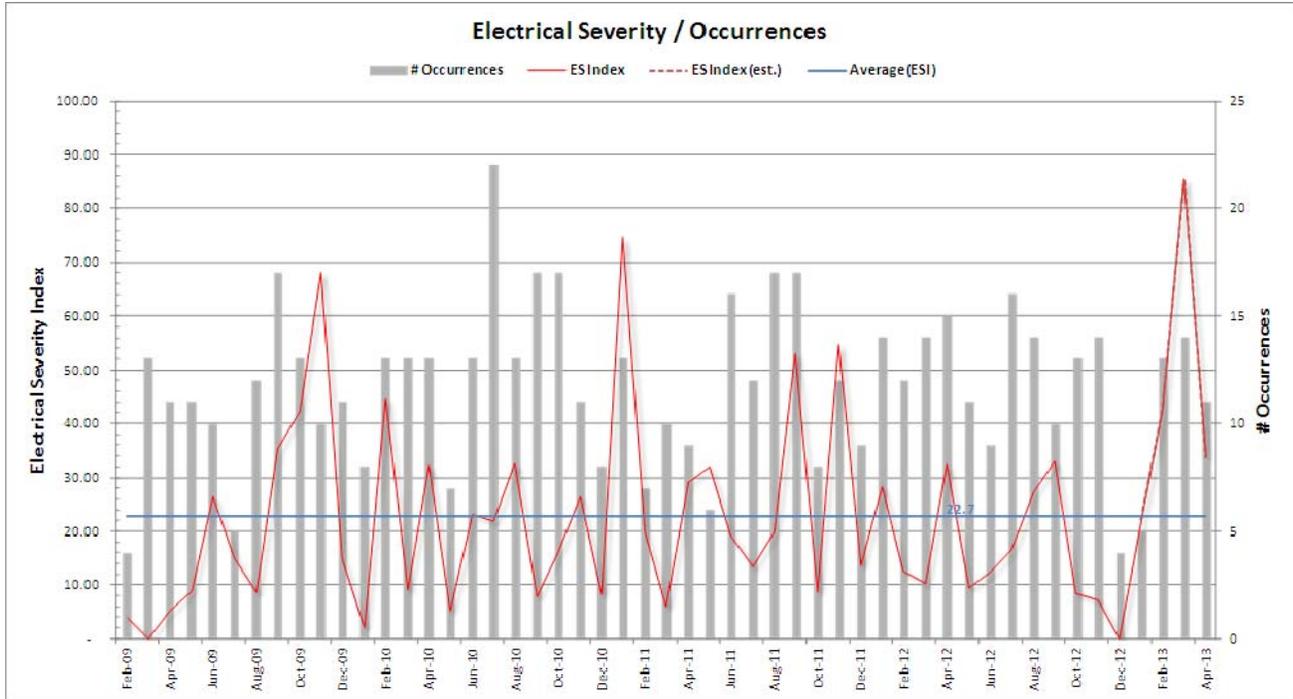
Category	March	April	Δ
Total Occurrences	14	11	-3
Total Electrical Severity	8,590	3,341	-5,249
Estimated Work Hours	20,093,413* (20,093,413)	19,808,163	-285,250
ES Index	85.50* (85.50)	35.73	-51.77
Average ESI	22.5	22.7	+0.2

* These are estimated CAIRS work hours for March and ES Index based on the estimated hours. The estimated hours and ES Index based on the estimated hours (as reported in March) 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 (22.7) has increased for the last three 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 25 days as of April 30. The previous longest interval was 679 days ending March 12, 2013.

Figure 9 - Days since Previous High Severity Occurrence

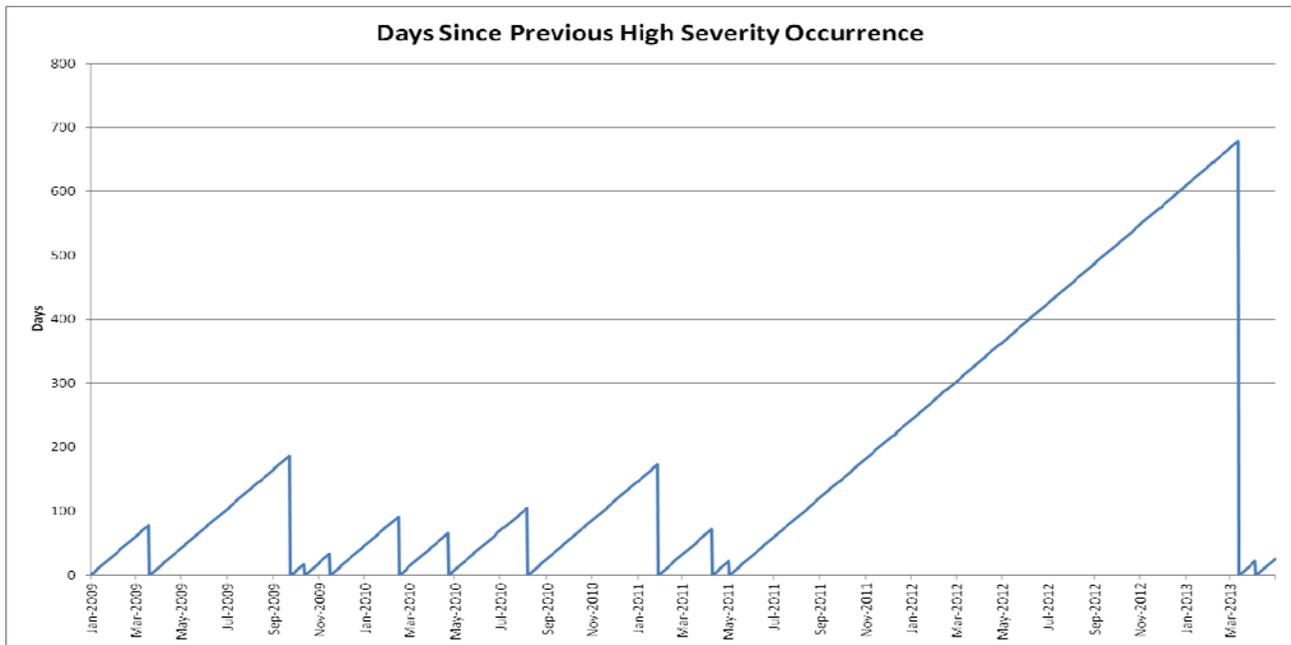
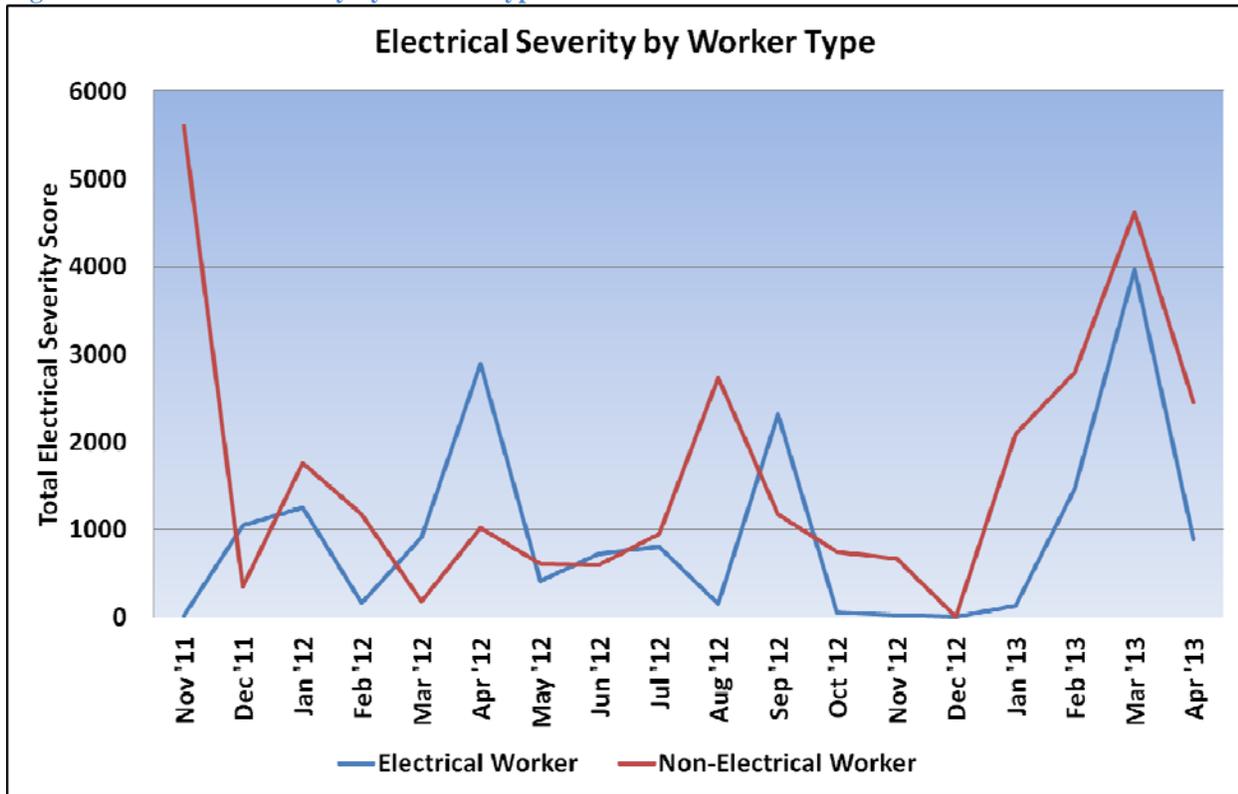


Figure 10 shows the total electrical severity score by worker type for each month.

Figure 10 – Electrical Severity by Worker Type



Following a peak in March 2013 for electrical workers and non-electrical workers, the ES score for both groups has started to drop. Electrical workers ES scores are at 891 and non-electrical workers ES scores are at 2,450. The average ES scores for the 18 month period are 960 for electrical workers and 1,641 for non-electrical workers.

