



Office of Health, Safety and Security

Monthly Analysis of Electrical Safety Occurrences



September 2012

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 14 in August to 10 in September. This is the second month in a row in which the number of occurrences has decreased across the DOE complex; however, the number of electrical shocks increased from one in August to six occurrences. The number of electrical intrusion occurrences decreased from five in August to one occurrence, which involved contact with an overhead power line. Also, the number of lockout/tagout occurrences decreased from six to two while worker hazards identification was negatively impacted by the electrical intrusion occurrence and the increase in electrical shocks.

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 June occurrence reports is provided in Attachment 2.

Electrical Shock

There were six reported electrical shocks in the month of September, which is an increase from the one occurrence reported in August. Two of these shocks resulted from unplugging power cords from outlets.

1. A post-doc experienced a minor shock when he grazed his left arm against a clamp on a metal mounting rod while moving the tip of an ultrasonicator, and then sustained a second shock to his right hand as he removed his sample from the holder clamped to the rod. The ultrasonicator and tip were properly grounded but a mixer, also mounted to the rod, was had an intermittent resistive connection from line voltage to the equipment mounting

bracket. Subsequent inspection of the mixer found that it had no Nationally Recognized Testing Laboratory listing or was it approved for use.

2. Two electricians felt a tingle while installing a new grill/oven in a cafeteria kitchen. An electrical safety officer reported that the shock was caused by a short of one of the three phases of the 480 volts to the grill, measuring approximately 50 volts to ground.
3. A computer support unit employee felt a shock to their right middle finger and thumb while unplugging a computer speaker power cord from a power strip when setting up a computer system for a customer. An electrical safety SME noted that the power strip was UL listed and that a continuity test revealed no defects.
4. A controls subcontractor received an electrical shock between the fingers on the right hand when he installed a jumper between modules in a controls cabinet. The voltage at the time of the event was 206 volts although the voltage to the controls cabinet was designed for 24 volts; the cause of the 206 volts is under investigation.
5. A laboratory employee experienced a minor electric shock while attempting to unplug her laptop power supply from a 120-VAC multi-outlet power strip. She experienced a minor electric shock when her finger inadvertently touched the metal prong that was still partially inserted in the outlet.

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 shocks per month.

Figure 1 – Three-Year Trend of Electrical Shocks

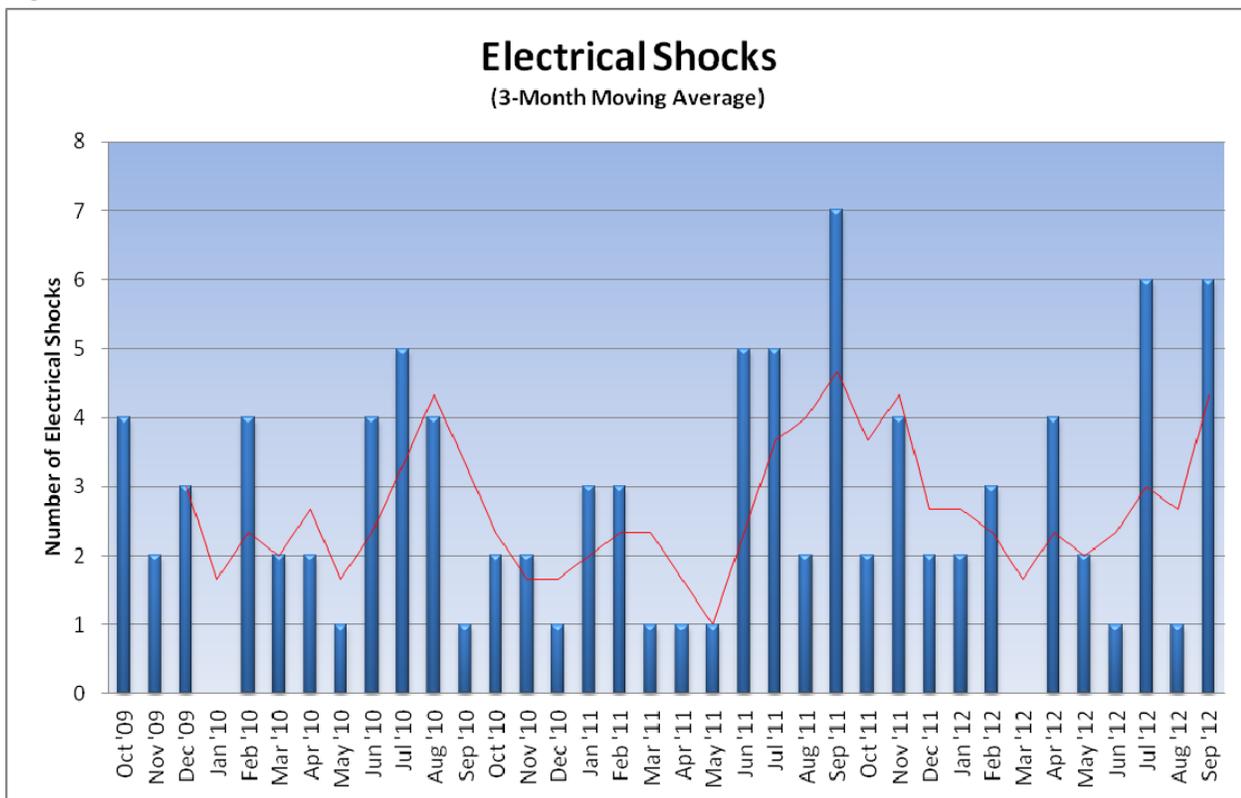


Figure 2 shows electrical shocks by worker type. The majority of shocks (about 75 percent) involve non-electrical workers.

Figure 2 - Electrical Shock by Worker Type

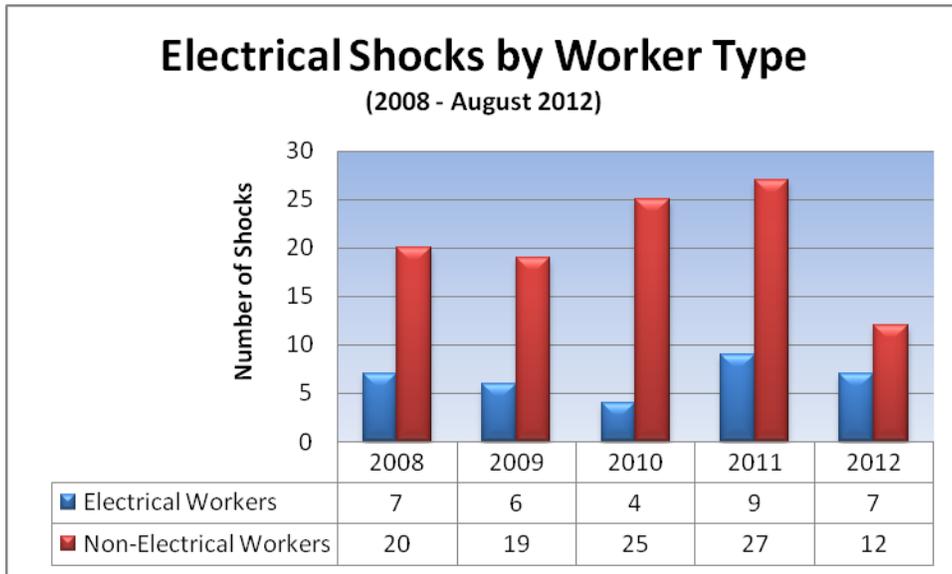
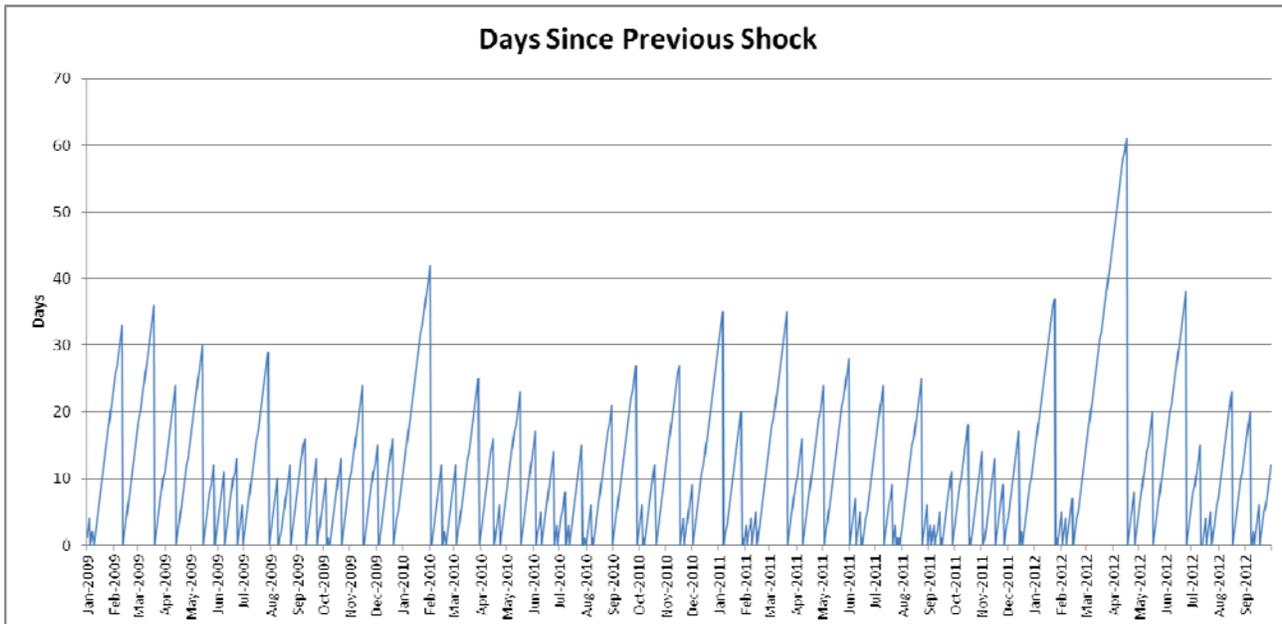


Figure 3 shows the number of days since the previous electrical shock for the DOE complex. The longest interval was 61 days (April 16, 2012) and the present interval is 12 days as of September 30.

Figure 3 - Days since Previous Shock



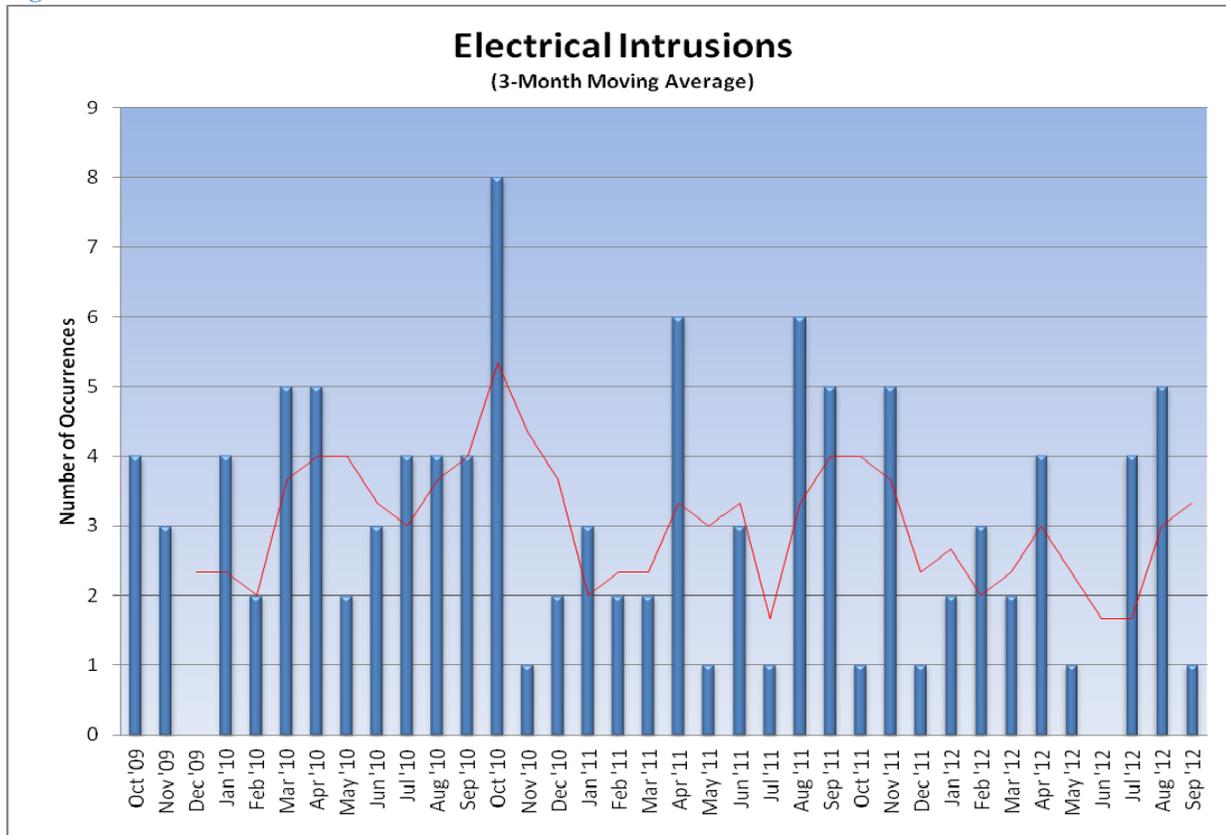
Electrical Intrusion

In September, the number of electrical intrusion occurrences (i.e., cutting/penetrating, excavating, or vehicle/equipment contact of overhead electrical conductors) decreased from

five in August to one. In this occurrence, an excavator hit a de-energized overhead electrical line while the equipment operator was repositioning the excavator to install an attachment onto the end of the boom arm. The operator was moving the excavator towards the rising sun and as a result, neither the operator nor the spotter saw the overhead line. The 480-volt overhead line was at a height of 30 feet and supplies power for the parking lot lighting. This lighting circuit is controlled from a central location by a photo cell. The insulated power line was not damaged.

