



Office of Health, Safety and Security



Monthly Analysis of Electrical Safety Occurrences

December 2011

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 twelve in November to nine in December and the number of reported electrical shocks decreased from four to two. Also the number of electrical intrusion occurrences decreased from five in November to one. Hazards identification still needs to improve; for example, in only fifty-five percent of the occurrences in December workers identified the hazards.

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 December occurrence reports is provided in Attachment 2.

Electrical Shock

There were two occurrences in December that resulted in an electrical shock. One of these occurrences involved a non-electrical worker. The occurrences are summarized below.

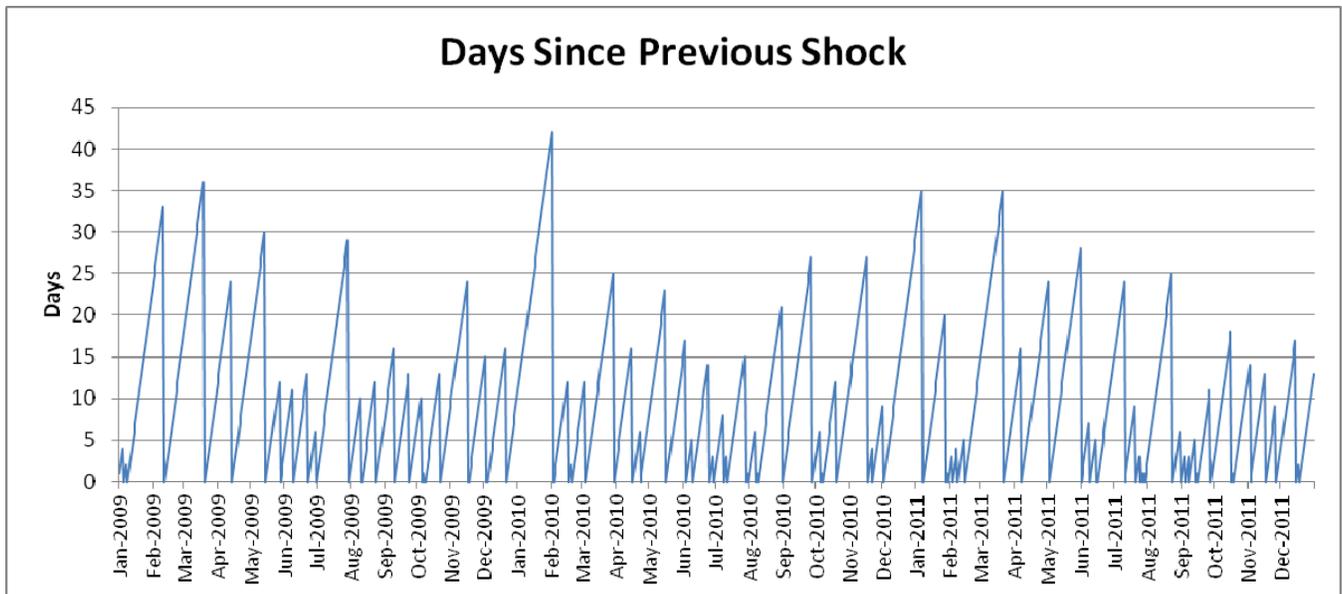
1. A Disposition Project worker received a mild electrical shock from an energized 120-volt electrical line while sealing penetrations with fire-stop material in a common wall between two facilities, one of which was in "cold and dark" for demolition. The worker was not injured and was taken to medical for evaluation and released for work. The worker was pushing the seal material into a previously cut conduit line when he received a tingle to his hand and saw a spark within the conduit. The electrical line was recessed in the conduit and was not visible on initial inspection. This

penetration/conduit was only accessible by an aerial lift. Interference removal required for accessing this area limited the ability of a pre-job inspection of this work site. The line should have been de-energized as part of the “cold and dark” condition. The electrical line has since been removed.

2. An electrical contractor received an electrical shock while working in an electrical panel. The worker received minor electrical burns to his hand and was treated at the Occupational Medical Clinic and returned to work. The electrical panel had been locked and tagged out before the incident. The worker had conducted zero energy checks minutes before receiving the shock. The source of energy that caused the shock has not been determined and could have been from a welder’s arc.