Summary of Occurrences by Severity Band

For the interval April 2012 through April 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)

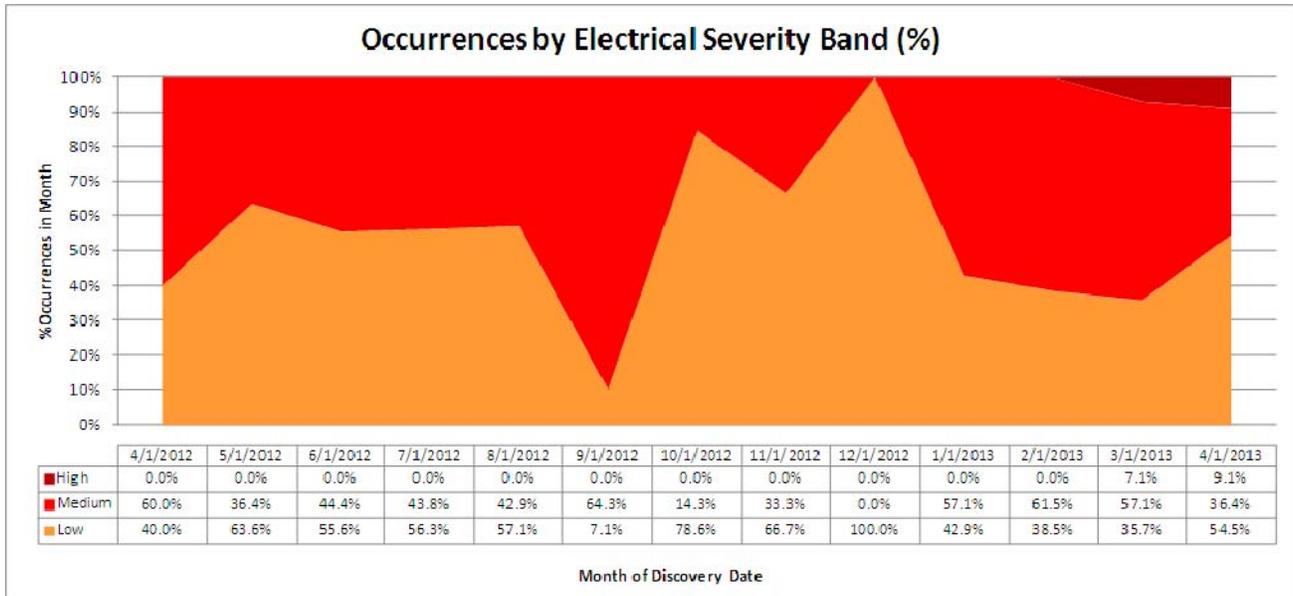
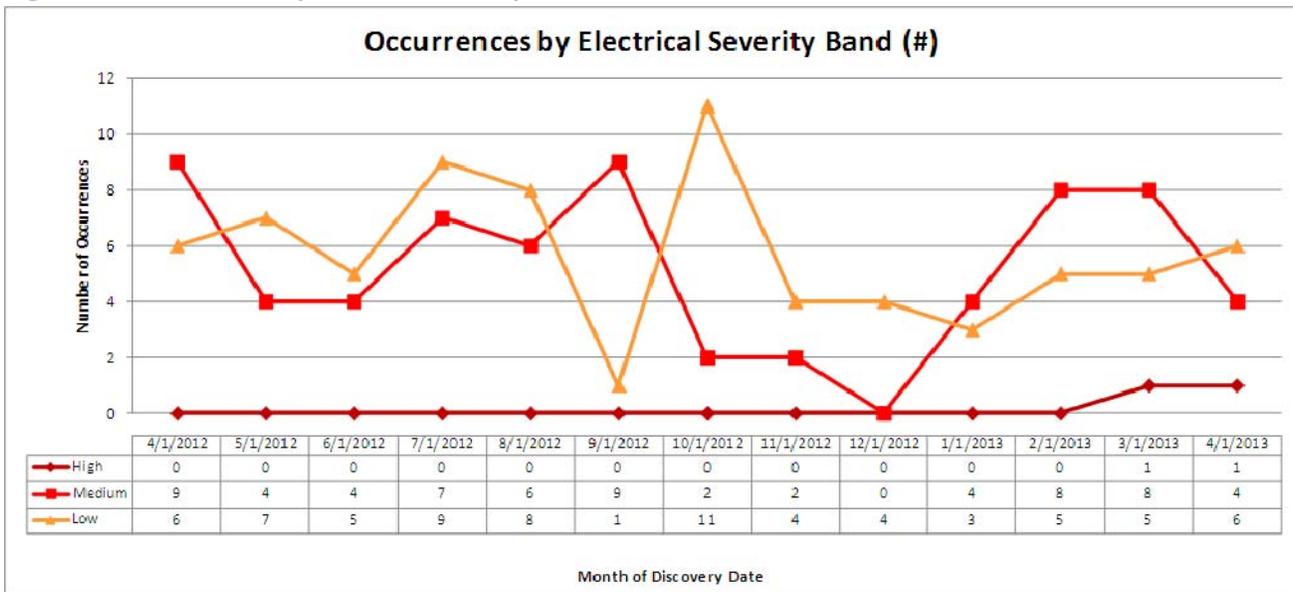


Figure 12 - Occurrences by Electrical Severity Band (Number)

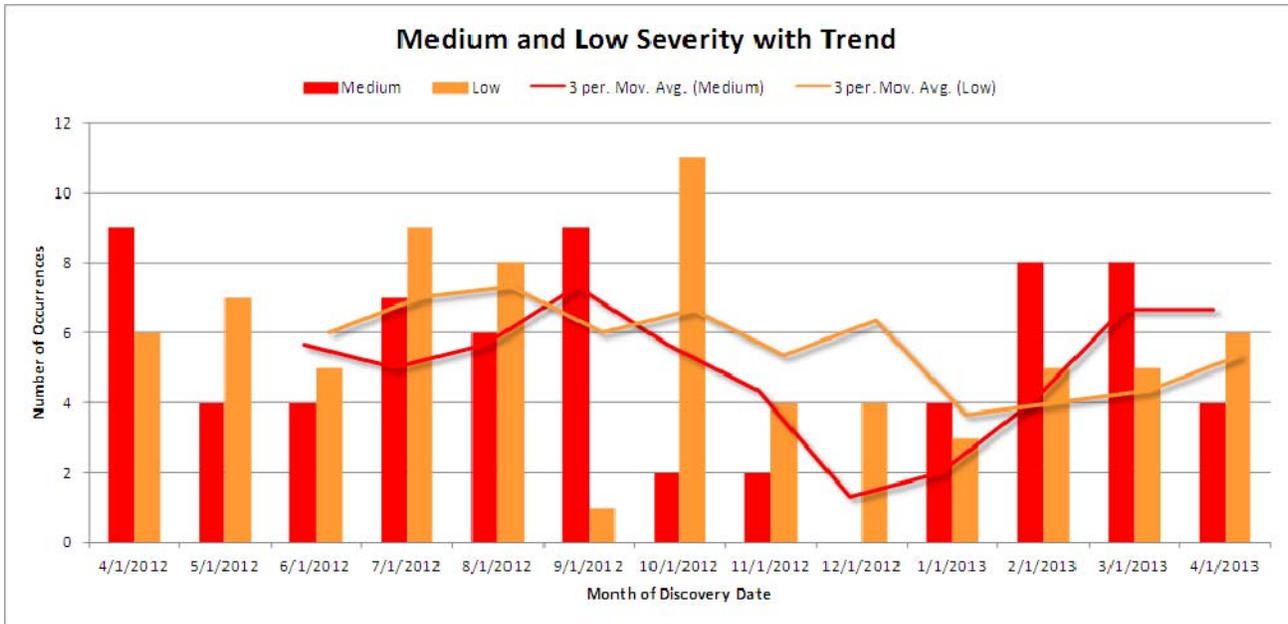


The previous two charts shows that a high electrical severity event occurred in March and in April, ending a 679-day period since the last occurrence in May 2011. The number of occurrences with Medium scores decreased and those with Low or zero severity scores increased from the previous month.

Medium and Low Severity with Trend

Figure 13 focuses on the Medium and Low severity data series for April 2012 through April 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 slight increasing trend for Low severity occurrences and a leveling of Medium 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

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Attachment 1

Electrical Safety Occurrences – April 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-2013-0009	LOTO device falls of circuit breaker switch when challenged.				X					4	10(2)	0
2	EM--PPPO-FBP-PORTSDD-2013-0012	Employee removes 480V electrical junction box cover without LOTO protection.				X					4	2E(3)	700
3	EM--PPPO-SST-PGDPENVRES-2013-0001	A computer technician felt a tingle in his left thumb when he turned on a computer.	X								2	2E(1)	330
4	EM-RL--MSC-S&W-2013-0001	Safe condition check was not performed on the correct side of 480V disconnect.				X					4	2E(3)	50
5	NA--LASO-LANL-ACCCOMPLEX-2013-0003	A worker did not hang his lock or perform zero voltage check before repairing a circuit card.				X	X				3	2E(2), 2E(3)	110
6	NA--LSO-LLNL-LLNL-2013-0015	LOTO performed on incorrect panel for a pump.				X					4	2E(3)	0
7	NE-ID--BEA-ATR-2013-0011	An electrician working on a fan discovered 120V control power in a motor starter cabinet.					X				3	2E(2)	20
8	NE-ID--BEA-ATR-2013-0013	A cabinet back was left off; allow untrained workers to enter RAB for exposed energized parts.									3	10(2)	1
9	SC--BHSO-BNL-AGS-2013-0001	A worker replacing a transformer failed to lock out and tag out circuit breakers as required.				X					3	2E(3), 10(2)	10
10	SC--BSO-LBL-OPERATIONS-2013-0006	An employee felt a slight tingling in both hands when a pipe he was holding touched a light fixture.	X								2	2E(1)	2100

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--PNSO-PNNL-PNNLNUCL-2013-0002	Construction craft discovered two flex conduits containing exposed energized 120V conductors.									3	2E(2)	20
	TOTAL		2	0	0	6	2	0	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 – April 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-2013-0009	LOTO device falls of circuit breaker switch when challenged.	X				X				X			
2	EM--PPPO-FBP-PORTSDD-2013-0012	Employee removes 480V electrical junction box cover without LOTO protection.	X				X		X		X			
3	EM--PPPO-SST-PGDPENVRES-2013-0001	A computer technician felt a tingle in his left thumb when he turned on a computer.		X	X	X					X			
4	EM-RL--MSC-S&W-2013-0001	Safe condition check was not performed on the correct side of 480V disconnect.	X				X				X			
5	NA--LASO-LANL-ACCCOMPLEX-2013-0003	A worker did not hang his lock or perform zero voltage check before repairing a circuit card.	X				X				X			
6	NA--LSO-LLNL-LLNL-2013-0015	LOTO performed on incorrect panel for a pump.	X				X				X			
7	NE-ID--BEA-ATR-2013-0011	An electrician working on a fan discovered 120V control power in a motor starter cabinet.	X				X				X			
8	NE-ID--BEA-ATR-2013-0013	A cabinet back was left off; allow untrained workers to enter RAB for exposed energized parts.	X				X				X			
9	SC--BHSO-BNL-AGS-2013-0001	A worker replacing a transformer failed to lock out and tag out circuit breakers as required.	X				X		X		X			
10	SC--BSO-LBL-OPERATIONS-2013-0006	An employee felt a slight tingling in both hands when a pipe he was holding touched a light fixture.		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--PNSO-PNNL-PNNLNUCL-2013-0002	Construction craft discovered two flex conduits containing exposed energized 120V conductors.		X			X				X			
	TOTAL		8	3	1	2	9	0	2	0	11	0	0	0

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

Production GUI - New ORPS

ORPS contains 56176 OR(s) with 59486 occurrences(s) as of 6/20/2013 6:15:47 AM
 Query selected 11 OR(s) with 11 occurrences(s) as of 6/20/2013 10:06:21 AM

Download this report in Microsoft Word format. 