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

Figure 4 – Three-Year Trend of Electrical Intrusion Occurrences



Hazardous Energy Control

In September there were two reported occurrences involving lockout/tagout (LOTO), which is a decrease six occurrences reported in August. Failure to hang locks and tags and following hazardous energy control procedures is a recurring problem. These events are summarized in the following sections.

Occurrences Involving Lockout/Tagout

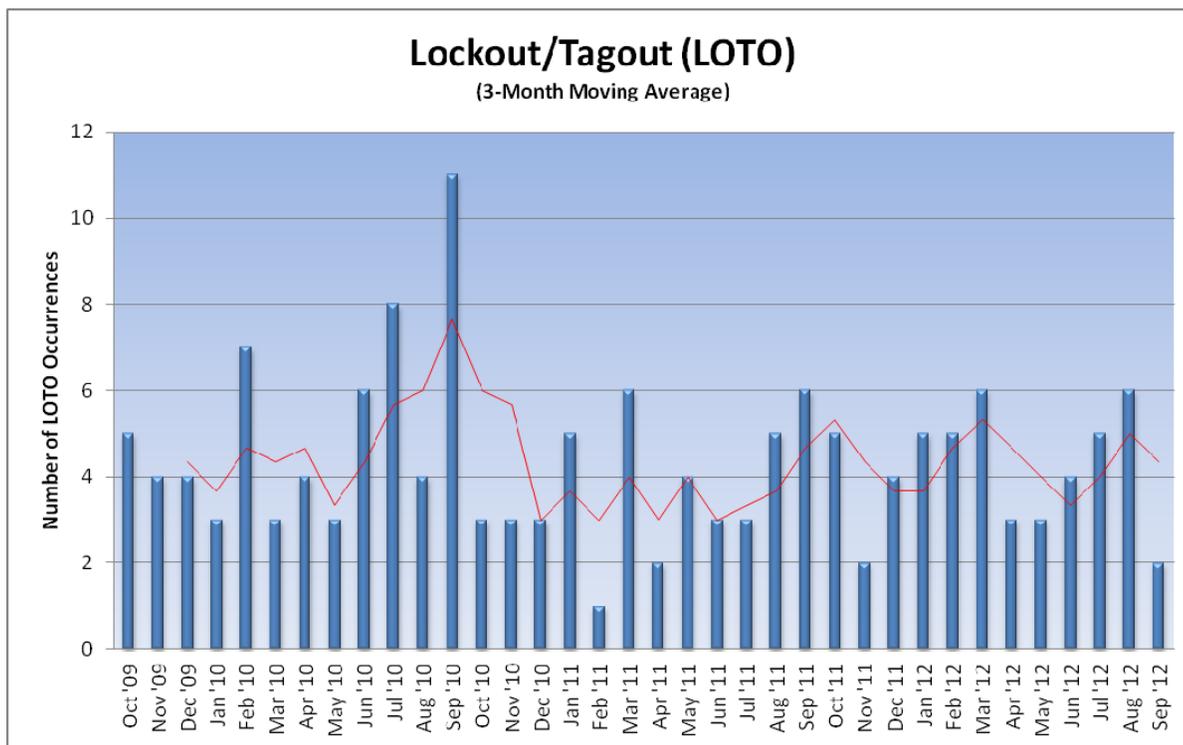
1. A service vendor operated a pump on/off switch, a system electrical disconnect, and ran new wiring into a panel/junction box without following LOTO procedures while working to replace the high water float switch for the demineralized water system. The facility

manager discovered that two other electrical panels had been accessed and that a circuit breaker had been placed in the off position. A fact finding meeting was held.

2. A worker opened the 480-volt disconnect to an air compressor, removed the disconnect cover, and verified zero energy without performing required LOTO and without wearing proper personnel protective equipment. The worker then opened the panels to the interior of the air compressor to allow measurements to be taken on de-energized circuits. Work on this activity was paused.

Figure 5 shows a 3-year trend of LOTO occurrences for the DOE complex. Although there was an increase in the number of occurrences since June, a large drop occurred September. The monthly average is 4.3 occurrences.

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



Occurrences Involving Hazardous Energy Control Procedure Non-Compliances

1. A field engineer provided the wrong personal protection equipment (PPE) values during the development of safe condition checks (SCC) for two work packages. One of the work packages was checked out and completed by a crew of electricians on September 14; however, after other electricians had completed the other work package, they identified differing PPE use between the SCCs in both work packages and informed management about the concern. The field engineer did not use the Hazardous Risk Category table in the procedure for the incident energy value for the SCC form in the first work package. During both SCCs energy sources were isolated using LOTO and no workers were exposed to hazardous energy.

- An electrician turned off a circuit breaker to a heating, ventilation, and air conditioning (HVAC) unit without proper personal protective equipment. The event took place during a "Take Cover" drill when the building warden asked if someone was qualified to turn off the HVAC system. The electrician put on his gloves, safety glasses, and hardhat, walked over and turned off the HVAC system from inside the circuit panel. The warden had attempted to inform the electrician that this was a simulated activity; however, because of the noise in the room, the electrician only heard the command to shut the HVAC off and performed the task. The electrician was not wearing a long sleeve shirt for protection as required by procedure when he operated the circuit breaker.

Electrical Near Miss

In September, there were two occurrences that were considered to be an electrical near miss, which is a decrease from the seven occurrences last month. One of these occurrences was discussed in the Electrical Intrusions section and the other was discussed in the Electrical Shocks section as occurrence number 2.

Monthly Occurrences Tables

Table 1 shows a breakdown of the outcomes, performance issues, and worker types associated with the electrical safety occurrences for September 2012.

Table 1 - Breakdown of Electrical Occurrences

Number of Occurrences	Involving:	Last Month
6	Electrical Shocks	1
0	Electrical Burns	0
2	Hazardous Energy Control (LOTO)	6
2	Inadequate Job Planning	2
0	Inadvertent Drilling/Cutting of Electrical Conductors	4
0	Excavation of Electrical Conductors	1
1	Vehicle Intrusion of Electrical Conductors or Equipment	0
2	Electrical Near Misses	7
6	Electrical Workers	5
4	Non-Electrical Workers	9
2	Subcontractors	7

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 (10 reports), 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

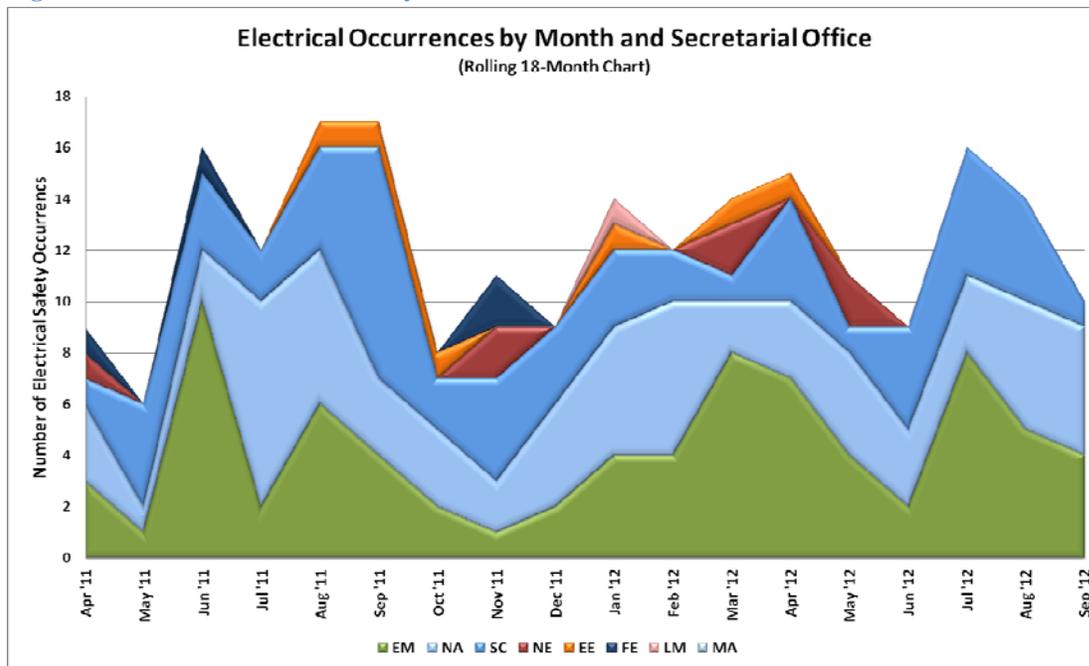
Table 2 provides a summary of the electrical safety occurrences for CY 2012. The present monthly average decreased from last month's value of 13.1/month. The average number of occurrences a year ago (September 2011) was 11.9/month.

Table 2 - Summary of Electrical Occurrences

Period	Electrical Safety Occurrences	Shocks	Burns	Fatalities
September	10	6	0	0
August	14	1	0	0
July	16	6	0	0
June	9	1	0	0
May	11	2	1	0
April	15	4	0	0
March	14	0	0	0
February	12	3	0	0
January	14	2	0	0
2012 total	115 (avg. 12.7/month)	25	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

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 Revision 2 of 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 ten occurrences are classified as shown in Table 3. The actual score for each occurrence is provided in Attachment 1.

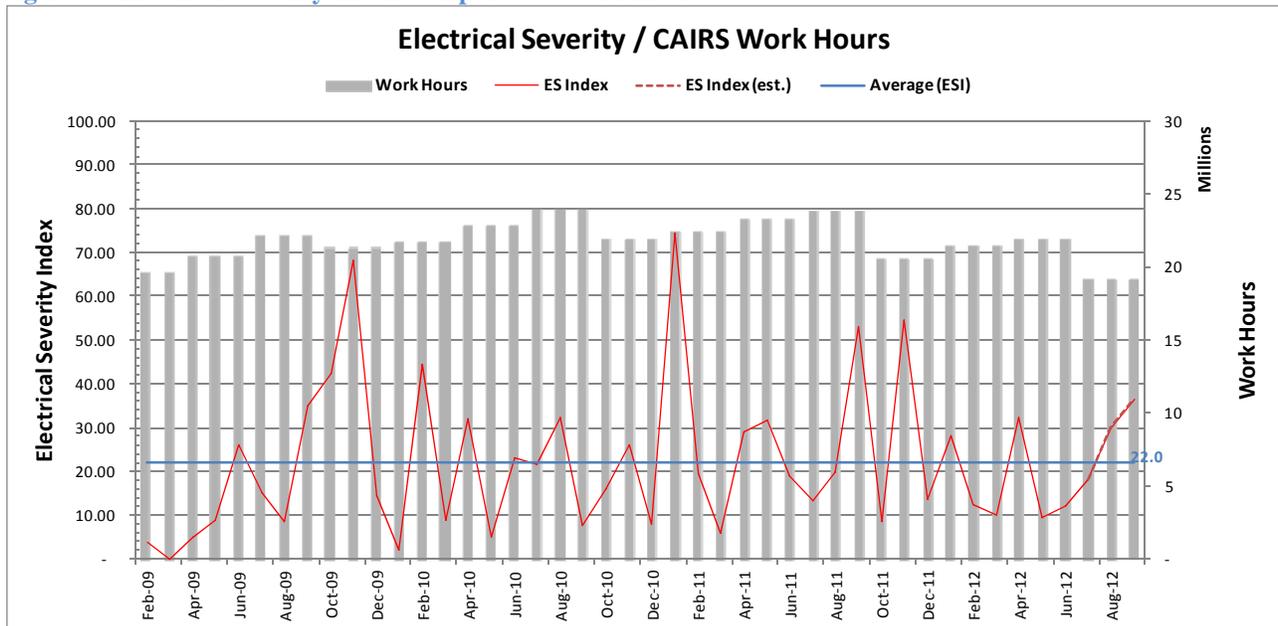
Table 3 – Classification of Electrical Safety Occurrences by ES Score

Occurrence Classification	Electrical Severity Score	Number of Occurrences
HIGH	≥ 1750	0
MEDIUM	31-1749	9
LOW	1-30	1