Figure 1 shows the number of days since the previous electrical shock for the DOE complex. The present interval is 13 days. The longest interval was 41days in 2010.

Figure 1 - Days since Previous Shock



Electrical Intrusion

In December, the number of electrical intrusion occurrences (i.e., cutting/penetrating, excavating, or vehicle contact of electrical conductors) decreased from five in November to just one this month. In this occurrence, a contractor backhoe operator damaged a secondary 120-volt electrical line while excavating a trench for a lift station project. The secondary electrical line serves a septic tank high-level alarm system. The work was authorized with an excavation permit and pre-job utility locates had been performed. The secondary electrical line was not detected using traditional utility locate methods or the 50/60 Hz frequency method. There was no impact to personnel safety, health, or the environment as a result of this event. A critique was conducted. The appropriate as-built drawings will be annotated to reflect the secondary electrical line.

Hazardous Energy Control

In December there were four reported occurrences involving lockout/tagout (LOTO) or hazardous energy control issues. This is an increase from the two occurrences reported in November. The majority of these occurrences involved the failure to install LOTO devices when they were required, underscoring the importance of establishing an electrically safe work condition and implementing positive control over the source of energy.

1. A worker noticed two transformers with labels identifying them as direct current capacitors sitting outside and he saw no visible sign of shorting straps/devices that would indicate the capacitors were electrically safe. He reported the situation and the area was immediately roped-off. The Chief Electrical Safety Officer determined that there was no electrical hazard associated with the capacitors because they had not been charged in over 6 years. A standing Integrated Work Document for safing capacitors was modified for use outdoors and the equipment was safed.
2. A facility representative observed that a motor control center (MCC), which provided power to an electrical panel had not been locked and tagged out. Flooding had occurred from frozen reheat coils in the ceiling and water had been observed flowing from the ceiling and through the electrical panel. As a precaution, the acting operations manager had isolated the MCC with the intention to lock and tag it out at a later time, but forgot to do so. Following identification of the error by the facility representative, the operations manager locked and tagged out the MCC. There was no impact to workers, operations, or the facility from the lockout/tagout discrepancy. The reheat coils were repaired and a work ticket was issued for electricians to replace the circuit breakers in the electrical panel.
3. A worker was connecting garage door pressure sensor wiring to a 24-volt AC controller following maintenance and did not use a lockout device. The worker had disconnected the power source to the controller and verified a zero-energy condition, but failed to lockout the 120-volt AC energy isolation switch. There were no injuries.
4. Subcontractor workers had removed a bus shelter structure before electrical isolation was confirmed and the work was authorized. The bus shelter contained a ceiling light that required a LOTO. They had removed the shelter from its foundation and demolished the electrical conduit supplying power to the ceiling light without verifying the absence of hazardous energy. The demolished electrical conduit and wire ran between a street lamp pole and the bus shelter. There was no damage to the lamp pole. Facility electricians subsequently determined that electrical energy was isolated from the ceiling light. A stand-down meeting was held with the subcontractor workers.

Electrical Near Miss

In December there were two occurrences that were considered to be an electrical near miss. This is a decrease from the five near-miss occurrences reported in November. The first occurrence involved the excavation event discussed in the Electrical Intrusion section. The second occurrence happened while a vendor service engineer was installing optical fiber

cables in a new cabinet server rack. The service engineer's upper arm bumped into a metal wire bail on a cabinet power distribution unit (CDU) attached to the back of the rack causing a small electrical arc. The metal bail is a retainer clip used to securely hold a standard type plug into the CDU receptacle. The bail flexed on the hard contact and an end slipped out of its normal mooring slot and slid into a heat vent hole behind the mooring slot which caused the arc. The circuit breaker for this section of the CDU tripped. The CDU is a commercial, UL approved device operating at 208 volts. The service engineer did not make any direct skin contact with the electrical current or the arc. He was wearing a jacket and a shirt underneath the jacket. The arc fault did leave a black 5 millimeter mark on the jacket sleeve above the elbow. The vendor is already working on a remedy and has suggested a simple bail design improvement that will be tested to see if it reduces or eliminates the risk of an arc fault.