1)Report Number: [EE-GO--NREL-NREL-2013-0009](#) **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: Lockout/tagout device comes off circuit breaker switch during routine safety walk

Date/Time Discovered: 04/17/2013 11:00 (MTZ)

Date/Time Categorized: 04/23/2013 09:55 (MTZ)

Report Type: Notification/Final

Report Dates:

Notification	04/25/2013	17:44 (ETZ)
Initial Update	04/25/2013	17:44 (ETZ)
Latest Update	04/25/2013	17:44 (ETZ)
Final	04/25/2013	17:44 (ETZ)

Significance Category: 4

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 4 occurrence)

Cause Codes:

ISM: 5) Provide Feedback and Continuous Improvement

Subcontractor Involved: Yes
 Guaranteed Electric, lower tier sub to Blue Line

Occurrence Description: On April 17, 2013, during a routine safety walk of a restroom renovation project in NREL's Field Test Laboratory Building (FTLB), DOE EHS personnel inspected the application of lockout/tagout (LOTO) on a circuit breaker by testing the security of the lock hasp. During the handling of the lock, the LOTO device came off of the breaker switch.

The 120 Volt, 20 Amp restroom lighting circuit (which is approximately 30 years old) was de-energized at the time. Because the circuit was

isolated, there was no exposure to hazardous energy as a result of this occurrence.

On February 8, 2013, a subcontract electrician locked and tagged out the circuit breaker in accordance with NREL procedures. The BRADY circuit breaker LOTO device that came off is widely used and there have been other lessons learned shared across the DOE complex documenting similar device failures. An event involving the same type of LOTO device occurred at NREL in 2011 (See Similar Occurrence Reports section of this report).

A new clamp-on device was applied to the lighting circuit breaker and tested by the subcontractor electrician to verify its security. NREL communicated to the subcontractor the need to securely apply and more frequently check the security of these types of LOTO devices.

Cause Description:

Operating Conditions:

Normal, dry, well-lit interior conditions.

Activity Category:

Construction

Immediate Action(s):

1. A new lockout/tagout device was installed on the restroom lighting circuit breaker switch.
2. NREL communicated to the subcontractor the need to securely apply and more frequently check the security of these types of LOTO devices.

FM Evaluation:

No injuries or property damage resulted from this occurrence. Many of NREL's older buildings have circuit breakers which were not designed with LOTO in mind. The type of LOTO device involved in this occurrence is used throughout NREL.

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: Field Test Laboratory Building

Facility Function:

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

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

HQ Summary:

On April 17, 2013, a BRADY lockout/tagout (LOTO) device came off a circuit breaker switch when DOE EHS personnel tested the security of the lock hasp during a routine safety walk of a restroom renovation project in NREL's Field Test Laboratory Building. The 120-volt restroom lighting circuit was de-energized at the time. The BRADY LOTO device is widely used and lessons learned have been shared across the DOE complex documenting similar device failures. A new clamp-on device was applied to the lighting circuit breaker.

Similar OR Report Number: 1. EE-GO--NREL-NREL-2011-0012

Facility Manager:

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

Originator:

Name	LITRELL, 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
04/23/2013	09:55 (MTZ)	Event Distribution	DOE/NREL
04/24/2013	11:02 (MTZ)	Terry Dembrowski	DOE

Authorized Classifier(AC):

2)Report Number: [EM--PPPO-FBP-PORTSDD-2013-0012](#) After 2003 Redesign

Secretarial Office: Environmental Management

Lab/Site/Org: Portsmouth Gaseous Diffusion Plant

Facility Name: Portsmouth Decontamination and Decommissioning

Subject/Title: 480 VAC Electrical Junction Box Cover Removed Without Lockout/Tagout Protection

Date/Time Discovered: 04/05/2013 07:45 (ETZ)

Date/Time Categorized: 04/05/2013 10:55 (ETZ)

Report Type: Notification/Final

Report Dates:

Notification	04/05/2013	15:18 (ETZ)
Initial Update	04/05/2013	15:18 (ETZ)
Latest Update	04/05/2013	15:18 (ETZ)

Final	04/05/2013	15:18 (ETZ)
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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: No

Occurrence Description: FBP Cut and Cap Shift Manager was informed of an alleged unsafe act performed by an employee, where the employee was said to have removed the cover from a 480 VAC electrical junction box without a Lockout/Tagout (LOTO) being issued for personnel protection. After an investigation into the allegation, and a review of the circumstances surrounding the alleged incident, affected management believes that the incident occurred, as described, without LOTO protection.

Cause Description:

Operating Conditions: Normal Operations

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

Immediate Action(s):

- Operations secured the area for investigation
- X-326 Operations Manager had electrical supply secured and tagged out.
- Investigation initiated. Investigation to include personnel from Industrial Safety Group, Security Group, Industrial Relations Group, and Operations Management.

FM Evaluation: Investigation/Evaluation will be concluded by facility management.

DOE Facility Representative Input:

DOE Program Manager Input:

Further Evaluation is Required: No

Division or Project: Facility Stabilization and Deactivation

Plant Area: Grid Map: G-4

System/Building/Equipment: X-326, Cut & Cap Project

Facility Function: Environmental Restoration Operations

Corrective Action:

Lessons(s) Learned:

HQ Keywords: 01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)

08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
 12I--EH Categories - Lockout/Tagout (Electrical or Mechanical)
 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On April 5, 2013, FBP Cut and Cap Shift Manager was informed of an alleged unsafe act performed by an employee, where the employee was said to have removed the cover from a 480 VAC electrical junction box without a Lockout/Tagout being issued for personnel protection. Operations personnel secured the area for investigation and the electrical supply was secured and tagged out. An investigation was initiated.

Similar OR Report Number:

Facility Manager:

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

Originator:

Name	CRABTREE, RONALD P
Phone	(740) 897-3025
Title	PLANT SHIFT SUPERINTENDENT

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/05/2013	10:55 (ETZ)	Ken Whittle	PORTSFBP
04/05/2013	11:08 (ETZ)	Dennis Carr	PORTSFBP
04/05/2013	11:11 (ETZ)	Joel Bradburne	DOEPORTS

Authorized Classifier(AC): Teresa Mollette Date: 04/05/2013

3)Report Number:

[EM--PPPO-SST-PGDPENVRES-2013-0001](#) After 2003 Redesign

Secretarial Office:

Environmental Management

Lab/Site/Org:

Paducah Gaseous Diffusion Plant

Facility Name:

Environmental Restoration

Subject/Title:

Employee Experiences a Mild Shock during Maintenance of a Personal Computer

Date/Time Discovered:

04/01/2013 09:50 (ETZ)

Date/Time Categorized:

04/01/2013 11:03 (ETZ)

Report Type:

Final

Report Dates:

Notification	04/02/2013	10:55 (ETZ)
Initial Update	04/30/2013	16:18 (ETZ)
Latest Update	04/30/2013	16:19 (ETZ)
Final	05/01/2013	12:04 (ETZ)

Attachment 2

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:	4) Perform Work Within Controls
Subcontractor Involved:	Yes Wastren Advantage, Inc.
Occurrence Description:	Shortly before 10:00 EDT, a computer technician was performing a replacement of a power supply on personal computer (Hewlett Packard). He plugged the repaired computer into the wall outlet. While resting the left hand on the back of the computer case, the technician pushed the power switch on the front of the machine. At that time, the technician felt a vibrating tingle in their left thumb and quickly removed their hand. The technician immediately unplugged the computer and contacted the immediate supervisor. The computer was segregated away from the repair area.

There were no personnel injuries, no damage to equipment or facilities, nor any threat to security or the environment as a result of this event.

Follow Up Actions:

After the initial occurrence report, the Environmental, Safety, and Health (ES&H) Manager interviewed the Information Technology (IT) technician. The technician was a relatively new employee (~two months) but had completed five previous power supply changes. In addition, the technician had completed many other similar power supply changes in previous jobs. Power supply replacement is a routine activity for the IT technicians. During the follow up interview, the technician stated that he felt a “jolt”, a more definitive description indicating a potential shock than the original “vibrating tingle” used in the initial event report to describe the event.

On April 2, 2013, a recreation of the sequence of events that resulted in the technician experiencing the potential shock was conducted. The activity included the technician involved, the IT Manager, the ES&H Manager, and an electrician. The electrician conducted testing and inspection during the activity and found a small charge on the computer case, but not at a level that would have resulted in any sensation if touched. The power supply was properly grounded. The electrician could find no evidence of stray voltage that might have caused the “jolt”. The computer and power supply as installed were tested with no indication of problems. However, as a precaution against the possibility of an intermittent problem that was not evidenced during the recreation or testing, the power supply was

removed from service and subsequently disposed of.

During the event recreation, the electrician noted that the floor of the room in which the maintenance was being conducted was carpeted, and questioned the technician about the type of shoes he was wearing. Static shock was discussed as a possible contributor to the sensation the technician experienced and as a potential source of damage to the electronics during maintenance. IT technicians are now using anti-static wrist straps when computer equipment is opened for maintenance. A voltmeter also has been ordered to allow the IT technicians to check for stray voltage before and after maintenance on the computer equipment.

Actions to address the control of static electricity during computer maintenance work and other issues identified during the recreation of the event have been entered into the SST corrective action tracking system.

Cause Description: Although a definitive cause could not be identified, the most likely cause was determined to be a faulty power supply that was failing intermittently.

Operating Conditions: Does not apply

Activity Category: Maintenance

Immediate Action(s):

1. The employee was taken to a medical service provider for evaluation. After examination, the employee was released with no injury and returned to work with no restrictions.
2. Walked down the computer lab area and interviewed all personnel involved.
3. Installed a Defective Equipment Tag on the computer pending evaluation by a qualified electrician.

FM Evaluation: This occurrence did not have impact to other facilities or equipment. The corrective actions address other potential hazards that were identified during the investigation of the occurrence.

DOE Facility Representative Input: This report is approved.
Entered by: SNOOK, JEFFREY G. 05/01/2013

DOE Program Manager Input:

Further Evaluation is Required: No

Division or Project: Swift & Staley Team

Plant Area: Kevil, KY

System/Building/Equipment: Kevil, KY

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

Corrective Action 01:

Target Completion Date: 04/02/2013	Tracking ID: CATS 1295-01
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Evaluate the computer and power supply involved in the event using a

qualified electrician.

Corrective Action 02: **Target Completion Date:**04/25/2013 **Tracking ID:**CATS 1295-02

Dispose of the power supply.

Corrective Action 03: **Target Completion Date:**04/08/2013 **Tracking ID:**CATS 1295-03

Recommend static electricity control measures in the computer maintenance area.

Corrective Action 04: **Target Completion Date:**04/19/2013 **Tracking ID:**CATS 1295-04

Implement recommendations from the ES&H Manager on control of static.

Corrective Action 05: **Target Completion Date:**05/17/2013 **Tracking ID:**CATS 1295-05

Provide a multi-meter or non-contact voltage meter to the IT technicians to allow checks for stray voltage after power supply replacement.

Corrective Action 06: **Target Completion Date:**04/15/2013 **Tracking ID:**CATS 1295-06

Install additional overhead or task specific lighting in the computer maintenance area to aid the technician during repairs.

Lessons(s) Learned: Intermittent electrical problems can be hard to detect. It is important that personnel conducting maintenance have the tools and equipment on hand to ensure that preventive checks can be made or that checks can occur as soon as possible after an event. A voltmeter is being purchased to allow the IT technicians to make checks before and after repairing or replacing power supplies.

It is easy to become complacent about our daily work environment. Fresh eyes may see potential hazards that you work around each day. It is helpful to ask someone who does not routinely work in your area to do a walk through to look for hazards. Don't wait for an incident or occurrence to re-evaluate your work place for hazards. While the cause for this occurrence could not be definitively determine, several other potential hazards were identified by the personnel involved in the recreation of the event. Corrective actions have been identified.