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

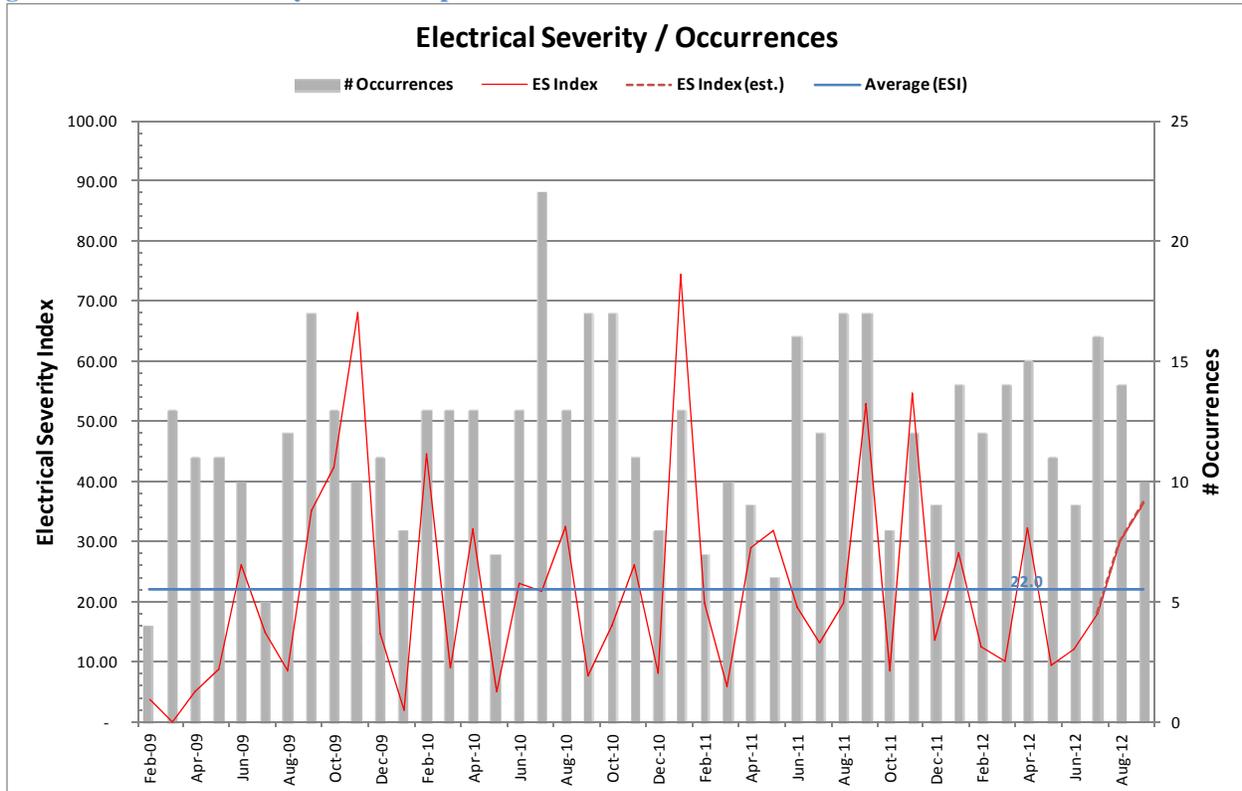
Category	August	September	Δ
Total Occurrences	14	10	-4
Total Electrical Severity	2,880	3,500	+620
Estimated Work Hours	19,173,333* (21,070,250)	19,173,333	0
ES Index	30.04* (27.34)	36.51	+6.47
Average ESI	21.6	22.0	+0.4

* These are estimated CAIRS work hours for August and ES Index based on the estimated hours. The estimated hours and ES Index based on the estimated hours (as reported in August) 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 (22.0) has increased slightly from last month. 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 516 days as of September 30. The previous longest interval was 181 days in 2009.

Figure 9 - Days since Previous High Severity Occurrence

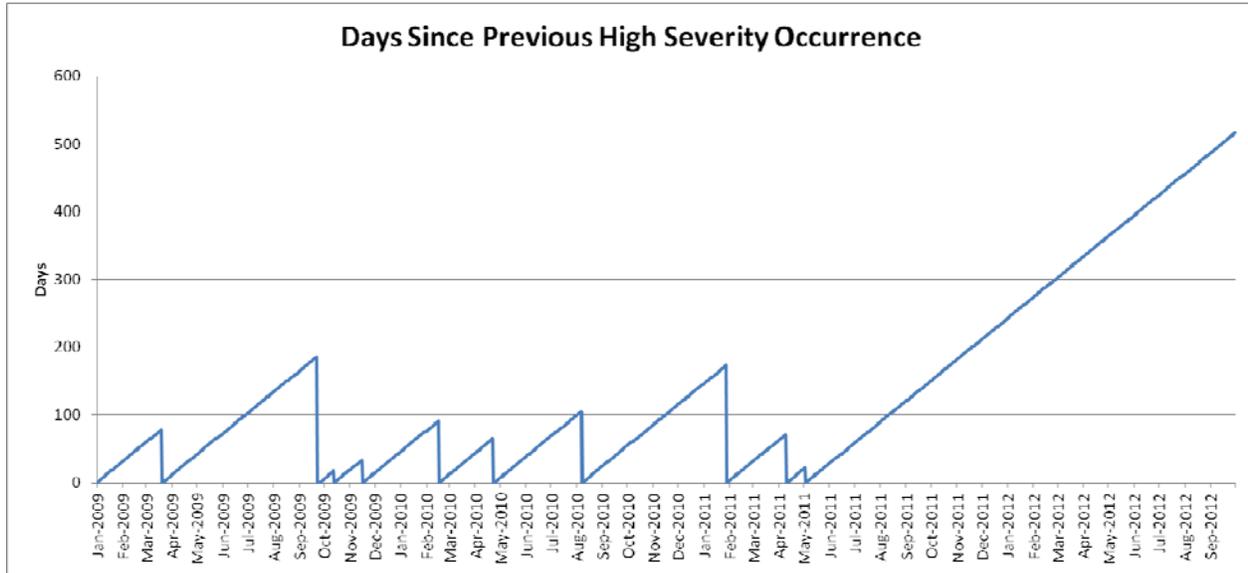
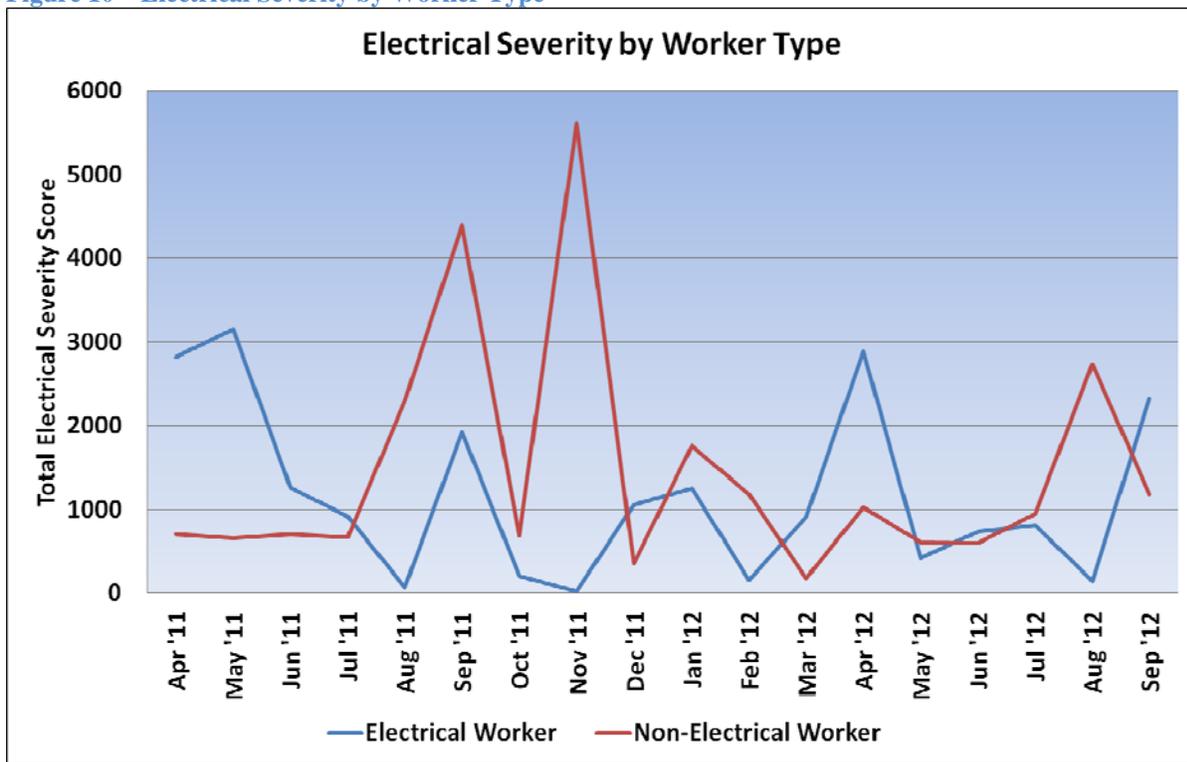


Figure 10 shows the total electrical severity score by worker type for each month.

Figure 10 – Electrical Severity by Worker Type



Electrical workers typically have the fewest number of occurrences but in September they had the majority of the occurrences and the higher total ES score (2,320), while non-electrical workers ES scores totaled 1,180. The average ES scores for the 18 month period are 1,227 for electrical workers and 1,464 for non-electrical workers. Note: Electrical workers had two high severity events in April and May 2011.

Summary of Occurrences by Severity Band

For the interval September 2011 through September 2012 (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)

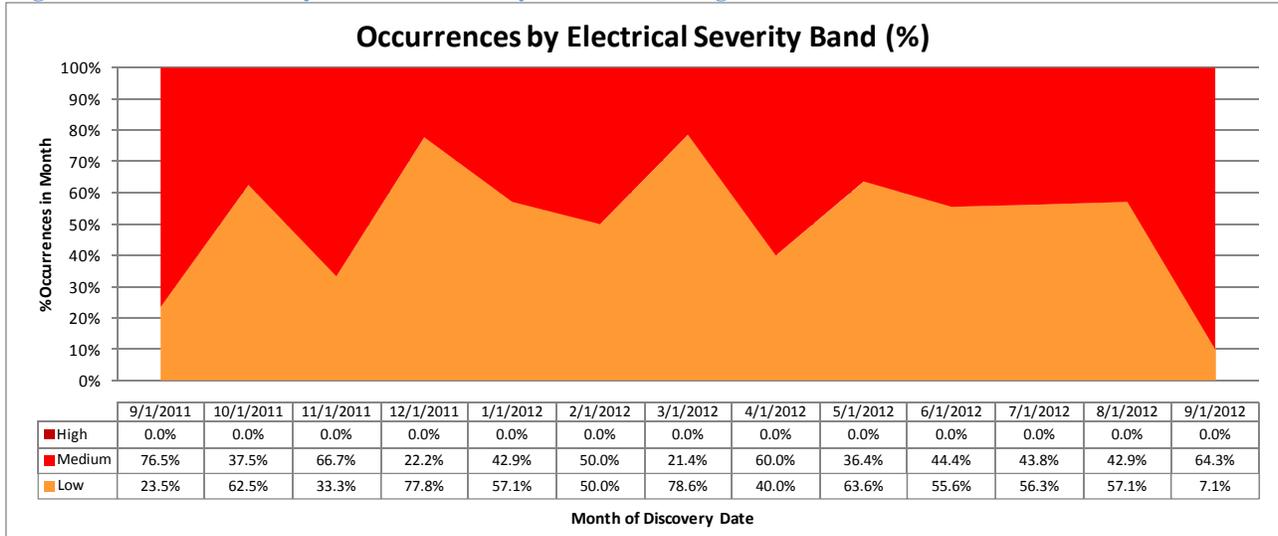
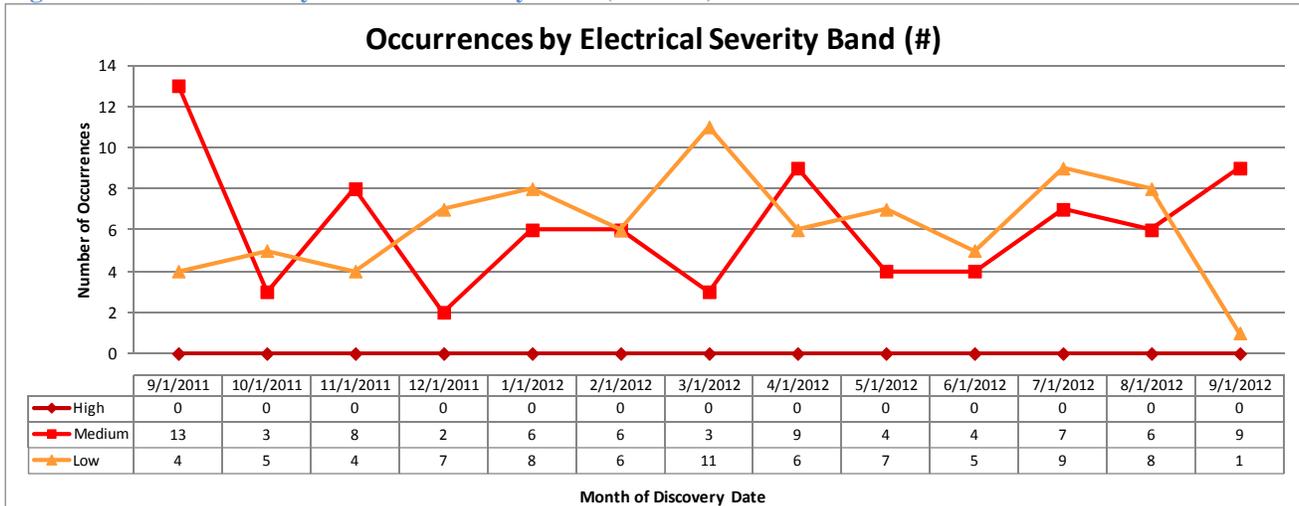


Figure 12 - Occurrences by Electrical Severity Band (Number)