HQ Keywords: 07E--Electrical Systems - Electrical Equipment Failure
08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
11G--Other - Subcontractor
12C--EH Categories - Electrical Safety
14L--Quality Assurance - No QA Deficiency

HQ Summary: On April 1, 2013, a computer technician felt a vibrating tingle in his left thumb when he pushed the power switch on the front of a computer while resting his left hand on the back of the computer. The technician replaced the power supply prior to the incident. The employee was evaluated by a medical service provider and released with no restrictions.

Similar OR Report Number: 1. EM-SR--SRR-WVIT-2013-0004, Electrical Ti

- 2. NA--LSO-GOAK-LSO-2011-0001, Employee Rec
- 3. SC--ASO-ANLE-ANLEAPS-2011-0002, Worker R
- 4.

Facility Manager:

Name	Smith, Scott
Phone	(270) 441-5104
Title	Program Manager

Originator:

Name	JOLLY, DEBORA R.
Phone	(270) 441-5352
Title	QUALITY ASSURANCE MANAGER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/01/2013	10:00 (ETZ)	Tom Stanberry	SST ES&H
04/01/2013	10:09 (ETZ)	Scott Smith	SST PM
04/01/2013	10:15 (ETZ)	Jeff Snook	DOE
04/01/2013	10:15 (ETZ)	Don Dihel	DOE

Authorized Classifier(AC): Jackie Thompson Date: 04/30/2013

4)Report Number:

[EM-RL--MSC-S&W-2013-0001](#) After 2003 Redesign

Secretarial Office:

Environmental Management

Lab/Site/Org:

Hanford Site

Facility Name:

SEWER SYSTEMS & WATER UTILITIES

Subject/Title:

282W - Safe Condition Check was not Performed on the Correct Side of the Equipment

Date/Time Discovered:

04/09/2013 10:30 (PTZ)

Date/Time Categorized:

04/09/2013 10:30 (PTZ)

Report Type:

Notification/Final

Report Dates:

Notification	04/11/2013	22:59 (ETZ)
Initial Update	04/11/2013	22:59 (ETZ)
Latest Update	04/11/2013	22:59 (ETZ)
Final	04/11/2013	22:59 (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:

A5B4C01 - Communications Less Than Adequate (LTA); Verbal

Attachment 2

	Communications LTA; Communication between work groups LTA
ISM:	1) Define the Scope of Work 2) Analyze the Hazards
Subcontractor Involved:	Yes D.R. Grant/Sun River
Occurrence Description:	<p>During the execution of LOTO at the 282W/200 West facility on Monday 04/08/13, MSA plant forces maintenance personnel supporting MSA operations and offsite construction personnel incorrectly performed a safe condition check on the correct side of electrical disconnect equipment. The electrical equipment that the safe condition check needed to be completed on the 480 volt disconnects that are fused for emergency fire pumps. Prior to the initiation of the work on the system, construction forces personnel working the job observed some configuration issues with the equipment which caused them to question the correct performance of the safe condition check and notified their field superintendent. Upon initial field investigation of the equipment it could not be determined if the safe condition check was completed on the correct side of the 480 Volt Electrical Disconnect equipment.</p> <p>A fact finding was held on Tuesday morning 04/09/13 to determine how the work evolved and where the safe condition was completed. At the end of the fact finding it was determined that the safe condition check was completed on the incorrect side of the electrical disconnects.</p>
Cause Description:	<p>The MSA Electricians that were tasked with completing the required Safe Condition check were not familiar with the equipment located in this building.</p> <p>The Safe Condition check as indicated in block #32 of the TAF for the tags that had been hung reads, Perform voltage checks on the line side of WW-282W-EDS-DISC-003 and WW-282W-EDS-DISC-004 for tag 2 and Perform voltage checks on the line side of WW-282W-EDN-DISC-003 and WW-282W-EDN-DISC-004 for tag 11. However due to unique configuration of these disconnects, as they are bottom feed units which is not an industry norm, and that both electricians assigned this work had never worked on this equipment, there was some misunderstanding as to which part of the disconnect cabinet needed to be opened up to complete the Safe Condition check. The expected normal configuration of an electrical disconnect is that the line side feed (incoming power) comes in from the top of the unit and the bottom part of the unit is the load side feed (power to pumping equipment).</p> <p>Upon entering the area where the electrical disconnects are located, the electricians questioned the facility controlling organization Field Work Supervisor (FWS) where they were to perform the safe condition check. The facility controlling organization FWS pointed out which of the</p>

electrical disconnects were on which tag requiring the safe condition check thinking that was the question being asked. The MSA electricians took the answer as to which section of the electrical disconnects cabinet the safe condition check was to be performed. The facility controlling organization FWS then left the immediate work area and the MSA electricians proceeded to open the upper cabinet panel door and performed a safe condition check on the wrong side of the electrical disconnect. The correct location for the performance of this safe condition check was through the electrical cabinet lower panel.

Issue identification form MSA-IIF-2013-0190 Safe Condition Check Completed Not Performed on Correct Side of Equipment has been generated to conduct a further review of any other under lying communication issues will be performed. At that time all necessary corrective actions will be identified.

Operating Conditions:

Normal Operation

Activity Category:

Maintenance

Immediate Action(s):

1. Contractor stopped work within the 282W Facility
2. Returned the equipment to a safe configuration
3. Secured the controlling org lock box
4. Made notification
5. Scheduled fact finding meeting for next day

FM Evaluation:

There were no personnel injuries or negative impacts to the environment or facility operations as a result of this event.

Communication of work scope requirements and roles and responsibilities prior to and during the performance of activities is crucial to the successful completion of work as well as ensuring personnel safety during the performance of work. Additionally it is imperative to ensure the communication has been correctly received and acknowledged to ensure continuity of safety and work progression throughout the evolution.

Workers assigned to perform the work following the performance of the safe condition checks exhibited a questioning attitude and felt free to question the established lockout tag-out boundary and performance of the safe condition check for the work to be performed.

Upon identification of the issue, all members of the operations, maintenance and construction groups worked together to ensure a safe work environment was maintained and personnel were not exposed to hazards. They ensured all personnel clearly understood the event and

worked collectively to resolve identified event issues.

Maintaining this team effort ensures quick resolution of issues and fosters a workplace environment that supports issues identification and resolution.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: Site Infrastructure & Logistics

Plant Area: 200 West

System/Building/Equipment: 282W Emergency Raw Water Fire Pump

Facility Function: Balance-of-Plant - Site/outside utilities

Corrective Action:

Lessons(s) Learned:

HQ Keywords: 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
 01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)
 01P--Inadequate Conduct of Operations - Inadequate Oral Communication
 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 April 8, 2013, MSA plant forces maintenance personnel supporting MSA operations and offsite construction personnel incorrectly performed a safe condition check on the incorrect side of electrical disconnect equipment during the execution of a lockout/tagout. The electrical equipment that the safe condition check needed to be completed on was the 480-volt disconnects that are fused for emergency fire pumps. The MSA electricians that were tasked with completing the required safe condition check were not familiar with the equipment located in this building. The equipment was returned to a safe configuration and a fact-finding meeting was scheduled.

Similar OR Report Number:

Facility Manager:

Name	S.L. Camp
Phone	(509) 372-0175
Title	Manager, Water/Sewer Utilities

Originator:

Name	WOODFORD, TERRY L
------	-------------------

Phone	(509) 376-3030
Title	HANFORD EOC SHIFT OFFICE OFCR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/09/2013	10:30 (PTZ)	S.D. Shupe	MSA
04/09/2013	10:30 (PTZ)	EOC	MSA
04/09/2013	10:30 (PTZ)	M.B. Wilson	MSA
04/09/2013	10:30 (PTZ)	B.L. Wallace	DOE-RL

Authorized Classifier(AC):

5)Report Number: [NA--LASO-LANL-ACCCOMPLEX-2013-0003](#) After 2003 Redesign

Secretarial Office: National Nuclear Security Administration

Lab/Site/Org: Los Alamos National Laboratory

Facility Name: Accelerator Complex

Subject/Title: Modulator Circuit Card Repair Results in Unexpected Discovery of Hazardous Electrical Energy

Date/Time Discovered: 04/16/2013 14:30 (MTZ)

Date/Time Categorized: 04/16/2013 18:28 (MTZ)

Report Type: Update

Report Dates:

Notification	04/18/2013	19:17 (ETZ)
Initial Update	05/29/2013	12:31 (ETZ)
Latest Update	05/29/2013	12:31 (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.

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

Cause Codes:

ISM:

Subcontractor Involved: No

Occurrence Description: MANAGEMENT SYNOPSIS: At 1430 on April 16, 2013, the LANSCE Facility Operations (LFO) Facility Operations Director (FOD) was

notified of an electrical event involving a circuit card repair on a klystron modulator test stand with 120V that occurred on March 22, 2013.

Due to extenuating circumstances, the involved Accelerator Operations and Technology Radio Frequency Engineering (AOT-RFE) worker (W1) was not available for the critique and will not be available for at least two weeks. Available information was gathered by the AOT-RFE Group Leader, the LANL Chief Electrical Safety Officer, the AOT-RFE Deputy Group Leader, the AOT-RFE ESO, the team leader of W1, and the LFO FOD Division Electrical Safety Officer during an interview with an AOT-RFE engineer knowledgeable of the work in the area (W2).

Based on information presented at the critique, it is believed that W1 was repairing a circuit card or adjacent component on a klystron modulator test stand that is used to test components of the LANSCE accelerator. W2 reported that the breaker servicing the modulator was in the open position (disconnected) and a LOTO was applied in accordance with the Integrated Work Document (IWD) for the work activity. However, it is unknown if W1 hung his own lock or performed zero voltage verification per the LANL institutional requirement Lockout/Tagout for Hazardous Energy Control (P101-3). It is believed that as W1 was performing the work activity with an insulated tool, an unexpected spark occurred. The workers stopped and verified the modulator/circuit card was not de-energized although a LOTO had been applied. The source of the unexpected energy to the modulator and circuit card is currently unknown.

The LANL Chief ESO evaluated the electrical severity of the event using the Electrical Severity Tool and determined the ES was 110, which is defined as moderate risk.

Based on this information, the LFO FOD determined the event met the Group 2E(3) and Group 2E(4) criterion. The LFO FOD determined that issues associated with the notification process will be addressed locally and will not be included in the ORPS report.

UPDATE (5/29/2013): This report is being updated to reflect an extended due date in order to allow more time for completion of the investigation, causal analysis, and development of corrective actions. The new due date is July 15, 2013.

Cause Description:

Operating Conditions:

Activity Category:

Immediate Action(s):

Normal

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

1. The AOT-RFE Group Leader made immediate notifications to his management and the LFO FOD when he became aware of the event.

2. All work was paused on the klystron modulator test stand.
3. An electrical evaluation of the klystron modulator test stand was initiated to identify potential equipment failure.
4. AOT management will communication zero voltage verification requirements and expectations to AOT workers.

FM Evaluation: UPDATE (5/29/2013): This report is being updated to reflect an extended due date in order to allow more time for completion of the investigation, causal analysis, and development of corrective actions. The new due date is July 15, 2013.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

Yes.
Before Further Operation? No
By Whom: LFO FOD and QPA-PA
By When: 07/15/2013

Division or Project:

LANSCE

Plant Area:

TA-53

System/Building/Equipment: klystron modulator test stand

Facility Function:

Accelerators

Corrective Action:

Lessons(s) Learned:

HQ Keywords:

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

HQ Summary:

On April 16, 2013, the LANSCE Facility Operations Director was notified of an electrical event involving a circuit card repair on a klystron modulator test stand with 120V that occurred on March 22. Due to extenuating circumstances, the involved Accelerator Operations and Technology Radio Frequency Engineering worker was not available for the critique. Based on information presented at the critique, it is believed that the worker was repairing a circuit card or adjacent component on a klystron modulator test stand. A second worker reported that the breaker servicing the modulator was in the open position (disconnected) and a Lockout/Tagout (LOTO) was applied. It is unknown if the worker hung his own lock or performed zero voltage verification per the Los Alamos National Laboratory institutional requirement LOTO for Hazardous Energy Control. It is believed that as the worker was performing the work activity with an insulated tool, an unexpected spark occurred. The source

of the unexpected energy to the modulator and circuit card is currently unknown.

Similar OR Report Number:

Facility Manager:

Name	Paul Lewis
Phone	(505) 665-8363
Title	LFO Facility Operations Director

Originator:

Name	TANNER, KIMBERLI K
Phone	(505) 665-8197
Title	OCCURRENCE INVESTIGATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/16/2013	18:28 (MTZ)	Bruce LeBrun	NNSA

Authorized Classifier(AC): Kimberli Tanner Date: 05/29/2013

6)Report Number:

[NA--LSO-LLNL-LLNL-2013-0015](#) 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:

LOTO performed on incorrect panel in Building 683

Date/Time Discovered:

04/23/2013 11:00 (PTZ)

Date/Time Categorized:

04/23/2013 14:00 (PTZ)

Report Type:

Notification/Final

Report Dates:

Notification	04/25/2013	13:10 (ETZ)
Initial Update	04/25/2013	13:10 (ETZ)
Latest Update	04/25/2013	13:10 (ETZ)
Final	04/25/2013	13:10 (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:

3) Develop and Implement Hazard Controls

Subcontractor Involved:

No

Occurrence Description:

On April 23, 2013 at 11am it was discovered that LOTO was not performed correctly on a sand filter pump located in B683 cooling tower.

The worker performed the LOTO on panel #1, including a zero energy check, in accordance with the work permit and removed electrical leads from the pump in preparation for the pump change out to be performed by MUSD. Prior to performing work, MUSD personnel discovered that panel #2 should have LOTO instead of panel #1.

Work was paused and an investigation initiated.

This occurrence report is being tracked in LLNL's Issues Tracking System, reference Assessment No. 35979.

Cause Description:

Operating Conditions: Normal

Activity Category: Maintenance

Immediate Action(s): Work was paused and an investigation initiated.

FM Evaluation:

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: N&PS

Plant Area: Site 200

System/Building/Equipment: Building 683

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
12I--EH Categories - Lockout/Tagout (Electrical or Mechanical)
14E--Quality Assurance - Work Process Deficiency

HQ Summary: On April 23, 2013, MUSD personnel discovered that a lockout/tagout (LOTO) for a sand filter pump located in Building 683 cooling tower was performed on the wrong power panel. A worker performed a LOTO on panel #1 and zero energy check in accordance with the work permit and removed electrical leads from the pump in preparation for the pump change out. MUSD determined panel #2 should have LOTO instead of panel #1 prior to performing work.

Similar OR Report Number:

Facility Manager:

Name	Valerie Roberts
Phone	(925) 424-3662

Title	NIF&PS Deputy Principal Associate Director
-------	--

Originator:

Name	MCTYER, NORMA J.
Phone	(925) 423-8075
Title	REGULATORY COMPLIANCE ASSURANCE ENGI

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/23/2013	14:48 (PTZ)	Paul Borenstein	ES&H TL
04/23/2013	14:51 (PTZ)	Joel Bowers	LEDO
04/23/2013	15:07 (PTZ)	Roy Kearns	NNSA LFO

Authorized Classifier(AC): Lydia Hunt Date: 04/23/2013

7)Report Number: [NE-ID--BEA-ATR-2013-0011](#) **After 2003 Redesign**
Secretarial Office: Nuclear Energy, Science and Technology
Lab/Site/Org: Idaho National Laboratory
Facility Name: Advanced Test Reactor
Subject/Title: Unexpected Discovery of Electrical Energy at the Nuclear Materials Inspection and Storage (NMIS) Facility
Date/Time Discovered: 04/02/2013 10:30 (MTZ)
Date/Time Categorized: 04/02/2013 11:30 (MTZ)
Report Type: Final
Report Dates:

Notification	04/03/2013	15:28 (ETZ)
Initial Update	05/13/2013	18:29 (ETZ)
Latest Update	06/12/2013	18:07 (ETZ)
Final	06/12/2013	18:07 (ETZ)

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: A5B2C08 - Communications Less Than Adequate (LTA); Written Communication Content LTA; Incomplete / situation not covered
A4B4C11 - Management Problem; Supervisory Methods LTA; Assignment did not consider worker's ingrained work patterns
A5B4C01 - Communications Less Than Adequate (LTA); Verbal Communications LTA; Communication between work groups LTA
A4B1C01 - Management Problem; Management Methods Less Than

Adequate (LTA); Management policy guidance / expectations not well-defined, understood or enforced
A4B4C05 - Management Problem; Supervisory Methods LTA; Emphasis on schedule exceeded emphasis on methods/doing a good job

ISM:

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

Subcontractor Involved:

No

Occurrence Description:

On April 2, 2013, at approximately 1030 while performing work on work order (WO) 171231, "TRA-621 Replace NMIS 621 Overhead Fan," an electrician performing the work discovered 120 VAC control power in the motor starter cabinet. The 480 VAC power to the fan motor was tagged out and locked out with a simple lockout/tagout (LO/TO) to disconnect the motor at the terminal box on the motor. The Electrical Supervisor elected to disconnect the motor at the starter cabinet. The starter cabinet contained 120 VAC control power from another source that was not isolated. Prior to commencing work the electrician noticed two conduits entering the starter cabinet and performed a proximity test identifying the 120 VAC power. Work was immediately stopped.

Categorization was delayed until the critique was held, which determined this event to be reportable.

Cause Description:

A Level 1 Cause Analysis was performed in accordance with LWP-13845, "Cause Analysis, Action Planning, and Investigation Reporting Process," and the following causes were determined:

A5B2C08 - Incomplete/Situation not covered. Guidance instructions were not provided to the planning department for the development of a scope of work statement that provides the desired job objectives and major tasks in detail sufficient to allow identification of hazards, mitigations, controls, and work performance requirements. Work Order (WO) 171231 scope of work statement did not contain enough detail to establish the boundaries of the work. Due to this lack of detail, the Outer Area Supervisor and NMIS Supervisor assumed that the R1 Blower Motor would be disconnected at the terminal box of the motor based on their past experience. Not establishing boundaries allowed room for the Electrical Foreman to identify a point of disconnection of the R1 Blower Motor that was outside of the LO/TO boundary established by the Outer Area Supervisor. (See corrective actions #1 and #2)

A4B4C11 - Assignment did not consider worker's ingrained work patterns. The use of human performance tools for situational awareness (task preview, job-site review, questioning attitude, stop when unsure) has not

become an ingrained standard in the accomplishment of work. Employees have not grasped the importance of the concept that an accurate knowledge and understanding (mental picture) of relevant information from the work environment guides their decisions and actions. The Electrical Foreman was not aware of the starter/disconnect switch arrangement when providing directions to the electricians for disconnecting the R1 Blower Motor. His mental picture of the work environment was a disconnect switch/motor arrangement without a second source of power. The Electrician did not stop when it was evident that a second source of power was present and the physical configuration was different than what the foreman discussed during the briefing. The Outer Area Supervisor, NMIS Supervisor, and workers did not perform a walkdown to determine the point of isolation and the zero energy verification prior to installing the LO/TO as required by MCP-9502, "ATR Programs Operations Implementation." (See corrective actions #3, #4, and #5)

A5B4C01 - Communication between work groups LTA. The Operations Supervision did not communicate the limitations of the LO/TO that was installed and the Electrical Foreman did not communicate his intention of performing the disconnection at other than the terminal box on the motor. The Electrical Foreman made a decision to disconnect the power cable between the starter and the motor in order to totally remove the cable to prevent damage and to satisfy the unwritten policy of not leaving exposed electrical leads. (See corrective actions #6 and #7)

A4B1C01 - Management policy guidance/expectations not well-defined, understood, or enforced. The Electrical Foreman did not cover the basic elements of a briefing with the electricians performing the zero energy verification as required, as a minimum, for all briefings in accordance with LWP-9201, "Briefings," Section 4.2.1. (See corrective action #8)

A4B4C05 - Emphasis on schedule exceeded emphasis on methods/doing a good job. There was a common theme of the workers and supervisors being hesitant to act in a way which may appear as if they are causing delays in work (perceived pressure to adhere to schedule). (See corrective action #9)

Analysis of this event determined that implementation of the ISMS system failed during the use of all 5 Core Functions:

Core Function 1 - Define the Scope of Work. The scope of work statement in WO-171231 did not clearly identify boundaries of work due to lack of specificity. The loosely defined scope of work statement did not aid the Outer Area Supervisor in determining an adequate LO/TO isolation point without having to make assumptions. It provided the Electrical Foreman

the opportunity to work outside of the intent of the LO/TO that was approved by the Outer Area Supervisor and still be within the scope of work statement. The expectations regarding the scope of work were not clearly communicated to the electricians by the NMIS Supervisor. The configuration of equipment was not known by the Electrical Foreman when he gave instructions to the electricians.

Core Function 2 - Analyze the Hazards. Since the scope of work was not well defined, the 120V AC power going to the starter was not part of the analysis of hazards.

Core Function 3 - Develop and Implement Hazard Controls. Since the 120V AC power was not identified as a hazard, no controls were implemented.

Core Function 4 - Perform Work within Controls. Procedure in MCP-9502 (6.3.2) was not followed when determining the isolation point for the zero energy check. MCP-9502 requires that the FAS, AE and worker will discuss where and how the single energy source will be isolated and how the zero energy verification will be performed. The work was not performed as planned. The electrician removing the fan, proceeded with work in the face of uncertainty. When he noticed a probable second source of electricity connected to the starter, he did not stop work and notify a supervisor.

Core Function 5 - Provide Feedback and Continuous Improvement. The Outer Area Supervisor did not communicate clearly with specific language in the LO/TO to identify a specific disconnect point. More specificity is also needed by planners when designing work packages.

Evaluation of the Cause Analysis has determined an Extent of Conditions will not be performed. This event is related to less than adequate human performance.

Operating Conditions:

Entry into the NMIS had been made to perform work order 171231

Activity Category:

Maintenance

Immediate Action(s):

Appropriate levels of BEA management and DOE-ID were notified of this event.

Work was immediately stopped, notifications made, and a critique was scheduled for 2 April 2013 at 1400 hours.