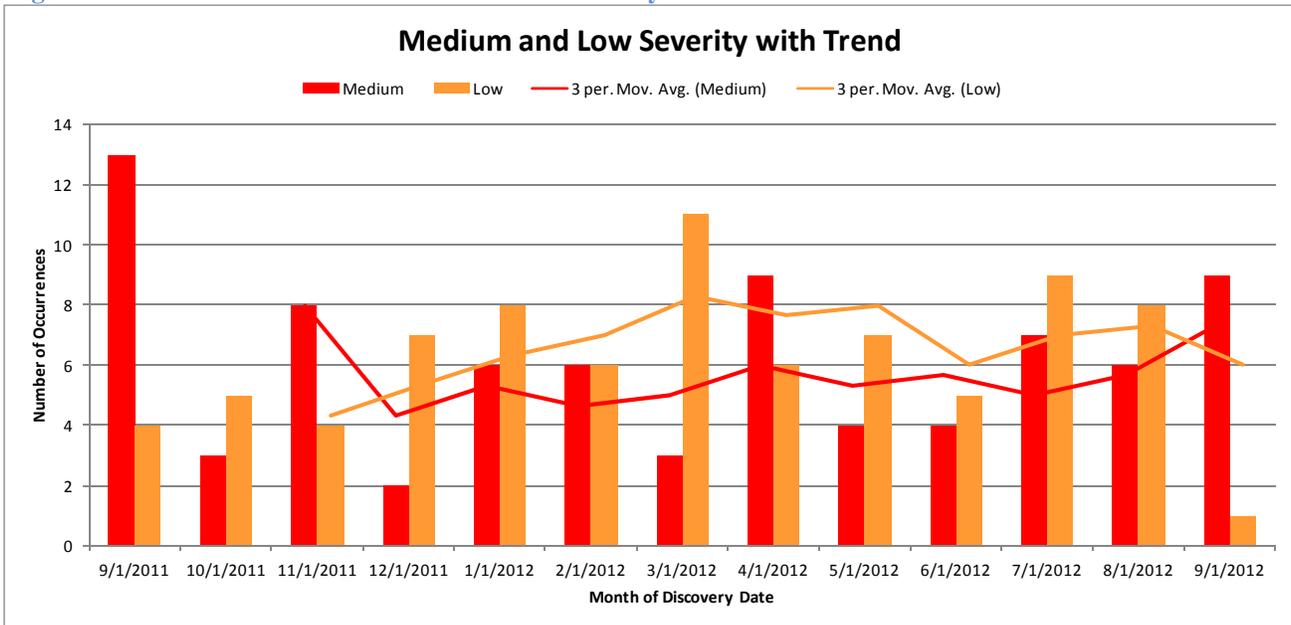


What can be seen from the previous two charts is that the number of occurrences with High electrical severity scores has remained at zero for the past 14 months and that the number of occurrences with Medium scores increased as the number of Low and zero severity occurrences decreased.

Medium and Low Severity with Trend

Figure 13 focuses on the Medium and Low severity data series for September 2011 through September 2012. Trend lines are included for each, using a 3-month moving average.

Figure 13 - Trend of Medium and Low Electrical Severity Occurrences



The 3-month moving average shows an increasing trend for Medium severity occurrences and a decreasing trend for Low severity occurrences. A higher percentage of Low severity occurrences is preferred.

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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Office of Analysis, HS-24

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Email: glenn.searfoss@hq.doe.gov

Attachment 1

Electrical Safety Occurrences – September 2012

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	EM--PPPO-FBP-PORTSDD-2012-0022	An excavator boom hit a de-energized overhead 480V line for parking lot lighting.								X	3	10(3)	100
2	EM-ORO--UCOR-X10ENVRES-2012-0002	A service vendor operated an electrical disconnect and ran new wiring into a junction box without following LOTO procedures.				X	X				4	2E(3)	10
3	EM-RP--BNRP-RPPWTP-2012-0023	Engineer uses wrong energy values for PPE use and electrician performs zero energy check on 277V.					X				4	2E(3)	550
4	EM-RP--BNRP-RPPWTP-2012-0024	An electrician opened a 240V circuit breaker to an HVAC unit without proper PPE.									4	2E(3)	50
5	NA--LASO-LANL-HEMACHPRES-2012-0006	A worker opened a 480V disconnect and verified zero energy on the line side out by removing the disconnect cover without a LOTO and proper PPE.				X					2	2E(3), 10(2)	1050
6	NA--LASO-LANL-MATSCCMPLX-2012-0002	A post-doc experienced a minor shock when he grazed his left arm against a clamp on a metal mounting rod.	X								2	2E(1)	330
7	NA--LASO-LANL-TA55-2012-0030	Two electricians felt a tingle while installing a new grill/oven in a cafeteria kitchen from a short on one of the three phases.	XX								2	2E(1)	330
8	NA--SS-SNL-9000-2012-0001	An employee felt a shock to their right middle finger and thumb as they unplugged a computer speaker power cord from a power strip.	X								2	2E(1)	330

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⁾
9	NA--SS-SNL-NMFAC-2012-0005	A controls subcontractor received a shock between the fingers on the right hand when he installed a jumper in a controls cabinet.	X								2	2E(1)	330
10	SC--BSO-LBL-GN-2012-0001	An employee experienced a minor shock while attempting to unplug her laptop power supply from a 120V multi-outlet power strip.	X								2	2E(1)	420
	TOTAL		6	0	0	2	2	0	0	1			

Note: Although there were five “events” reporting electrical shocks this month, event No. 7 had two separate incidents.

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

Electrical Safety Occurrences – September 2012

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			
1	EM--PPPO-FBP-PORTSDD-2012-0022	An excavator boom hit a de-energized overhead 480V line for parking lot lighting.				X					X			X
2	EM-ORO--UCOR-X10ENVRES-2012-0002	A service vendor operated an electrical disconnect and ran new wiring into a junction box without following LOTO procedures.	X		X						X			
3	EM-RP--BNRP-RPPWTP-2012-0023	Engineer uses wrong energy values for PPE use and electrician performs zero energy check on 277V.	X			X		X	X		X			
4	EM-RP--BNRP-RPPWTP-2012-0024	An electrician opened a 240V circuit breaker to an HVAC unit without proper PPE.	X			X		X	X		X			
5	NA--LASO-LANL-HEMACHPRES-2012-0006	A worker opened a 480V disconnect and verified zero energy on the line side out by removing the disconnect cover without a LOTO and proper PPE.	X			X		X	X		X			
6	NA--LASO-LANL-MATSCCMPLX-2012-0002	A post-doc experienced a minor shock when he grazed his left arm against a clamp on a metal mounting rod.		X		X					X			
7	NA--LASO-LANL-TA55-2012-0030	Two electricians felt a tingle while installing a new grill/oven in a cafeteria kitchen from a short on one of the three phases.	X			X					X			X
8	NA--SS-SNL-9000-2012-0001	An employee felt a shock to their right middle finger and thumb as they unplugged a computer speaker power cord from a power strip.				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			
9	NA--SS-SNL-NMFAC-2012-0005	A controls subcontractor received a shock between the fingers on the right hand when he installed a jumper in a controls cabinet.	X		X	X					X			
10	SC--BSO-LBL-GN-2012-0001	An employee experienced a minor shock while attempting to unplug her laptop power supply from a 120V multi-outlet power strip.				X					X			
	TOTAL		6 X	4	2	6	4	3	3	0	10	0	0	2

Key

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

ORPS Operating Experience Report

ORPS contains 55859 OR(s) with 59169 occurrences(s) as of 10/11/2012 11:27:26 AM
 Query selected 10 OR(s) with 10 occurrences(s) as of 10/11/2012 11:39:31 AM

Download this report in Microsoft Word format. 

1)Report Number: [EM--PPPO-FBP-PORTSDD-2012-0022](#) After 2003 Redesign
Secretarial Office: Environmental Management
Lab/Site/Org: Portsmouth Gaseous Diffusion Plant
Facility Name: Portsmouth Decontamination and Decommissioning
Subject/Title: Near Miss - Excavator Arm/Boom Contacts De-energized Overhead Power Line

Date/Time Discovered: 09/13/2012 08:00 (ETZ)

Date/Time Categorized: 09/13/2012 13:57 (ETZ)

Report Type: Notification

Report Dates:

Notification	09/17/2012	15:56 (ETZ)
Initial Update		
Latest Update		
Final		

Significance Category: 3

Reporting Criteria: 10(3) - A near miss to an otherwise ORPS reportable event, where something physically happened that was unexpected or unintended, or where no or only one barrier prevented an event from having a reportable consequence.
 The significance category assigned to the near miss must be based on an evaluation of the potential risks and extent of personnel exposure to the hazard. (1 of 3 criteria - This is a SC 3 occurrence)

Cause Codes:

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

Subcontractor Involved: Yes
 Company Wrench and LVI

Occurrence Description: At approximately 0800 hours on September 13, 2012 an excavator contacted a de-energized overhead electrical line in the X 206B South Main Parking Lot. The excavator was being repositioned to install an attachment onto the end of its boom arm. The operator was moving the excavator towards the rising sun and as a result, neither the operator nor the spotter saw the overhead line.

The overhead line normally carries 480 volt electricity and is used to

supply power for parking lot lighting. This lighting circuit (including the overhead line that was contacted) is controlled from a central location by a photovoltaic cell. The photovoltaic cell senses the amount of ambient daylight present and turns the parking lot lights on at night and off during the day. It was during the daylight hours when the excavator made contact with the overhead line and as a result there was no current present. This event was classified as a near-miss because the power had not been de-energized using a hazardous energy control process.

Cause Description:

Operating Conditions:

Normal Operations

Activity Category:

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

Immediate Action(s):

- The Plant Shift Superintendent (PSS) was notified that an excavator made contact with an overhead power line.
- Work in the immediate vicinity of the overhead line was paused.
- The PSS entered Incident Command System to obtain resources and take immediate actions at the scene.
- Power Engineering authorized Front Line Manager (FLM) to isolate power supply, terminate line connection (remove the overhead line) and restore power supply to remainder of parking lot.
- A Problem Report was initiated.
- FBP Management, Performance Assurance, Plant Shift Superintendent and the on-site DOE Facility Rep were notified.
- A Fact Finding meeting was held.
- An Occurrence Report was initiated.

FM Evaluation:

An internal investigation will be conducted and corrective actions developed.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

Facility D&D

Plant Area:

G5

System/Building/Equipment: X-206B South Main Parking Lot, Long Reach Excavator

Facility Function:

Environmental Restoration Operations

Corrective Action:

Lessons(s) Learned:

HQ Keywords:

- 01N--Inadequate Conduct of Operations - Inadequate Job Planning (Other)
- 08F--OSHA Reportable/Industrial Hygiene - Industrial Operations Issues
- 08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
- 08J--OSHA Reportable/Industrial Hygiene - Near Miss (Electrical)

12K--EH Categories - Near Miss (Could have been a serious injury or fatality)

14E--Quality Assurance - Work Process Deficiency

14G--Quality Assurance - Procurement Deficiency

HQ Summary:

On September 13, 2012, during repositioning of an excavator by the operator, the excavator contacted a de-energized overhead electrical line. The excavator was being repositioned to install an attachment onto the end of its boom arm. The operator was moving the excavator towards the rising sun and as a result, neither the operator nor the spotter saw the overhead line. The 480-volt overhead line supplies power for the parking lot lighting. Personnel isolated the power supply and removed the overhead line. Appropriate notifications were made and a Fact Finding meeting was held.

Similar OR Report Number:

Facility Manager:

Name	Dennis Carr
Phone	(740) 897-3532
Title	Fluor-B&W/Portsmouth Program Mgr.

Originator:

Name	BOOK, JACKIE
Phone	(740) 897-2569
Title	QUALITY PROGRAMS COORDINATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/13/2012	15:18 (ETZ)	Dennis Carr	PORTSFBP
09/13/2012	15:20 (ETZ)	Bob Nichols	PORTSFBP
09/13/2012	15:49 (ETZ)	Dee Powell	DOEPORTS

Authorized Classifier(AC): Doug Fogel Date: 09/17/2012

2)Report Number: [EM-ORO--UCOR-X10ENVRES-2012-0002](#) **After 2003 Redesign**

Secretarial Office: Environmental Management

Lab/Site/Org: Oak Ridge National Laboratory

Facility Name: Melton Valley Closure Project

Subject/Title: Failure to follow hazardous energy control

Date/Time Discovered: 09/27/2012 10:30 (ETZ)

Date/Time Categorized: 10/01/2012 12:00 (ETZ)

Report Type: Notification/Final

Report Dates:	Notification	10/03/2012	11:06 (ETZ)
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Initial Update	10/03/2012	11:06 (ETZ)
Latest Update	10/03/2012	11:06 (ETZ)
Final	10/03/2012	11:06 (ETZ)

Significance Category: 4

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

Cause Codes:

ISM: 1) Define the Scope of Work

Subcontractor Involved: Yes

Water Professionals

Occurrence Description: On Thursday September 27, 2012 at approximately 1030 hours, a service vendor entered Building 3042 to replace the high water float switch for the demineralized water system. The Facility Manager (FM) conducted a Safety Task Analysis Risk Reduction Talk (STARRT) card briefing prior to the vendor starting work.

While the FM was energizing the facility lighting and out of sight of the vendor, the vendor operated the pump on/off switch to determine if the pump system was de-energized. Upon return to the worksite, the FM discovered the vendor had operated the system electrical disconnect and the pump was still not de-energized. When the electrical disconnect did not de-energize the pump, the FM realized the full scope of work had not been identified to include electrical work and stopped work.

The FM left the Facility to summon Energy Solutions (ES) electricians and supervision for assistance in assessing the system conditions. Upon returning to the facility with electricians (1045 hours), the FM discovered that two other electrical panels had been accessed and a breaker had been placed in the off position. After verifying the system was in a safe condition, it was determined that work could not proceed without further hazardous energy controls. The FM notified his Manager of the events and was instructed to leave the equipment in a safe configuration and gather all personnel for a fact finding. The electricians identified the correct energy source and a lockout was installed.