FM Evaluation:

There were no programmatic impacts as a result of this event.

A Level 1 Cause Analysis is currently in progress for this event and due to complete on 30 May 2013; therefore, the final ORPS submittal will not be within the 45-day requirement. The final report will be submitted no later

than 6 June 2013. DOE-ID has been notified.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: ATR Programs

Plant Area: NMIS

System/Building/Equipment: Nuclear Materials Inspection and Storage Facility

Facility Function: Category "A" Reactors

Corrective Action 01:

Target Completion Date: 09/26/2013	Tracking ID: IO-026394, AI-012984
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Perform a training needs analysis of GDE-6200, especially section 4.10.1, for ATR Programs departments to determine training needs. If training is needed, complete analysis and design to include target audience and objectives. The target audience should include, as a minimum, the planners and reviewers of work orders.

Corrective Action 02:

Target Completion Date: 12/19/2013	Tracking ID: IO-026394, AI-012985
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Perform training on GDE-6200 as identified by the training needs analysis performed in Corrective Action #1.

Corrective Action 03:

Target Completion Date: 09/26/2013	Tracking ID: IO-026394, AI-012986
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Develop and implement a Ready-Ready Work Order walkdown procedure to include verification of work scope statement and craft participation requirements for all crafts involved in the work activity.

Corrective Action 04:

Target Completion Date: 09/26/2013	Tracking ID: IO-026394, AI-012987
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Perform a training needs analysis on the situational awareness tools to include description, application in field, and management expectations for usage for ATR Programs departments to determine training needs. If training is needed, complete analysis and design to include target audience and objectives. As a minimum, the target audience should include foremen and crafts.

Corrective Action 05:

Target Completion Date: 12/19/2013	Tracking ID: IO-026394, AI-012988
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Perform training on situational awareness tools as identified by the training needs analysis performed in corrective action #4.

Corrective Action 06:

Target Completion Date: 07/15/2013	Tracking ID: IO-026394, AI-012989
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Determine what is causing barriers to communications between Operations supervision and maintenance associated with communicating LO/TO boundary restrictions and take actions to remove those barriers.

Corrective Action 07:

Target Completion Date: 07/15/2013	Tracking ID: IO-026394, AI-012990
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Determine what is causing barriers to communications between Maintenance and Operations associated with communicating task decisions that could be outside of the boundaries of a LO/TO and take actions to remove those barriers.

Corrective Action 08:

Target Completion Date: 06/27/2013	Tracking ID: IO-026394,AI-012991
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Develop and communicate a policy for assigning zero energy verifications including briefing and required actions to be taken by foreman and electricians prior to performing task.

Corrective Action 09:

Target Completion Date: 07/25/2013	Tracking ID: IO-026394, AI-012992
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Develop lines of inquiry and perform an assessment to determine the cause of workers being hesitant to delay work when there appears to be a problem if an assessment covering this topic is in progress or scheduled, utilize that assessment.

Lessons(s) Learned:

Communications are key to successful job completion. The work process failed to identify enough detail to establish the boundaries of the work. Supervisory personnel should NEVER assume they know what workers are going to perform. Pre-job briefs are essential; however, a reverse-brief where the worker briefs the Supervisor on what they are going to do, is a valuable tool that should not be overlooked. Any new personnel arriving at the job site needs to be briefed by the Supervisor and Craft personnel on the intent of the task so that all parties are clear regarding job scope. A last minute "take two" should always be done to ensure the job is ready to work.

HQ Keywords:

- 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
- 01F--Inadequate Conduct of Operations - Training Deficiency
- 01G--Inadequate Conduct of Operations - Inadequate Procedure
- 01M--Inadequate Conduct of Operations - Inadequate Job Planning (Electrical)
- 01P--Inadequate Conduct of Operations - Inadequate Oral Communication
- 01R--Inadequate Conduct of Operations - Management issues
- 12C--EH Categories - Electrical Safety
- 14B--Quality Assurance - Training and Qualification Deficiency

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

HQ Summary:

On April 2, 2013, an electrician performing work on an overhead fan discovered 120 VAC control power in the motor starter cabinet. The 480 VAC power to the fan motor was tagged out and locked out in order to disconnect the motor at the terminal box on the motor. The Electrical Supervisor elected to disconnect the motor at the starter cabinet which contained 120 VAC control power from another source that was not isolated. Prior to commencing work, the electrician noticed two conduits entering the starter cabinet and performed a proximity test identifying the 120 VAC power. Work was immediately stopped.

Similar OR Report Number: 1. None

Facility Manager:

Name	Hill, Shawn Ashley
Phone	(208) 533-4128
Title	ADVANCED TEST REACTOR OP. FACILITY M

Originator:

Name	OWENS, MARJORIE A
Phone	(208) 533-4563
Title	ATR OPERATIONS FACILITY ADMINISTRATI

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/02/2013	12:30 (MTZ)	J. Duplessis	DOE-ID

Authorized Classifier(AC): Jeffrey L. Garner Date: 06/12/2013

8)Report Number: [NE-ID--BEA-ATR-2013-0013](#) After 2003 Redesign
Secretarial Office: Nuclear Energy, Science and Technology
Lab/Site/Org: Idaho National Laboratory
Facility Name: Advanced Test Reactor
Subject/Title: Exposed Unguarded Terminal Board on the Back of the Stack Particulate, Iodine, and Noble Gas (SPING) Cabinet at the ATR
Date/Time Discovered: 04/24/2013 17:00 (MTZ)
Date/Time Categorized: 04/24/2013 17:45 (MTZ)
Report Type: Final
Report Dates:

Notification	04/29/2013	18:41 (ETZ)
Initial Update	06/06/2013	15:11 (ETZ)
Latest Update	06/06/2013	15:11 (ETZ)
Final	06/06/2013	15:11 (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: A3B1C01 - Human Performance Less Than Adequate (LTA); Skill Based Errors; Check of work was LTA
-->couplet - A4B4C03 - Management Problem; Supervisory Methods LTA; Appropriate level of in-task supervision not determined prior to task
-->couplet - A5B4C01 - Communications Less Than Adequate (LTA); Verbal Communications LTA; Communication between work groups LTA

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

Subcontractor Involved: No

Occurrence Description: At 1700 on 24 April 2013, an Advanced Test Reactor (ATR) Radiological Controls Technician (RCT) discovered that the back of the SPING cabinet, located in the RadCon office area, was left off for troubleshooting which had started earlier in the day. The equipment/work area was left in a condition that, it was believed, could potentially allow untrained workers to enter the 3'6" Restricted Approach Boundary which is in violation of National Fire Protection Association (NFPA) 70E, Section 130.2 Approach Boundaries to Live Parts.

It was believed that the electrical energy source within the SPING cabinet was 110V and upon being informed of the condition of the SPING cabinet, the ATR Shift Supervisor immediately secured the area (stationed a guard). By 1745, 24 April 2013, the area was roped off and safety signs were posted.

A critique was held on 25 April 2013, which resulted in further investigation being conducted. It was discovered that the exposed electrical circuitry was 24V and posed no threat to employees.

Cause Description: An apparent cause analysis was performed in accordance with LWP-13845, CAUSE ANALYSIS, ACTION PLANNING, AND INVESTIGATION REPORT PROCESS, and the following causes were determined:

A3B1C01 - Check of work was LTA. The Work Order (WO) required the work area to be posted and roped off prior to commencing work. Review and discussion of the WO would have identified this requirement. Nor was LI-521, "Working On Or Near Energized Equipment 240V and Below,"

Attachment 2

reviewed, as workers were not aware of the correct voltage contained in the SPING cabinet. (See corrective action #1)

A4B4C03 - Appropriate level of in-task supervision not determined prior to task. During the critique of this event, it became obvious that the job supervisor was not clearly identified. See corrective action #1)

A5B4C01 - Communication between work groups LTA. The pre-job brief was inadequate as workers were not aware of the hazards associated with the job. (See corrective action #1)

ISM Core Functions #2 - Analyze the Hazards, and #3 - Develop and Implement Hazard Controls, would have been implemented had there been an adequate pre-job brief with workers and the job supervisor.

An Extent of Conditions will not be performed. There are no hazards to workers associated with the SPING cabinet.

Operating Conditions: The ATR was shut down for the Cycle 154A-1 outage.
Activity Category: Maintenance
Immediate Action(s): Appropriate levels of BEA management and DOE-ID were notified of this event.

The area around the SPING cabinet was immediately secured, i.e., guard posted, area roped off, and signs posted.

A critique was held resulting in further investigation which discovered the exposed electrical circuitry to be 24V, not 110V as originally thought.

FM Evaluation: There were no programmatic impacts as result of this event.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: ATR Programs

Plant Area: RadCon Office

System/Building/Equipment: TRA-670, Advanced Test Reactor, SPING

Facility Function: Category "A" Reactors

Corrective Action 01: **Target Completion Date:**04/29/2013 **Tracking ID:**IO-026985

Coach and mentor individuals regarding human performance issues and management expectations not being met.

Lessons(s) Learned: This event underscores the need for use and adherence of pre-job briefing

forms and implementation of management's expectations concerning pre-job briefs, clear communications, and proper use of electrical boundaries.

HQ Keywords:

- 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
- 01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
- 01N--Inadequate Conduct of Operations - Inadequate Job Planning (Other)
- 01P--Inadequate Conduct of Operations - Inadequate Oral Communication
- 01R--Inadequate Conduct of Operations - Management issues
- 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
- 12C--EH Categories - Electrical Safety
- 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On April 24, 2013, during troubleshooting, an Advanced Test Reactor (ATR) Radiological Controls Technician (RCT) discovered that the back of the SPING cabinet, located in the RadCon office area, was left off. The equipment/work area was left in a condition that could potentially allow untrained workers to enter the 3-foot 6-inch Restricted Approach Boundary for exposed energized parts, which is in violation of National Fire Protection Association. It was believed that the electrical energy source within the SPING cabinet was 110-volts and upon being informed of the condition of the SPING cabinet, the ATR Shift Supervisor immediately secured the area. An investigation revealed that the exposed electrical circuitry was 24-volts and posed no threat to employees.

Similar OR Report Number: 1. None

Facility Manager:

Name	Hill, Shawn Ashley
Phone	(208) 533-4128
Title	ADVANCED TEST REACTOR OP. FACILITY M

Originator:

Name	OWENS, MARJORIE A
Phone	(208) 533-4563
Title	ATR OPERATIONS FACILITY ADMINISTRATI

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/24/2013	18:00 (MTZ)	J. Duplessis	DOE-ID

Authorized Classifier(AC): Jeffrey L. Garner Date: 06/06/2013

9)Report Number:

[SC--BHSO-BNL-AGS-2013-0001](#) After 2003 Redesign

Secretarial Office:

Science

Lab/Site/Org:

Brookhaven National Laboratory

Facility Name:

Alternating Gradient Synchrotron

Attachment 2

Subject/Title: Failure to Follow a Prescribed Hazardous Electrical Energy Control Process

Date/Time Discovered: 04/03/2013 11:15 (ETZ)

Date/Time Categorized: 04/03/2013 13:55 (ETZ)

Report Type: Final

Report Dates:

Notification	04/05/2013	09:37 (ETZ)
Initial Update	05/09/2013	15:01 (ETZ)
Latest Update	05/09/2013	15:01 (ETZ)
Final	05/09/2013	15:01 (ETZ)

Significance Category: 3

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

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:

A5B2C05 - Communications Less Than Adequate (LTA); Written Communication Content LTA; Ambiguous instructions / requirements
A4B1C01 - Management Problem; Management Methods Less Than Adequate (LTA); Management policy guidance / expectations not well-defined, understood or enforced

A6B3C01 - Training deficiency; Training Material LTA; Training objectives LTA

A3B2C05 - Human Performance Less Than Adequate (LTA); Rule Based Error; Situation incorrectly identified or represented results in wrong rule used

-->couplet - A6B2C01 - Training deficiency; Training Methods Less Than Adequate (LTA); Practice or "hands-on" experience LTA

A6B2C03 - Training deficiency; Training Methods Less Than Adequate (LTA); Refresher training LTA

ISM: 3) Develop and Implement Hazard Controls

Subcontractor Involved: No

Occurrence Description: On April 3, 2013, at Brookhaven National Laboratory (BNL), a worker was assigned the job of replacing a feedback amplifier and feedback transformer in an RF power amplifier located within the Alternating Gradient Synchrotron (AGS) ring. At approximately 11:15 AM, after work had commenced, the worker's supervisor discovered that the correct breakers in Building 929 had been opened to de-energize the RF power

amplifier and do the work, but only the 13.8 kV and 480 VAC breakers were locked in the open position. The correct 208 VAC breakers were opened, but were not locked open. There was no injury and no contact with hazardous energy.

Cause Description:

The investigation team included the C-AD Chief Electrical Engineer and the BNL Electrical Safety Officer. The investigation included a review of written statements by the involved personnel, interviews of the involved personnel, a walkthrough of the sequence of events by the worker who performed the equipment turn-off and LOTO, and use of the Five Whys causal analysis method by the investigation team to determine the apparent causes.

The following were the apparent causes of this event as determined by the investigation team.

A5B2C05 - Ambiguous instructions/requirements:

1. There was a lack of a clear written procedure for performing LOTO of RF Power Amplifiers.

A4B1C01 - Management policy guidance/expectations not well-defined, understood or enforced:

A6B3C01 - Training objectives LTA:

2. There was a lack of clear expectations on what is required for supervisors to conduct effective on-the-job training for specific equipment LOTO.

A3B2C05 - Situation incorrectly identified or represented results in wrong rule used:

A6B2C01 - Practice or "hands-on" experience LTA:

3. The job was assigned as worker planned work. The worker involved with this event had participated in this work two weeks earlier during the previous scheduled maintenance day but this was the first time he was assigned to complete this work on his own.

A5B2C05 - Ambiguous instructions/requirements:

4. There was inconsistent use of specific written procedures for complex LOTO of hazardous energy sources. There was a standing, annual work permit that was used to cover complex LOTO which allowed the work planner to determine if the standing work permit was adequate to control a complex LOTO or if a specific detailed procedure was needed for complex LOTO. This was recognized by the investigation team to be a workaround which contributed to possible overuse of the standing work permit. This event would have been prevented had there been a specific complex LOTO procedure. It is recognized that consistent use of specific complex LOTO procedures would minimize the risk of recurrence of these types of events throughout the C-AD facility.

A6B2C03 - Refresher training LTA:

5. The periodic class room training for the LOTO program given for C-AD facility-specific authorized LOTO employees was determined to be too infrequent.

Operating Conditions:

Normal Shutdown Condition

Activity Category:

Maintenance

Immediate Action(s):

To ensure safety, the supervisor immediately opened and locked a 208 VAC breaker that was upstream of the 208 VAC breakers opened by the worker in Building 929. This upstream breaker was locked open using an installed Kirk Key system. The supervisor then proceeded to the AGS ring with the intention to stop work. When he arrived at the entrance gate to the AGS ring he discovered that the job was already completed by the worker without injury. The supervisor discussed the safety issues of not locking the 208 VAC breakers with the worker and informed management of this event. Collider-Accelerator Department (C-AD) management initiated an investigation.

The Department Chair required all groups who perform electrical lockout/tagout (LOTO) to conduct a stand-down to review LOTO program requirements and discuss electrical safety with their staff and report completion of this meeting to him within 2 days of this event. Until these meetings were completed, the Department Chair required that all LOTO applications within these groups be double-checked by the group supervisor or a knowledgeable co-worker.

FM Evaluation:

This condition was initially declared a Significance Category 4 occurrence. At 2:30 PM, after further consideration, C-AD management elected to raise the categorization of this condition to a SC-3 Management Concern.

The following corrective actions address the apparent causes and will reduce recurrence of this condition throughout the C-AD complex.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

Collider Accelerator Department

Plant Area:

AGS Ring

System/Building/Equipment: Building 929

Facility Function:

Accelerators

Corrective Action 01:

Target Completion Date: 04/08/2013	Actual Completion Date: 04/08/2013
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Cancel the standing, annual work permit for Complex LOTO.

Corrective Action 02:

Target Completion Date: 06/28/2013	Actual Completion Date:
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Revise the C-AD LOTO Program OPM to require a specific written Complex LOTO procedure for all Complex LOTOs.

Corrective Action 03:

Target Completion Date: 04/08/2013	Actual Completion Date: 04/08/2013
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Until C-A Complex LOTO OPMs are completed; require that Complex LOTO be covered by a job specific enhanced work permit (EWP) or equivalent control.

Corrective Action 04:

Target Completion Date: 06/28/2013	Actual Completion Date:
---	--------------------------------

Develop a procedure in the C-A-OPM which describes the expectations of C-AD management for conducting an effective on-the-job (OJT) LOTO training program. This will address the trainer's and the trainee's responsibilities and ensure that OJT is uniformly conducted within the Department.

Corrective Action 05:

Target Completion Date: 09/20/2013	Actual Completion Date:
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Update and enhance the C-AD LOTO Program classroom training course and conduct training for all C-AD authorized LOTO workers. Enhancement will include clear descriptions of when a Complex LOTO procedure is needed and how to effectively conduct OJT LOTO training. This training will be given annually.

Corrective Action 06:

Target Completion Date: 09/30/2013	Actual Completion Date:
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Add a requirement to the C-A-OPM to hold annual forums for work planners on how to make better judgments on when work can be worker-planned and when it must be prescribed work or work permitted work.

Lessons(s) Learned:

HQ Keywords:

- 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
- 01F--Inadequate Conduct of Operations - Training Deficiency
- 01G--Inadequate Conduct of Operations - Inadequate Procedure
- 01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)
- 01R--Inadequate Conduct of Operations - Management issues
- 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
- 12I--EH Categories - Lockout/Tagout (Electrical or Mechanical)
- 14B--Quality Assurance - Training and Qualification Deficiency
- 14D--Quality Assurance - Documents and Records Deficiency
- 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On April, 3, 2013, a worker assigned the job of replacing a feedback transformer in an RF power amplifier located within the Alternating Gradient Synchrotron ring failed to lock out and tag out circuit breakers as

required by procedure. The worker’s supervisor discovered the procedure violation after replacement of the transformer commenced. The worker opened the correct circuit breakers to de-energize the RF power amplifier but failed to follow the hazardous energy control process. There was no injury and no contact with any hazardous energy. The supervisor immediately opened and locked out an upstream circuit breaker.

- Similar OR Report Number:** 1. SC--BHSO-BNL-BNL-2012-0015
 2. SC--BHSO-BNL-BNL-2011-0020
 3.

Facility Manager:

Name	LESSARD, EDWARD T
Phone	(631) 344-4250
Title	C-AD ASSOCIATE CHAIR FOR ESSH&Q

Originator:

Name	SIERRA, EDWARD A
Phone	(631) 344-4080
Title	ORPS COORDINATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/03/2013	11:50 (ETZ)	R. Karol	BNL
04/03/2013	13:45 (ETZ)	L. Stiegler	BNL
04/03/2013	14:45 (ETZ)	A. Janczewski	BHSO/DOE

Authorized Classifier(AC):

10)Report Number: [SC--BSO-LBL-OPERATIONS-2013-0006](#) After 2003 Redesign
Secretarial Office: Science
Lab/Site/Org: Lawrence Berkeley National Laboratory
Facility Name: Operations Division
Subject/Title: Employee Experienced Tingling During Pipe Installation - No Injury
Date/Time Discovered: 04/05/2013 13:00 (PTZ)
Date/Time Categorized: 04/10/2013 11:34 (PTZ)
Report Type: Update/Final
Report Dates:

Notification	04/11/2013	18:43 (ETZ)
Initial Update	05/24/2013	14:35 (ETZ)
Latest Update	05/24/2013	14:35 (ETZ)
Final		

Significance Category:

2

Attachment 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: A2B1C02 - Equipment/ material problem; Calibration for Instruments Less Than Adequate (LTA); Equip. found outside acceptance criteria

ISM: 5) Provide Feedback and Continuous Improvement

Subcontractor Involved: No

Occurrence Description: On 04/05/2013 at around 1300 hours, while installing pipes in Building 2 Room 235, a Facilities employee felt a "slight tingling" in both hands when the plumbing pipe he was holding touched a light fixture housing. At the time, he was not sure if it was an electric shock; therefore, he did not stop work and did not report the event to his supervisor.

In the morning of 04/10, the employee told his supervisor about the 4/5 experience and was advised to report to the LBNL Health Services where he was examined and found not to have sustained any injury from the 04/05 incident.

The supervisor placed a work order for the Facilities electricians to check the B2-235 work location. They found the exterior housing of the light fixture was energized at 277 volt. Facilities personnel have since disconnected and removed all the electrical wiring to that light fixture.

Cause Description: Lighting fixture housing was energized due to poor installation practices. A2B1C02

Operating Conditions: Indoors, lighted, dry

Activity Category: Maintenance

Immediate Action(s): none

FM Evaluation: - Facilities management was not aware of the incident until 04/10.

- Facilities personnel have initiated an extent-of-condition effort to examine all the light fixtures on that floor and the first, third, and fourth floors in B02.

- Facilities personnel were able to identify the light fixture problem and fixed it on 04/11/2013.

05/24/2013 UPDATE:

The light fixtures in this building were installed and energized in 1989. This particular fixture was not properly installed as evidenced by the discovery of a missing component from the raceway assembly and by the three junction box extensions used to accommodate several circuits of wiring for various 277 volt lighting functions. The wires were stuffed into

this electrical junction box assembly before the covers were installed. While the light fixture has been maintained and serviced by Facilities, it is not known if any work has been done on the feed wiring assembly since 1989.

An Extent of Condition was preformed, consisting of checking all ground wiring to lights and checking all lighting fixtures on all four floors of the building. No additional problems were found. Installation of all other fixtures in this building was found to be completed properly. The fixture in this incident is unique to this building and is not used at any other locations on this site.