On Monday, October 1, 2012, an electrician who was unable to attend the Fact Finding, delivered his personal statement to Supervision. Upon review of the personal statement, Management conducted a walk down of the system with the FM and the ES Maintenance Manager and determined the vendor had run new wiring into a panel / junction box but had not landed the wiring or disconnected any existing wiring.

At 1200 hours notifications were made that work had failed to follow

prescribed hazardous energy control process.

Cause Description:

Operating Conditions:

: The water system was in the shut down mode and the 3042 facility was in stand-by Surveillance and Maintenance (S&M) awaiting D&D.

Activity Category:

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

Immediate Action(s):

The Facility Manager stopped work, summoned electricians and supervisors to the work site for assistance in assessing the work conditions. It was determined that a lockout/tagout (LO/TO) was needed and put in place. A fact finding meeting was conducted by the ORNL S&M Site Manager and fact sheet/time line prepared by the FM outlining the events that led up to the event.

Due to the nature of the issue, a standing order for S&M project was issued that requires supervision of vendor activities until further notice. A company-wide review is being performed.

FM Evaluation:

There was not any personal injury or exposure to hazardous electrical energy at the time the work was stopped. No equipment damage or environmental release occurred during the work activities.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

ORNL S&M Operations

Plant Area:

3042

System/Building/Equipment:

Building 3042

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

HQ Summary:

On September 27, 2012, a service vendor operated a pump on/off switch, system electrical disconnect and ran new wiring into a panel/junction box

without following prescribed hazardous electrical energy control procedures while working to replace the high water float switch for the demineralized water system in Building 3042. The subcontractor performed some of these activities while the Facility Manager (FM) was out of sight or out of the building seeking assistance to assess system conditions. The FM discovered that two other electrical panels had been accessed and a breaker had been placed in the off position. After verifying the system was in a safe condition, the FM realized the full scope of work had not been identified to include electrical work and stopped work. Management was notified and a fact finding meeting was held.

Similar OR Report Number:

Facility Manager:

Name	B. Howard
Phone	(865) 576-6314
Title	Facility Manager

Originator:

Name	HOLOWCZAK, MARK S
Phone	(865) 574-3611
Title	ENFORCEMENT COORDINATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/27/2012	12:30 (ETZ)	C. Wright	DOE FR

Authorized Classifier(AC): D. Smith Date: 10/02/2012

3)Report Number: [EM-RP--BNRP-RPPWTP-2012-0023](#) **After 2003 Redesign**

Secretarial Office: Environmental Management

Lab/Site/Org: Hanford Site

Facility Name: RPP Waste Treatment Plant

Subject/Title: Employee uses improper energy values for PPE use.

Date/Time Discovered: 09/20/2012 13:00 (PTZ)

Date/Time Categorized: 09/20/2012 13:30 (PTZ)

Report Type: Notification/Final

Report Dates:

Notification	09/25/2012	15:30 (ETZ)
Initial Update	09/25/2012	15:30 (ETZ)
Latest Update	09/25/2012	15:30 (ETZ)
Final	09/25/2012	15:30 (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: A3B1C04 - Human Performance Less Than Adequate (LTA); Skill Based Errors; Infrequently performed steps are performed incorrectly
-->couplet - A4B4C10 - Management Problem; Supervisory Methods LTA; Assignment did not consider effects of worker's previous task

ISM: 3) Develop and Implement Hazard Controls

Subcontractor Involved: No

Occurrence Description: A Field Engineer (FE) provided the wrong personal protection equipment (PPE) values during the development of two Safe Condition Checks (SCC).

On 9/6/2012, an FE wrote an SCC for work package 00 and another SCC on 9/13/2012 for work package 01. Work package 00 was checked out and completed by a crew of electricians in the Low Activity Waste (LAW) building on 9/14/2012. The electricians checked out and completed work package 01 when they identified differing PPE use between the SCC's in work packages 00 and 01. They informed their management staff about the concern.

During a post review of the work, the field engineer (FE) wrote the incident energy value on the SCC form in work package 00 to establish PPE use and did not use the Hazardous Risk Category (HRC) table from the procedure. During the work activity, the electrical crew used a conservative level of PPE not directed by the SCC and were protected.

In work package 01, the FE used the HRC tables after receiving guidance from supervision, and selected the wrong level of PPE. The crew performed the SCC wearing hardhat, safety glasses, and leather gloves. This level of PPE was inadequate for the work activity.

During both SCC's the energy source was isolated using Lockout/tagout and at no time were the workers exposed to hazardous energy.

The methods used for selecting PPE were less than adequate.

Cause Description: A3B1C04 - Infrequently performed steps were performed incorrectly.
Definition - An individual was not completely familiar with the tasks required based on not frequently performing the tasks and not operating at a fluency level.
Rationale - The employee's primary task was the installation of cable tray and conduit. Neither of those activities was related to lockout/tagout during that time.

A4B4C10- Assignment did not consider effects of workers previous task.

Definition - Supervision failed to assess the incompatibility between workers ingrained work patterns and necessary work patterns for successful completion of the current task.

Rationale - Employee was tasked with cable tray and conduit installation in the Pretreatment (PT). The employee was recently transferred to the LAW facility where responsibilities now include LOTO packages.

Operating Conditions: Construction

Activity Category: Construction

Immediate Action(s): All lockout/tagout packages in the field and in PDC were analyzed for any further Safe Condition Check discrepancies.

FM Evaluation: N/A

DOE Facility Representative Input:

DOE Program Manager Input:

Further Evaluation is Required: No

Division or Project: Waste Treatment Plant

Plant Area: 600

System/Building/Equipment: LAW

Facility Function: Nuclear Waste Operations/Disposal

Corrective Action:

Lessons(s) Learned: N/A

HQ Keywords: 01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
 01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
 01M--Inadequate Conduct of Operations - Inadequate Job Planning (Electrical)
 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 September 6, 2012, a field engineer provided the wrong personal protection equipment (PPE) values during the development of Safe Condition Checks (SCC) for Work Package 00 and Work Package 01. Work Package 00 was checked out and completed by a crew of electricians on September 14. After the electricians completed Work Package 01, they identified differing PPE use between the SCCs in both work packages and informed management about the concern. Management determined that the field engineer did not use the Hazardous Risk Category table in the procedure for the incident energy value for the SCC form in Work Package 00. The electrical crew had used a conservative level of PPE not directed

by the SCC and were protected. During both SCCs energy sources were isolated using lockout/tagout and at no time were the workers exposed to hazardous energy.

Similar OR Report Number: 1. N/A

Facility Manager:

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

Originator:

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

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/20/2012	13:31 (PTZ)	Tucker Campbell	BNI
09/20/2012	13:32 (PTZ)	Doug Hoffman	DOE
09/20/2012	13:52 (PTZ)	Ken Davis	ONC

Authorized Classifier(AC):

4)Report Number:

[EM-RP--BNRP-RPPWTP-2012-0024](#) After 2003 Redesign

Secretarial Office:

Environmental Management

Lab/Site/Org:

Hanford Site

Facility Name:

RPP Waste Treatment Plant

Subject/Title:

During an Emergency Drill an Employee was Directed to Open a Circuit Breaker to the Heating, Ventilation, and Air Conditioning Unit.

Date/Time Discovered:

09/20/2012 13:15 (PTZ)

Date/Time Categorized:

09/20/2012 13:35 (PTZ)

Report Type:

Notification/Final

Report Dates:

Notification	09/25/2012	18:12 (ETZ)
Initial Update	09/25/2012	18:12 (ETZ)
Latest Update	09/25/2012	18:12 (ETZ)
Final	09/25/2012	18:12 (ETZ)

Significance Category:

4

Reporting Criteria:

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

Cause Codes:

A5B4C01 - Communications Less Than Adequate (LTA); Verbal

Communications LTA; Communication between work groups LTA
4) Perform Work Within Controls

ISM: No

Subcontractor Involved: No

Occurrence Description: On 9/20/2012, at 0900 hrs an electrician turned off a circuit breaker to the Heating, Ventilation, and Air Conditioning (HVAC) unit without proper personal protective equipment (PPE).

The event took place during the Hanford Site Take Cover Drill in building T-28. The Building Warden (BW) asked if someone in the building was qualified to turn off the HVAC system. An electrician put on his gloves, safety glasses, and hardhat, walked over and turned off the HVAC system from inside the circuit panel. The BW attempted to inform the electrician that this activity was intended to be simulated. Because of the noise in the room, the electrician only heard the command to shut the HVAC off and performed the task. Based on procedural compliance, the worker was not allowed to turn the circuit breaker off without wearing the proper PPE. The electrician was not wearing a long sleeve shirt for protection.

Cause Description: A5B4C01 - Communication between work group was less than adequate. Definition - Lack of communication between work groups (support), contributed to the incident. Rationale - Although the Building Warden intended to inform the electrician that his activity was considered a simulation the electrician acted upon the initial command to shut off the HVAC.

Operating Conditions: Construction

Activity Category: Construction

Immediate Action(s): The T-28 building is locked by the subcontract security office. The building warden for T-28 was instructed that all activities in the building are considered simulated unless an actual event takes place.

FM Evaluation: N/A

DOE Facility Representative Input:

DOE Program Manager Input:

Further Evaluation is Required: No

Division or Project: Waste Treatment Plant

Plant Area: 600

System/Building/Equipment: T-28 building

Facility Function: Nuclear Waste Operations/Disposal

Corrective Action:

Lessons(s) Learned: N/A

HQ Keywords: 01A--Inadequate Conduct of Operations - Inadequate Conduct of

Operations (miscellaneous)
 01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
 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 September 20, 2012, an electrician turned off a circuit breaker to the Heating, Ventilation, and Air Conditioning (HVAC) unit without proper personal protective equipment. The event took place during the Hanford Site Take Cover Drill in Building T-28 when the building warden asked if someone was qualified to turn off the HVAC system. The electrician put on his gloves, safety glasses, and hardhat, walked over and turned off the HVAC system from inside the circuit panel. The warden had attempted to inform the electrician that this was a simulated activity; however, because of the noise in the room, the electrician only heard the command to shut the HVAC off and performed the task. The electrician was not wearing a long sleeve shirt for protection as required by procedure when he operated the circuit breaker.

Similar OR Report Number: 1. N/A

Facility Manager:

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

Originator:

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

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/20/2012	13:34 (PTZ)	Tucker Campbell	BNI
09/20/2012	13:38 (PTZ)	Doug Hoffman	DOE
09/20/2012	13:52 (PTZ)	Ken Davis	ONC

Authorized Classifier(AC):

5)Report Number: [NA--LASO-LANL-HEMACHPRES-2012-0006](#) After 2003 Redesign
Secretarial Office: National Nuclear Security Administration
Lab/Site/Org: Los Alamos National Laboratory
Facility Name: HE Machining/Pressing Facils

Subject/Title: Management Concern: Non-Compliance With Electrical Policy During Conduct of Work

Date/Time Discovered: 09/05/2012 13:00 (MTZ)

Date/Time Categorized: 09/05/2012 15:45 (MTZ)

Report Type: Update

Report Dates:

Notification	09/07/2012	16:59 (ETZ)
Initial Update	09/10/2012	11:02 (ETZ)
Latest Update	09/10/2012	11:02 (ETZ)
Final		

Significance Category: 2

Reporting Criteria: 2F(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 2 occurrence)

Cause Codes:

ISM:

Subcontractor Involved: Yes
Mesa

Occurrence Description: Management Synopsis: At approximately 1300 hours on 9/5/2012, subcontractor personnel were scoping an air compressor at 16-202 to verify required work steps for a work package. During the scoping process, a LANL worker opened the air compressor's 480 Volt electrical disconnect and verified zero energy on the line side out by removing the cover to the disconnect without performing required Lock-Out/Tag-Out (LOTO) and without wearing proper Personnel Protective Equipment. The LANL worker then opened the panels to the interior of the air compressor to allow measurements to be taken on de-energized circuits. These actions did not comply with the requirements of Laboratory policies, P101-3, Lockout/Tagout for Hazardous Energy Control and P101-13, Electrical Safety Program. There were no personnel injured or facility impacts resulting from this event.

UPDATE 07/10/2012: This report has been updated to reflect the immediate action taken by the Laboratory's Chief ESO.

Cause Description:

Operating Conditions: Not Applicable

Activity Category: Maintenance

Immediate Action(s):

- As the scoping activity was completed before the issue was recognized, a critique was held the following day to discuss the event.
- Work on this activity has been paused.
- The Laboratory's Chief ESO sent an e-mail to all ESOs clarifying applicable electrical work requirements.

FM Evaluation: UPDATE 07/10/2012: This report has been updated to reflect the immediate action taken by the Laboratory's Chief ESO.

DOE Facility Representative Input:

DOE Program Manager Input:

Further Evaluation is Required: Yes.
Before Further Operation? No
By Whom: WFO, W-7 and QA-PA
By When: 10/19/2012

Division or Project: Weapons Facility Operations

Plant Area: TA-16-202

System/Building/Equipment: TA-16-202 Compressor

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
14G--Quality Assurance - Procurement Deficiency

HQ Summary: On September 5, 2012, a LANL worker opened the 480-volt disconnect to an air compressor at 16-202, removed the disconnect cover and verified zero energy without performing required lock-out/tag-out (LOTO) and without wearing proper personnel protective equipment (PPE). The incident occurred while subcontractor personnel were verifying required work steps for a work package. The LANL worker then opened the panels to the interior of the air compressor to allow measurements to be taken on de-energized circuits. There were no personnel injured or facility impacts resulting from this event. Work on this activity was paused.