The incident investigation and analysis revealed that the policy to report all incidents and issues to the Work Request Center (WRC) is not clearly understood by all Facilities employees, as evidenced by the failure of the plumber and his lead to report the "slight tingling" event. The plumber was not sure if the tingling was an electrical shock and was not sure if he should report to the WRC. Additionally, the Work Planning and Control (WPC) group did not recognize this as a condition requiring notification. Based on this observation, Facilities developed three additional corrective actions to reinforce the incident reporting requirements.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: Facilities Division

Plant Area: B2-0235

System/Building/Equipment: Building 2 Room 235 Piping System

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

Corrective Action 01:

Target Completion Date: 05/30/2014	Actual Completion Date:
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Facilities management will, through various meetings and presentations, define and re-enforce the requirements, of EMRG-001, to immediately report all incidents. Any division member not in attendance will be required to attend a follow-up meeting presented by their manager. The importance of following this program will be discussed. In each meeting, a Facilities "Safety Meeting Attendance Form" will be completed and

forwarded to Facilities Safety to track completion of this corrective action. (LBNL CATS#9419-1)

Corrective Action 02:

Target Completion Date: 05/30/2014	Actual Completion Date:
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A refresher/reminder on the requirements, of EMRG-001 emergency incident notification, will be given annually. A Facilities "Safety Meeting Attendance Form" will be completed and forwarded to Facilities Safety to track completion of this corrective action. (LBNL CATS#9419-2)

Corrective Action 03:

Target Completion Date: 06/30/2013	Actual Completion Date: 05/21/2013
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EMRG-001 Emergency Incident Notification will be added to the Facilities New Employee Training.(LBNL CATS#9419-3)

Corrective Action 04:

Target Completion Date: 06/30/2013	Actual Completion Date:
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Facilities electricians will conduct a thorough 'Extent of Condition' inspection on all lighting fixtures and related ground wiring in the building. This was accomplished by using appropriate meters to check the integrity of all grounding paths associated with all four floors of corridor lighting fixtures. Additionally, every corridor lighting fixture was visually inspected and checked for voltage between the fixture housing and a known ground. (LBNL CATS#9419-4)

Lessons(s) Learned:

- The consequences of poor workmanship can create serious hazards over time.

HQ Keywords:

- 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
- 01P--Inadequate Conduct of Operations - Inadequate Oral Communication
- 07D--Electrical Systems - Electrical Wiring
- 08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
- 12C--EH Categories - Electrical Safety
- 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On April 5, 2013, a Facilities employee felt a slight tingling in both hands when the plumbing pipe he was holding touched a light fixture housing while installing pipes in Building 2 Room 235. He was not sure if it was an electric shock and did not stop work or report the event to his supervisor. On April 10, the employee told his supervisor about the experience and was advised to report to the LBNL Health Services where he was examined and found not to have sustained any injury from the incident. Electricians discovered that the exterior housing of the light fixture was energized at 277 volt. Facilities personnel have since disconnected and removed all the electrical wiring to that light fixture.

Similar OR Report Number: 1. SC--BSO-LBL-EETD-2007-0001

Facility Manager:

Name	Jennifer Ridgeway
Phone	(510) 486-6339

Title	Division Director
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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
04/10/2013	11:56 (PTZ)	Mary Gross	BSO
04/10/2013	11:56 (PTZ)	Kevin Hartnett	BSO

Authorized Classifier(AC):

11)Report Number: [SC--PNSO-PNNL-PNNLNUCL-2013-0002](#) After 2003 Redesign

Secretarial Office: Science

Lab/Site/Org: Pacific Northwest National Laboratory

Facility Name: PNNL Nuclear Facilities

Subject/Title: Unexpected Discovery of Uncontrolled Electrical Hazardous Energy Source in RPL Lab 209 During Demolition

Date/Time Discovered: 04/22/2013 13:00 (PTZ)

Date/Time Categorized: 04/22/2013 14:20 (PTZ)

Report Type: Final

Report Dates:

Notification	04/24/2013	14:16 (ETZ)
Initial Update	06/05/2013	13:27 (ETZ)
Latest Update	06/19/2013	16:05 (ETZ)
Final	06/19/2013	16:05 (ETZ)

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: A1B3C02 - Design/Engineering Problem; Design / documentation LTA; Design/documentation not up-to-date

ISM: 5) Provide Feedback and Continuous Improvement

Subcontractor Involved: Yes
InterMech

Occurrence Description: On April 22, 2013, at 1045 hours, two subcontractor laborers discovered an unsecured flex conduit in the ceiling space above lab 209 while

removing insulation as part of the Air Handling Unit removal project. The electrical conductors protruding from the flex conduits were not electrically safe. The laborers took the appropriate actions, immediately stopped work, and notified their supervisor.

At 1055 hours, the PNNL Construction Manager arrived on scene and identified a second conduit with a CAUTION tag affixed stating "This flex contains hot wire controlled by the left light switch by hall door..." At 1300 hours, PNNL electricians working under appropriate work authorization and controls, and wearing appropriate PPE, determined that the wiring in both flex conduits were energized. This was considered an unexpected discovery of an uncontrolled electrical hazardous energy source. Based on tags on the conduits, this condition dates back to 1980.

Cause Description:

Apparent Cause: A1B3C02 - Design/Engineering Problem | Design/Documentation LTA | Design / Documentation

The Westinghouse Hanford Corporation, Hanford Engineering Development Laboratory (HEDL), managed the 325 Building from 1970 until 1987. In 1980, WHC staff conducted lighting modifications in lab 209 and at the conclusion of the project, electrical conductors were left protruding from the conduit in two places, abandoned, and the ceiling was enclosed with insulation. At that point, the conductors could no longer be observed when PNNL took over operation of the building in 1987 and remained in this state until the ceiling insulation was removed as part of the RPL Air Handling Unit removal project. During pre-job planning for the April 2013 project, existing drawings and documents were reviewed to identify known electrical conduits. While the conduits were found on the drawing, the abandoned exposed conductors were not. (See corrective action #1.)

Note: the methodology used to determine causal factors is based on apparent causes found in Attachment 5 of DOE O 232.2, Occurrence Reporting & Processing of Operations Information.

Operating Conditions:

Indoors. Dry.

Activity Category:

Construction

Immediate Action(s):

The PNNL electricians placed the conductors in an electrically safe work condition by locking and tagging out the two circuit breakers, installing wire nuts on exposing the ends of the conductors, securing both conduits to junction boxes, and labeling the exterior faceplates to identify the circuit breaker. These actions placed the conductors in a safe configuration. PNNL electrical safety also inspected other areas of the room for exposed wires and ran calculations for an electrical severity score (see Evaluations Section below).

FM Evaluation:

A critique was conducted on Tuesday, April 23, 2013.

The Air Handling Unit removal work was planned in accordance with ADM-016, Work Control Procedure, and documented under the Job Planning Package (JPP) for Service Request S679203.

Processes were followed for conducting Pre-Job briefings and plan of the day briefings. Because the work was being conducted in a 60 year old building, the potential for encountering not-previously-identified hazards was discussed during job planning and during the pre-job briefing, as was the correct response to off-normal conditions. A non-conductive ladder and a non-conductive pole for pulling down insulation were selected due to the potential for finding an unanticipated electrical condition during this specific demolition activity.

Consequently, when the laborers who removed the insulation during the demolition work discovered the first conduit, they took a safety pause and follow the appropriate notification protocol and contacted their supervisor who in turn contacted the appropriate PNNL manager.

Upon discovery of the condition, Subcontractor and PNNL staff responded appropriately to place the area in a safe condition. Appropriate notifications were made to PNNL senior management and the issue was safety addressed by PNNL electricians working under their work control practices.

There were no significant impacts to the project, the facility or the environment. There were no injuries. The electrical severity score for this event (see calculation below) was 20. This is within the 0 - 30 range; which is an "event...that truly did not pose a risk to the worker such as...situations that were planned for in the work control document and the worker was appropriately protected." EFCOG Best Practice #48 R3, Electrical Severity Measurement Tool R3, 5/01/13.

The prior week an energized conductor exiting lab 209 was unexpectedly found behind conduits slated for removal on the exterior of the building. This energized conductor was not scheduled for removal as part of the Air Handling Unit work scope in that its location was not identified on facility drawings. Discovery of this unexpected energy source was not reportable at that time because there was no exposed energy hazard to personnel and proper notifications were made. However, facility personnel failed to recognize that this condition could indicate that other energized conductors may be present in the project workspace. Further detailed electrical inspections at that time could have precluded this occurrence.

Review of Similar Occurrences (see Item 37):

SC--PNSO-PNNL-PNNLNUCL-2009-0001 Conduit Severed by Construction Activity

This 2009 SC-3 occurrence was similar to the 2013-0002 event described above in that the issue of potential unknown electrical hazardous energy was considered during pre-job planning. For the 2009 project, however, the exposure concern was through a planned blind penetration. The 2013 project had no such plans. Precautions were taken to protect workers from contacting electrical energy and those provisions were successful.

Results of the Electrical Severity calculations for this event:

$$(EHF)*[(1+EF+SPF+AFPF+TPF)*IF]=ES$$

EHF (Electrical Hazard Factor) = 10

EF (Environmental Factor) = 0

SPF (Shock Proximity Factor) = 1

AFPF (Arc Flash Proximity Factor) = 0

TPF (Thermal Proximity Factor) = 0

IF (Injury Factor) = 1

$$(10)*[(1+0+1+0+0)*1] = 20 \text{ Low Severity}$$

PNSO Facility Representative Comments (for SC-3 only)

The PNSO FR (TH Davies) approved the Final report contingent on revisions to the sixth paragraph of the Evaluation Section (as modified above). 6/18/13

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: Nuclear & Operations Div/ Operational Systems Dir

Plant Area: 300 Area

System/Building/Equipment: RPL Facility (325 Bldg)

Facility Function: Laboratory - Research & Development

Corrective Action 01:

Target Completion Date: 10/04/2013	Tracking ID: ITS # E-00634-001
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Review key electrical drawings associated with room 209 and update as appropriate.

Lessons(s) Learned: At pre-job meetings, discuss the possibility that previously unidentified hazards could be discovered during the work. And, that if unidentified hazards are discovered, workers are to take a safety pause and contact their supervisor. For this particular job, the possibility of unidentified hazards was discussed and the workers did take all the appropriate actions when an unidentified hazard was found. Their actions demonstrate the value of pre-job meetings.

HQ Keywords: 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
 01Q--Inadequate Conduct of Operations - Personnel error
 11G--Other - Subcontractor
 12C--EH Categories - Electrical Safety
 14E--Quality Assurance - Work Process Deficiency

HQ Summary: On April 23, 2013, three construction craft discovered two unsecured flex conduits that contained two 120-volt conductors in the ceiling space above lab 209 while removing fiberglass insulation. The laborers immediately stopped work and notified their supervisor. PNNL electricians determined that the conductors in the flex conduit were energized. The electricians implemented LOTO and secured the conductors. Electrical severity was calculated as 20 - low severity.

Similar OR Report Number: 1. SC--PNSO-PNNL-PNNLNUCL-2009-0001

Facility Manager:

Name	Kerschner, H. F.
Phone	(509) 375-5345
Title	Manager, Radiochemical Processing Laboratory

Originator:

Name	Pollari, Roger Allen
Phone	(509) 371-7700
Title	EVENT REPORTING PROGRAM MANAGER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
04/22/2013	14:20 (PTZ)	Davies, T	PNSO

Authorized Classifier(AC): Pollari, R. A. Date: 06/19/2013

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