Similar OR Report Number:

Facility Manager:

Name	Mark Fitzgerald
Phone	(505) 500-7916
Title	Facility Operations Director Designee

Originator:

Name	KIRSCH, MICHELLE M
Phone	(505) 665-8146
Title	OCCURRENCE INVESTIGATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/06/2012	12:26 (MTZ)	John Swientoniewski	NNSA

Authorized Classifier(AC): Michelle Kirsch Date: 09/10/2012

6)Report Number: [NA--LASO-LANL-MATSCCMPLX-2012-0002](#) After 2003 Redesign

Secretarial Office: National Nuclear Security Administration

Lab/Site/Org: Los Alamos National Laboratory

Facility Name: Materials Science Complex

Subject/Title: Worker Sustains Minor Electrical Shocks during Experimental Work

Date/Time Discovered: 09/07/2012 15:15 (MTZ)

Date/Time Categorized: 09/07/2012 16:08 (MTZ)

Report Type: Notification

Report Dates:

Notification	09/12/2012	17:16 (ETZ)
Initial Update		
Latest Update		
Final		

Significance Category: 2

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

Cause Codes:

ISM:

Subcontractor Involved: No

Occurrence Description: MANAGEMENT SYNOPSIS: On September 7, 2012, at 1500, while moving the tip of a ultrasonicator in an upward motion, a Physical Chemistry and Applied Spectroscopy (C-PCS) post-doc grazed his left arm against a clamp on a metal mounting rod and sustained a minor shock. Then as he removed his sample from the holder that was clamped to the

metal mounting rod, the post-doc sustained a second minor shock to his right first and second fingers. He immediately notified his two mentors. The C-PCS mentor transported the post-doc to the Laboratory's occupational medicine facility (OMF) for evaluation. Medical personnel evaluated the post-doc and released him to work with no restrictions. The second mentor from the Materials Physics and Applications Division Center for Integrated Nanotechnologies (MPA-CINT) made notifications to the Chemistry and MPA Division management. The MPA-CINT mentor removed the Sonics, Vibra Cell 130W Ultrasonicator and tip from service pending further inspection. The MPA-CINT group electrical safety officer (GESO) inspected the ultrasonicator and found it was properly grounded. Subsequently, the MPA-CINT GESO and the MPA Division ESO inspected a CAT Unidrive Homogenizer Mixer that was also mounted to the mounting rod. The ESOs found an intermittent resistive connection from line voltage to the equipment mounting bracket that may have been the source of the electrical shocks. The MPA Division ESO removed the mixer from service pending further evaluation.

At 1608 on September 7, 2012, following notification, the Science and Technology Operations Facility Operations Director Designee preliminarily categorized the event as sub-threshold reportable pending a critique. On September 11, 2012, a critique was convened to review the event. At 1357, based on the fact that the post-doc sustained two minor shocks and that the equipment was unlisted and had not been inspected or approved for use per the unlisted electrical equipment inspection process specified in LANL Procedure P101-13, "Electrical Safety Program," the STO FOD re-categorized the event as reportable under the Hazardous Electrical Energy criteria.

BACKGROUND

At the time of the event, the post-doc was performing a suspension of carbon nanotubes experiment that he was authorized to perform under Integrated Work Document (IWD) No. MPA-CINT-3-1420-1221-4, "Aqueous Suspension of Carbon Nanotubes." According to the C-PCS mentor, the post-doc has been employed at LANL for two and a half months. During that time, the mentors have briefed the post-doc on the dispersion experimental work documentation and use of equipment including the ultrasonicator and mixer. The post-doc has also completed his electrical worker training. The post-doc indicated that he has previously used the ultrasonicator and mixer without incident.

The MPA-CINT management stated that the post-doc performed his experiment in an MPA laboratory using MPA equipment. The ultrasonicator, mixer and sample holder were clamped to the metal mounting rod. According to the MPA-CINT mentor, the mixer was

recently procured through the LANL procurement process as a replacement for a similar unit that had failed. The C-PCS mentor indicated that the mixer is considered a crucial piece of equipment for dispersion experiments. Per LANL Procedure P101-13, all electrical equipment that contains or produces hazardous energy used at LANL must be listed by a Nationally Recognized Testing Laboratory (NRTL) or approved for use by an ESO prior to use. Subsequent inspection of the mixer found that it had no NRTL listing or a LANL ESO label to indicate it had been approved for use.

Following the event, the C-PCS and MPA-DO ESOs inspected the ultrasonicator and mixer. The MPA-CINT and MPA-DO ESOs checked the ultrasonicator's power supply and found it to be properly grounded. The ultrasonicator was then returned to service. The MPA ESOs inspected the mixer and found that it had intermittent connection between line voltage and exposed metal parts. The mixer was removed from service pending further evaluation.

Cause Description:

Operating Conditions:

Normal Operations

Activity Category:

Research

Immediate Action(s):

1. The C-CPS mentor transported the post-doc to the OMF for evaluation. Medical personnel evaluated and released the post-doc to work with no restrictions.

2. The MPA-CINT mentor removed the ultrasonicator from service pending further inspection. The MPA ESOs inspected the ultrasonicator, found it to be properly grounded, and placed the equipment back in service.

3. The MPA ESOs inspected the mixer and found that it had intermittent connection between line voltage and exposed metal parts. The mixer was removed from service pending further evaluation.

4. As an extent of condition review, the Chemistry and MPA Division management tasked their line management and technical staff to inspect their electrical equipment in their laboratories for similar equipment and to verify whether the equipment is listed or has been labeled and approved for use by an ESO. If unlisted equipment is found that is non-compliant with LANL Procedure P101-13, the equipment will be removed from service pending inspection and approval for use by an ESO.

FM Evaluation:

Following the event, the Chief ESO evaluated the event to determine the electrical hazard and severity level of the electrical shock using the LANL electrical severity measurement tool. The Chief ESO deemed this electrical shock event to be a dry hand electrical shock with an electrical hazard factor of 330 and an electrical severity risk as medium.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

Yes.
 Before Further Operation? No
 By Whom: C-PCS, MPA, STO & QPA-PA
 By When: 10/26/2012

Division or Project:

Chemistry Division

Plant Area:

TA-3-1420

System/Building/Equipment: CAT Unidrive Homogenizer, Model X 1000D

Facility Function:

Laboratory - Research & Development

Corrective Action:

Lessons(s) Learned:

HQ Keywords:

01E--Inadequate Conduct of Operations - Operations Procedure Noncompliance
 07D--Electrical Systems - Electrical Wiring
 08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
 11I--Other - Visiting Scientist/Researcher or Student Employee
 12C--EH Categories - Electrical Safety
 14E--Quality Assurance - Work Process Deficiency
 14H--Quality Assurance - Inspection and Acceptance Testing Deficiency

HQ Summary:

On September 7, 2012, a Physical Chemistry and Applied Spectroscopy post-doc experienced a minor shock when he grazed his left arm against a clamp on a metal mounting rod while moving the tip of a ultrasonicator, and then sustained a second minor shock to his right first and second fingers as he removed his sample from the holder that was clamped to the metal mounting rod while performing an experiment in TA-3-1420. He was transported to the Laboratory's occupational medicine facility and released to work with no restrictions. The Sonics Vibra Cell 130W Ultrasonicator and tip were inspected and considered properly grounded. A CAT Unidrive Homogenizer Mixer that was also mounted to the mounting rod was inspected; testing discovered an intermittent resistive connection from line voltage to the equipment mounting bracket that may have been the source of the electrical shocks. Subsequent inspection of the mixer found that it had no Nationally Recognized Testing Laboratory listing or a LANL Electrical Safety Officer label to indicate it was approved for use. An electrical hazard factor of 330 and an electrical severity risk of medium were calculated for this incident using the LANL electrical severity measurement tool.

Similar OR Report Number:

Facility Manager:

Name	Rick Alexander
Phone	(505) 665-7020

Title	STO Facility Operations Director
-------	----------------------------------

Originator:

Name	YAZZIE, ALVA M
Phone	(505) 664-0666
Title	OCCURRENCE INVESTIGATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/07/2012	16:33 (MTZ)	Susan Stewart	NNSA
09/11/2012	13:57 (MTZ)	John Swientoniewski	NNSA

Authorized Classifier(AC): Michelle Kirsch Date: 09/12/2012

7)Report Number: [NA--LASO-LANL-TA55-2012-0030](#) **After 2003 Redesign**
Secretarial Office: National Nuclear Security Administration
Lab/Site/Org: Los Alamos National Laboratory
Facility Name: Plutonium Proc & Handling Fac
Subject/Title: Two Workers Receive Electrical Shock During Installation of Oven
Date/Time Discovered: 09/08/2012 17:00 (MTZ)
Date/Time Categorized: 09/10/2012 09:00 (MTZ)
Report Type: Update

Report Dates:

Notification	09/11/2012	18:37 (ETZ)
Initial Update	10/11/2012	11:10 (ETZ)
Latest Update	10/11/2012	11:10 (ETZ)
Final		

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

Cause Codes: A3B1C03 - Human Performance Less Than Adequate (LTA); Skill Based Errors; Incorrect performance due to mental lapse
 -->couplet - NA
 A5B4C01 - Communications Less Than Adequate (LTA); Verbal Communications LTA; Communication between work groups LTA

ISM: 4) Perform Work Within Controls

Subcontractor Involved: No

Occurrence Description: MANAGEMENT SYNOPSIS: On Saturday, September 8, 2012, at approximately 1700, at Technical Area 55, Building 1 (TA-55-1) cafeteria,

a Maintenance and Site Services, Central Shop Operations (MSS-CS) electrician (E1) and a Fire Protection (FP) electrician each felt a mild electrical shock while installing a new range oven in the kitchen. The two employees were taken to LANL Occupational Medicine (OccMed) where they were examined and were released to return to work without restrictions. Initial reports to the MSS-TA55 supervisor indicated that the voltage and current ratings associated with the source of the electric shock were not at a level considered to be hazardous energy. Consequently, the TA-55 Facility Operations Director (FOD) initially categorized the incident as sub-ORPS.

On Monday, September 10, 2012, at approximately 0900, the TA-55 FOD received a report from the Electrical Safety Officer (ESO) indicating the shock was caused by a short of one of the three phases of the 480-volt circuit to the oven. Voltage measurements subsequent to the event measured 180 volts between metal parts. Based on this information, the FOD re-categorized the event as ORPS reportable, 2E(1), Significance Category (SC) 2. On Tuesday, September 11, 2012, a critique was held. The categorization was verified by the FOD based upon the facts presented at that meeting. The Electrical Severity Tool scored this event as 330, which is of medium significance.

BACKGROUND: The work order to upgrade the TA55-1 cafeteria was opened in 2011 with the plan to replace the oven, the auto-fryer, and the fire suppression hood above the oven. The work was scheduled to be completed in the second half of 2012. The project required work to be done on a weekend with a power outage to part of Building 1. Crafts with various skill sets (forklift driver, pipefitters, fire protection, and electricians) were coordinated for Saturday, September 8, 2012. During the last week of August 2012, Superintendent 1 was brought onto the project to cover for vacationing coworkers. Superintendent 1 performed thorough walkdowns of this project with coworkers and planners. Up to this point, the work package had changed hands multiple times since 2011.

According to STD-342-100, LANL Engineering Standards Manual, Section D5020 Lighting and Branch Circuit Wiring, J3, a 480-volt receptacle that is out of sight or more than 50 feet from a lockable circuit disconnect, a receptacle with an interlocked circuit disconnect must be used. A Twist Lock Assembly (TLA), as used in this event, is not a receptacle with an interlocked circuit disconnect and therefore, the plug can be removed while the receptacle is energized. The receptacle was placed out of sight and more than 50 feet from a lockable circuit disconnect. In building the work package, a decision was made early on to use a TLA instead of a pin and sleeve type plug, and instead of hardwiring in the new oven, as was the case with the old oven. There were no health codes or fire protection codes that required the oven to be a plug-in device.

No documentation concerning the engineering choice of the TLA over a pin and sleeve plug, which would meet STD-342-100 requirements, or hardwiring the oven in could be located. In interviews with the TA-55 engineers, several believed that the decision may have been made so that cafeteria workers and janitorial services could unplug the oven, move it, and clean behind it. However, no documentation to this affect could be found.

Prep work that could be performed without interrupting cafeteria work was performed the week of September 3, 2012, especially on Friday September 7, 2012. These tasks included obtaining locks and tags for electrical work, setting up the wiring for the oven and fryer, and demolishing the oven wiring. Superintendent 1 spent time ensuring that the required power outage was properly set up and that all needed crafts had the proper badges to enter and work in the area. At approximately 1630 on September 7, 2012, Superintendent 1 brought in Superintendent 2 to cover work on Saturday September 8. The two performed a thorough walk-down of the work to be performed that Saturday.

The electricians (E1, E2, E3, FP electrician) had worked a normal 40 hour week that week and Saturday was overtime. Some of these electricians had worked on this project earlier in the week; others were called in to assist Saturday. All reported to work at the cafeteria at 0700 September 8 for a pre-job briefing. Overall, there were 12-15 people working in the area throughout the day.

The tasks involving the electricians for the day included wiring of the new oven, Lock Out Tag Out (LOTO) for the power outage, installing new breakers, assembling and installing the oven TLA with receptacle in the wall, performing insulation resistance tests, and testing the voltage after energizing. These tasks were all reviewed in the pre-job briefing and then the electricians set to work. Some of the tasks required two persons, such as the breaker work. Other tasks, such as assembling the TLA and installing it, required only one person. Tasks were not assigned by the Foreman, but rather distributed by the electricians.

E1 and E2 primarily performed breaker work throughout the day following the Integrated Work Document (IWD) 416851-01. E3 set to work assembling the new ArrowHart 50 ampere TLA (manufacturer's directions were available) and then installing the plug and Service and Oil resistant (SO) cord onto the oven and installing the receptacle in the wall. Having installed the receptacle and assembled the plug, E3 showed the Foreman that the TLA stuck approximately 12 inches out from the wall. This was an issue as the distance between the wall and the oven would not accommodate this configuration. The decision was made by the Foreman and Superintendent 2 to move the receptacle further along the wall so the

TLA would sit under the auto fryer table. E3 executed this task, moving the receptacle and then completing the requisite raceway. Throughout the day, E3 stated that he performed continuity checks on the TLA and there was nothing abnormal.

This task was completed before the Quality Control Inspector (QCI) arrived shortly before 1300. The QCI walked down the electrical work done by E1 and E2, and also witnessed as the breakers were torqued correctly, as required by the work package. The wires were then resistance tested. The QCI also walked down the work performed by E3, such as terminating the wires in the cafeteria storage room. The TLA was not reviewed; E3 did not point out the work and the QCI believed the oven came from the manufacturer with that particular plug. There was nothing in the work documents requiring the QCI to inspect the plug or the receptacle; as such work was considered skill of craft.

That afternoon, having completed all the work that required a power outage, power was returned. The oven was moved into place and plugged in. While E3 gathered up tools onto the cart, E1 and E2 were assisting in moving the auto fryer table into place. E3 left the room with the tool cart to return items to the staging area. While he was gone, four people, including E1 and the FP electrician, lifted the auto fryer and placed it on the table. As they were easing the fryer onto the table, the FP electrician bumped his elbow against a metal plate on the wall. He wasn't sure if he felt a little tingle or simply hit his funny bone. Shortly thereafter at approximately 1700, E1 leaned one hand on the metal table and felt a shock pass from his left arm through his chest and down his right arm. The resultant muscle contraction pulled his hands away from the fryer and table and broke the contact.

All work was paused. E3 returned to the cafeteria and his coworkers wanted to use his meter, which he retrieved from the staging area. However, the meter was damaged in that an Allen wrench was needed to turn the meter on and off. A different meter was used to take readings on the metal table, fryer, oven, metal plates on the wall, and raceway. All readings were 180 volts. The oven breaker panel was de-energized and readings were taken again. All meter readings were 0 volts. E2 knelt under the table and removed the oven plug from the wall. According to E2, it came apart in more than 2 pieces as he pulled it from the receptacle and there were several strands that were not terminated correctly within the plug. E3 stated that the plug was in two pieces and that a single crimped strand was sticking out from one termination lug. All are in agreement that the center screw that holds the plug together was missing. The plug was handed over to E3 to put back together as notifications were made to the TA-55 Operations Center (OC), who in turn contacted the on-call personnel for LANL OccMed at 1728. E1 and the FP electrician told their

management they felt fine and did not desire to go to the Los Alamos Medical Center (LAMC).

While the Foreman and Superintendent 2 discussed the path forward, the electricians looked for the missing screw, including sorting through the trash. When the screw was not found, they searched for a replacement screw. No screw could be found. The Foreman and Superintendent 2 contacted their management to discuss the possibility of hardwiring the oven in. Permission was granted. In reviewing the wiring to the receptacle, the Foreman noted that the wires had been left longer than usual; these were trimmed back prior to hardwiring the oven.

At approximately 1900, the FP electrician and E1 left with Superintendent 2 to go to OccMed. Shortly after they left, E3 found the center screw, which had rolled behind a work table. E3 gave the screw to the Foreman, who placed it with the TLA, which was later secured in his locker. E3 left work sometime between 1900 and 2000. At approximately 2030, a TA-55 ESO worked with E2 and the Foreman to walk down the electrical work, checking for any safety issues; none were found and the oven breaker panel was energized.

On-call OccMed personnel arrived at OccMed between 1920 and 1930. The FP electrician and E1 were released from OccMed with no restrictions and requested to check back in the following week for a follow up. The follow up did not reveal any medical problems resultant from this event.

Cause Description:

ISM SUMMARY:

In this event, Step 4 (Perform Work Within Controls) needed improvement. E3 incorrectly assembled and installed the TLA.

The FOD assessed the need for an Extent of Condition (EOC) in accordance with DOE Order 232.2 and determined that one was not warranted for this event.

INVESTIGATIVE METHODOLOGY:

Causal analysis and the DOE Causal Analysis Tree as described in the DOE Occurrence Reporting Causal Analysis Guide (DOE G 231.1-2) were used to identify the causes for this event. Apparent causes are identified as the most probable causes of an event or condition that management has the control to fix and for which effective recommendations for corrective actions can be generated.

CAUSAL ANALYSIS:

Direct and Root Cause:

In this event, the incorrect wiring of the oven plug or the receptacle is the

most likely cause of the unexpected energizing of all metal along the receptacle wall. In reviewing the details with a variety of electrical experts, both at TA-55 and other LANL sites, all agreed that the measured 180 volts was unusual and indicated a voltage leak.

Two possibilities existed:

- 1) In installing the receptacle in the wall and wiring it in, the wires at the termination were left longer than normal. This led to the possibility that as the receptacle plate was installed, one of the plate screws inadvertently sliced into the insulation of a wire just enough to provide a voltage leak. This would have then energized the plate, the metal studs, and then all the metal along that wall and any metal object touching that wall.
- 2) While it could not be confirmed by a third party, E2 indicated that once he had removed the oven plug from the wall after the shock event, the plug came apart in multiple pieces. Additionally, there were several strands sticking out of each of the three lug terminations. There is a possibility that these strands were then touching the plug casing, causing a voltage leak, and hence energizing all metal along the wall and any metal object touching the wall. E3 stated that there was only a single, crimped strand from one of the lug terminations.

Correct assembly and installation of a TLA (plug and wall receptacle) is considered skill of craft for a qualified Journeyman electrician, such as E1, E2, and E3, and thus should have been performed without introducing electrical shock hazards. Based on all available evidence and interviews, the incorrect installation of the receptacle or the incorrect assembly of the plug by E3 has been determined to be the direct and root cause of the event and has been categorized as Incorrect Performance Due to Mental Lapse (A3B1C03).

Contributory Cause:

The QCI walked down all electrical work that E1, E2, and E3 had informed him was completed. In glancing at the oven plug, he believed the oven had come from the manufacturer that way. E3 did not indicate to the QCI that he had installed the plug and SO cord to the oven [A5B4C01 Communications between work groups LTA]. While it is not required for the electricians to point out skill-of-craft work they have completed on a job, it is considered common practice to at least mention it. Inadequacies with the assembling and installing of the TLA may or may not have been caught by a cursory exam. The QCI was not required to review the plug assembly or receptacle installation because both are considered skill of craft.

Although not contributory to this event, it is worthy to note the following:

According to STD-342-100, Section D5020, J3, a 480-volt receptacle that is out of sight or more than 50 feet from a lockable circuit disconnect, a receptacle with an interlocked circuit disconnect must be used. A TLA is not a receptacle with an interlocked circuit disconnect and therefore, the plug can be removed while the receptacle is energized. There were no health codes or fire protection codes that required the oven to be a plug-in device rather than hardwired in, as the previous oven had been. No documentation concerning the choice of the TLA over a pin and sleeve plug, which would meet STD-342-100 requirements, or hardwiring the oven in could be located.

Operating Conditions:

Installation of replacement grill/oven.

Activity Category:

Maintenance

Immediate Action(s):

- 1) Directly after the shock event, work was paused and the hazards assessed. This led to de-energizing the oven breaker panel and reviewing the related work of wiring and installing the oven. The decision was made to hardwire the electrical power to the oven.
- 2) On Saturday, September 8, 2012, the two electricians were taken to OccMed where they were examined and were released without restrictions.
- 3) On Monday, September 10, 2012, at approximately 0900, the TA-55 FOD received a report from the ESO indicating the shock was caused by a short of one of the three phases of the 480 volts to the oven. The test measured approximately 180 volts to ground. The FOD re-categorized the event as ORPS reportable, 2E(1), SC 2.
- 4) Due to work scheduling the two electricians involved in the incident were not available until Tuesday, September 11, 2012. A critique was held then and the categorization of the event verified based upon the facts presented.

FM Evaluation:

The causal analysis has been approved on 10/11/2012 and this report updated.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

Yes.
Before Further Operation? No
By Whom: TA55-DO, MSS-CS
By When: 10/25/2012

Division or Project:

MSS-CS

Plant Area:

TA-55

System/Building/Equipment: TA-55-1, cafeteria replacement oven

Facility Function: Plutonium Processing and Handling

Corrective Action:

Lessons(s) Learned:

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

HQ Summary: On September 8, 2012, two Maintenance and Site Services, Central Shop operations electricians felt a tingle while installing a new grill/oven in the kitchen of the cafeteria in Building 3, Technical Area 55. The two electricians were taken to LANL Occupational Medicine, examined and released to return to work without restrictions. The Electrical Safety Officer (ESO) reported the shock was caused by a short of one of the three phases of 480 volts to the grill, which measured approximately 50 volts to ground. A critique was held.

- Similar OR Report Number:**
1. DP-ALO-KO-SNL-1000-1999-0002
 2. DP-ALO-KO-SNL-NMFAC-1994-0013
 3. DP-ALO-LA-LANL-ACCCOMPLEX-1996-0010

Facility Manager:

Name	Stuart McKernan
Phone	(505) 667-3030
Title	Facility Operations Director Deputy

Originator:

Name	VOSS, SUSAN J
Phone	(505) 667-5979
Title	OCCURRENCE INVESTIGATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/10/2012	09:00 (MTZ)	David Stewart	LASO/FR
09/10/2012	09:00 (MTZ)	Dan Carter	LASO/FR

Authorized Classifier(AC): Susan J. Voss Date: 10/11/2012

8)Report Number: [NA--SS-SNL-9000-2012-0001](#) After 2003 Redesign
Secretarial Office: National Nuclear Security Administration
Lab/Site/Org: Sandia National Laboratories - SS
Facility Name: SNL Division 9000
Subject/Title: CSU Employee Receives Electrical Shock While Removing Cord From a

Power Strip
Date/Time Discovered: 09/07/2012 12:00 (MTZ)
Date/Time Categorized: 09/10/2012 10:00 (MTZ)
Report Type: Update/Final

Report Dates:

Notification	09/10/2012	18:59 (ETZ)
Initial Update	09/13/2012	17:32 (ETZ)
Latest Update	10/09/2012	11:38 (ETZ)
Final		

Significance Category:

2

Reporting Criteria:

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

Cause Codes:

A3B3C06 - Human Performance Less Than Adequate (LTA); Knowledge Based Error; Individual underestimated the problem by using past events as basis
 -->couplet - A4B1C06 - Management Problem; Management Methods Less Than Adequate (LTA); Previous industry or in-house experience was not effectively used to prevent recurrence

ISM:

4) Perform Work Within Controls

Subcontractor Involved:

Yes
 Lockheed Martin Government Services

Occurrence Description:

A CSU employee was setting up a computer system for a customer. The employee noticed that the speakers to the computer were not working. The employee unplugged the speaker power from the power strip and felt a shock to their right middle finger and thumb.

Cause Description:

Critique/Fact Finding Performed: 09/10/2012
 Methodology Utilized: DOE M 231.1-2, Causal Analysis Tree, Critique, and Human Performance Improvement Error Precursors.

A3B3C06 (Individual underestimated the problem by using past events as basis); when the individual attempted to unplug the speaker power cord from the power strip, they did not expect to receive a shock.

A4B1C06 (Previous industry or in-house experience was not effectively used to prevent recurrence); there have been similar plug/cord/power strip shocks of this type at Sandia National Laboratories and throughout industry. This information was not communicated to the workforce.

Human Performance Improvement (HPI) Error Precursors: Work Environment (unexpected conditions) - employee did not expect to receive a shock; Human Nature (assumptions) - employee assumed that they

would not be shocked by simply unplugging a cord from a power strip; Task Demands (time pressure and high workload).

Operating Conditions:

Normal working conditions

Activity Category:

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

Immediate Action(s):

The employee notified management and was escorted to Medical for a precautionary evaluation. The power strip was evaluated by the SNL electrical safety SME. The power strip was UL listed and a continuity test revealed no defects.

FM Evaluation:

EOC event #20120257

This event's severity was a 330, as follows: Electrical Hazard Factor: 10 (120 VAC single phase); Environment Factor: 0 (dry); Shock Proximity Factor: 10 (Contact with live parts); Arc Flash Proximity Factor: 0 (single phase 120 VAC); Thermal Proximity Factor: NA (AC); No PPE Mitigations; Injury Factor: 3 (shock).

The investigation/discussion revealed that the employee probably wrapped their fingers around the speaker power plug as they were attempting to remove it from the power strip. In doing so, the employee's fingers may have contacted the metal prongs, resulting in a shock. Also, the employee was working under the customer's desk, which may have resulted in an awkward position/line-of-sight for performing this activity.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

9000/CSU Operations

Plant Area:

Tech Area I

System/Building/Equipment:

Bldg. 750, RM. 262, Computer speakers system

Facility Function:

Balance-of-Plant - Offices

Corrective Action 01:

Target Completion Date: 09/21/2012	Actual Completion Date: 09/11/2012
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Department 9343 - The SNL electrical safety SME presented an electrical safety "awareness" briefing to the Org. 09343 Moves Team group. Topics included cord/plug equipment, daisy chaining power strips, reporting to medical immediately after receiving a shock, and situational awareness.

Corrective Action 02:

Target Completion Date: 09/21/2012	Actual Completion Date: 09/12/2012
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Department 9343 - Employee who received the shock was required to retake the SNL safety courses (ESH100 and ELC105).

Lessons(s) Learned:

Title: Employee receives shock while removing cord from a power strip
 Lesson Learned Statement: No matter how common it is to remove a power cord plug from a power strip or outlet, the potential for a shock is still present. Situational awareness by the employee is paramount when working around energized electrical equipment.
 Discussion of Activities: A CSU employee was setting up a computer system for a customer. The employee noticed that the speakers to the computer were not working. The employee unplugged the speaker power plug from the power strip and felt a shock to their right middle finger and thumb.
 Analysis: The investigation/discussion revealed that the employee probably wrapped their fingers around the speaker power plug as they were attempting to remove it from the power strip. In doing so, the employee's fingers may have contacted the metal prongs, resulting in a shock. Also, the employee was working under the customer's desk, which may have resulted in an awkward position/line-of-sight for performing this activity.
 Recommended Actions: The CSU team was briefed by the SNL electrical safety SME. Topics included cord/plug equipment, daisy chaining power strips, reporting to medical immediately after receiving a shock, and situational awareness.

HQ Keywords:

08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
 11G--Other - Subcontractor
 12C--EH Categories - Electrical Safety
 14L--Quality Assurance - No QA Deficiency

HQ Summary:

On September 7, 2012, a Computer Support Unit employee felt a shock to their right middle finger and thumb as the employee unplugged the computer speaker power cord from the power strip while setting up a computer system for a customer. The employee notified management and was escorted to Medical for a precautionary evaluation. An SNL electrical safety SME noted the power strip was UL listed; a continuity test revealed no defects.

Similar OR Report Number: 1. NA--SS-SNL-NMFAC-2012-0004

Facility Manager:

Name	Frank Antonich
Phone	(505) 845-3481
Title	Division 9000 ES&H/S&S Coordinator

Originator:

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

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/07/2012	16:00 (MTZ)	EOC	4136
09/10/2012	09:30 (MTZ)	Veronica Martinez	NNSA/SSO
09/10/2012	10:10 (MTZ)	John Zepper	9300
09/10/2012	10:10 (MTZ)	Laura Charles	9343
09/10/2012	10:10 (MTZ)	Bonnie Hammond	9340

Authorized Classifier(AC): Steven Feador Date: 10/01/2012

9)Report Number: [NA--SS-SNL-NMFAC-2012-0005](#) **After 2003 Redesign**
Secretarial Office: National Nuclear Security Administration
Lab/Site/Org: Sandia National Laboratories - SS
Facility Name: SNL NM Site-wide F & M
Subject/Title: Contract Controls Subcontractor Receives Shock While Installing Jumpers in Controls Cabinet at Building 962
Date/Time Discovered: 09/11/2012 15:40 (MTZ)
Date/Time Categorized: 09/11/2012 17:05 (MTZ)
Report Type: Notification
Report Dates:

Notification	09/13/2012	17:20 (ETZ)
Initial Update		
Latest Update		
Final		

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

Cause Codes:

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

Subcontractor Involved: Yes
 Siemens (subcontract to Enterprise)

Occurrence Description: At approximately 1540 on Tuesday, September 11, 2012, a controls subcontractor received an electrical shock at Building 962. The controls contractor was a subcontractor to an electrical prime contractor on the 962 Controls Upgrade project. When the controls contractor installed a jumper (small conductor between modules) in the cabinet, the controls contractor felt a shock between the fingers on the right hand. The voltage at the time of the event was 206 volts and the controls contractor was utilizing standard construction personal protective equipment which included a hard

hat, safety shoes, safety glasses and cotton clothing. The voltage to the controls cabinet was designed for 24 volts and as part of the investigation the cause or causes for the 206 volts will be investigated. The controls contractor was well experienced with over 30 years in the trade.

The controls subcontractor was on the pre-task plan for the day and the hazards were updated and identified prior to the event. The prime contractor's safety representative also makes regular documented site visits to the site. All paper work including the contract specific safety plan for the contract is correct and in place.

The subcontractor went to SNL medical and was released to full duty.

The prime contractor has initiated their own investigation and statements.

Cause Description:

Critique/Fact Finding Performed: 9/12/2012

Operating Conditions:

Normal

Activity Category:

Construction

Immediate Action(s):

The area was placed in a safe condition and was barricaded.

Worker was taken to medical and released to full duty.

Notifications were conducted.

Investigation was initiated.

FM Evaluation:

EOC# 26778

The severity for this event is 330, as follows: Hazard Factor: 10 (208 VAC downstream of a 45 KVA transformer); Environment Factor: 0 (dry); Shock Proximity Factor: 10 (contact with live parts); Arc Flash Proximity Factor: 0 (< 1.2 Cal/cm²); Thermal Proximity Factor: NA (AC); No PPE Mitigations; Injury Factor: 3 (shock).

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is

Yes.

Required:

Before Further Operation? Yes

By Whom: Causal Analysis Team

By When: 10/27/2012

Division or Project:

4820/Arc Flash Study

Plant Area:

Tech Area IV

System/Building/Equipment:

962 Controls Upgrade /Bldg. 962/Basement

Facility Function:

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

Corrective Action:

Lessons(s) Learned:

HQ Keywords:

08A--OSHA Reportable/Industrial Hygiene - Electrical Shock
 11G--Other - Subcontractor
 12C--EH Categories - Electrical Safety
 14L--Quality Assurance - No QA Deficiency

HQ Summary:

On September 11, 2012, a controls subcontractor received an electrical shock between the fingers on the right hand when he installed a jumper (small conductor between modules) in a controls cabinet in Building 962. The voltage at the time of the event was 206 volts although the voltage to the controls cabinet was designed for 24 volts; the cause of the 206 volts will be investigated. The subcontractor wore standard construction personal protective equipment that included a hard hat, safety shoes, safety glasses and cotton clothing. The subcontractor went to SNL medical and was released to full duty. The severity for this event was calculated to be 330: Hazard Factor: 10 (208 VAC downstream of a 45 KVA transformer); Environment Factor: 0 (dry); Shock Proximity Factor: 10 (contact with live parts); Arc Flash Proximity Factor: 0 (< 1.2 Cal/cm²); Thermal Proximity Factor: NA (AC); No PPE Mitigations; Injury Factor: 3 (shock).

Similar OR Report Number:

Facility Manager:

Name	Greg Kirsch
Phone	(505) 845-9497
Title	FESH Lead

Originator:

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

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/11/2012	17:05 (MTZ)	Debbie Garcia-Sanchez	DOE/SSO
09/12/2012	08:00 (MTZ)	Stan Harrison	4870
09/12/2012	08:00 (MTZ)	Anthony Chavez	4843
09/12/2012	08:00 (MTZ)	Art Ratzel	4800
09/12/2012	08:00 (MTZ)	Lynne Schluter	4820
09/12/2012	08:00 (MTZ)	EOC	4236

Authorized Classifier(AC): John Zavadil Date: 09/13/2012

10)Report Number: [SC--BSO-LBL-GN-2012-0001](#) After 2003 Redesign

Secretarial Office: Science
Lab/Site/Org: Lawrence Berkeley National Laboratory
Facility Name: Genomics
Subject/Title: Employee Experienced Minor Electric Shock While Unplugging Laptop at JGI - No Injury
Date/Time Discovered: 09/18/2012 14:35 (PTZ)
Date/Time Categorized: 09/19/2012 13:10 (PTZ)
Report Type: Update/Final
Report Dates:

Notification	09/20/2012	16:21 (ETZ)
Initial Update	10/08/2012	13:21 (ETZ)
Latest Update	10/08/2012	13:21 (ETZ)
Final		

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

Cause Codes: A2B6C01 - Equipment/ material problem; Defective, Failed or Contaminated; Defective or failed part
 A3B1C03 - Human Performance Less Than Adequate (LTA); Skill Based Errors; Incorrect performance due to mental lapse
 -->couplet - A1B5C01 - Design/Engineering Problem; Operability of Design / Environment LTA; Ergonomics LTA

ISM: 5) Provide Feedback and Continuous Improvement

Subcontractor Involved: No

Occurrence Description: At around 1435 hours on 09/18/2012, a matrixed Lawrence Livermore National Laboratory (LLNL) employee experienced a minor electric shock at LBNL Joint Genome Institute. The employee was not injured.

After attending a meeting in building 100, conference room 101 at JGI, the LLNL employee attempted to remove her laptop charger plug from a 120 VAC multi-outlet power strip located on top of the table, about 30 inches from the table edge. The employee reached to the center of the table but was unable to unplug the charger in the sitting position. While still engaged in a conversation with colleagues, she stood up to get a better grip of the plug. The charger plug was halfway out of the power strip receptacle when it got stuck. The employee applied more effort to remove the plug and her finger inadvertently contacted the exposed metal prongs that were still partially inserted in the receptacle. After experiencing a minor shock, the employee immediately let go of the charger plug and stepped back from the table.

Other than experiencing tingling, the employee did not appear to be injured by the shock. The JGI safety coordinator immediately contacted LLNL and LBNL Health Services and LBNL EHSS (Environment/Health/Safety/Security) personnel advising them of the incident. In a follow-up phone call with the LLNL Health Services, the employee declined medical evaluation. She remained at work for the rest of the day and returned to work the following day with no health issues.

Cause Description:

Primary Apparent Causes (in order of significance):

1. The receptacle in the power strip was defective, damaged, or worn in a manner that made the removal of the electrical plug difficult. During a reenactment of the incident, the plug was again stuck half way out of the power strip receptacle. When tested on other receptacles in the room, the laptop charger plug did not get stuck. A2B6C01
2. The power strip was located in the center of the table approximately 30 inches from the edge of the table. Removing a battery charger plug with arms fully extended made the electrical plug more difficult to grasp, pull out, and to visually check hand position to ensure it did not contact exposed prongs. A1B5C01

Secondary Contributing Apparent Causes(in order of significance):

1. The grounding prong on the plug was slightly bent towards the other two prongs, which would further increase the effort required to remove the electrical plug from the power strip. A2B6C01
2. The employee may have been distracted as she was engaged in conversation with fellow employees while she was trying to remove the electrical plug from the power strip. A3B1C03/couplet A1B5C01

Operating Conditions:

Indoors, dry, lighted

Activity Category:

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

Immediate Action(s):

- The employee stepped back from the table.
- A coworker unplugged the power strip from the electric outlet.
- JGI safety coordinator contacted Health Services at both LLNL and LBNL shortly after, at around 1445 hours.

FM Evaluation:

- The electrical severity (ES) score is 420 (medium significance).
- JGI is a DOE facility and is comprised of six partner institutions, including LBNL and LLNL, with LBNL having the overall management responsibilities, including safety.

- After the incident, the JGI safety coordinator contacted the Health Services group at both LLNL and LBNL.
- Per Memorandum of Understanding, the LLNL Health Services provides health related services to LLNL employees working at JGI.
- The LLNL employee is matrixed to work at JGI and was working under LBNL Job Hazard Analysis (JHA) work authorization when the event occurred.

10/08/2012 UPDATE:

- The power strip was examined by the LBNL electrical safety Subject Matter Expert (SME) and was determined to be not listed by a Nationally Recognized Testing Laboratory (NRTL). It is unlikely that this factor contributed to the incident.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: Joint Genome Institute (JGI)

Plant Area: B100R101

System/Building/Equipment: Building 100, Room 101

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

Corrective Action 01:

Target Completion Date: 10/31/2012 **Actual Completion Date:**

JGI Safety Coordinator will perform walkthrough of all JGI Conference and meeting rooms to locate power strips that are the same manufacturer and model as the power strip involved in the shock incident, and destroy these power strips so they cannot be re-used. (LBNL CATS#9241-1)

Corrective Action 02:

Target Completion Date: 01/17/2013 **Actual Completion Date:**

JGI Safety Coordinator will produce an LBNL Lessons Learned that outlines this incident, and actions that can be taken to avoid similar incidents. (LBNL CATS#9241-2)

Lessons(s) Learned:

- Replace power strips if they become damaged and do not operate correctly.
- Inspect power strips during safety walkthroughs
- Replace non-NRTL listed power strips with NRTL listed power strips.

HQ Keywords:

01A--Inadequate Conduct of Operations - Inadequate Conduct of

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

HQ Summary:

On September 18, 2012, a matrixed Lawrence Livermore National Laboratory employee experienced a minor electric shock at the Lawrence Berkeley National Laboratory Joint Genome Institute while attempting to unplug her laptop power supply from a 120-VAC multi-outlet power strip. She experienced a minor electric shock when her finger inadvertently touched the metal prong that was still partially inserted in the outlet. Other than experiencing tingling, the employee did not appear to be injured by the shock. The employee declined medical evaluation and remained at work for the rest of the day and returned to work the following day with no health issues.

Similar OR Report Number: 1. SC--BSO-LBL-CRD-2011-0001

Facility Manager:

Name	Edward Rubin
Phone	(510) 486-5072
Title	Division Director

Originator:

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

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
09/19/2012	13:34 (PTZ)	Mary Gross	BSO
09/19/2012	13:34 (PTZ)	Kevin Hartnett	BSO

Authorized Classifier(AC):

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