Monthly Occurrences Tables

Table 1 shows a breakdown of the outcomes, performance issues, and worker types associated with the electrical safety occurrences for December 2011.

Table 1 - Breakdown of Electrical Occurrences

Number of Occurrences	Involving:	Last Month
2	Electrical Shocks	4
1	Electrical Burns	0
4	Hazardous Energy Control	2
2	Inadequate Job Planning	1
0	Inadvertent Drilling/Cutting of Electrical Conductors	2
1	Excavation of Electrical Conductors	3
0	Vehicle Intrusion of Electrical Conductors or Equipment	0
2	Electrical Near Misses	5
5	Electrical Workers	2
4	Non-Electrical Workers	10
4	Subcontractors	5

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

In compiling the monthly totals, the search initially 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
 The search produced nine occurrence reports.

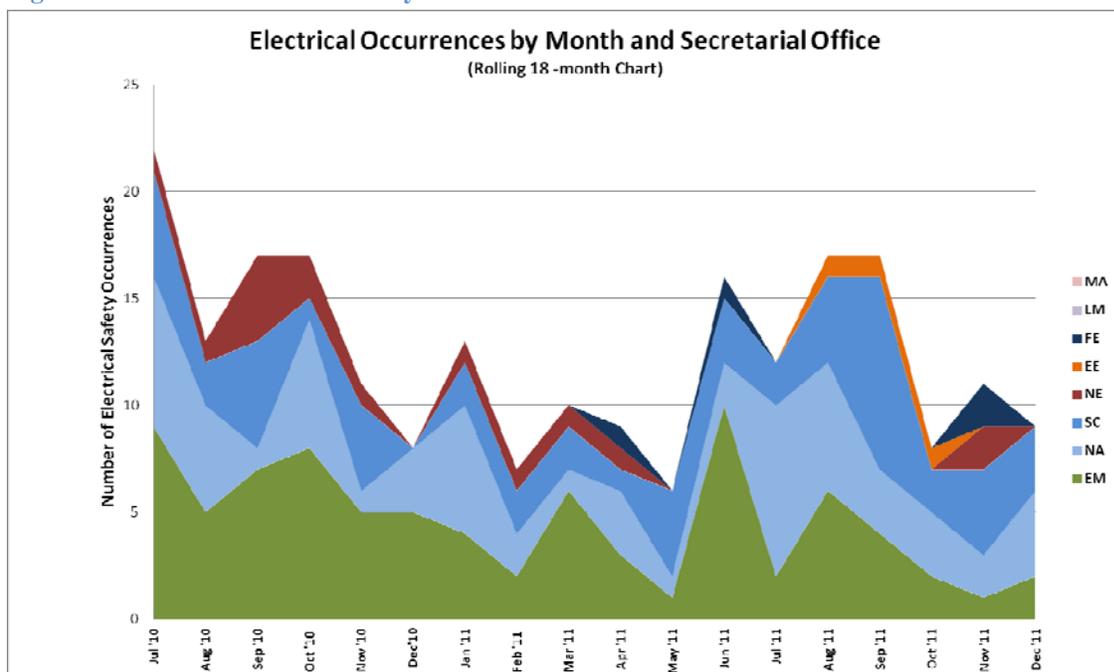
Table 2 provides a summary of the electrical safety occurrences for CY 2011. The monthly average for 2011 remained the about the same as last month (11.5 occurrences). The reported number of electrical shocks averaged 3 per month for the year.

Table 2 - Summary of Electrical Occurrences

Period	Electrical Safety Occurrences	Shocks	Burns	Fatalities
December	9	2	1	0
November	12	4	0	0
October	8	2	0	0
September	17	7	2	0
August	17	2	0	0
July	12	5	0	0
June	16	5	1	0
May	6	1	0	0
April	9	1	0	0
March	10	1	0	0
February	7	3	0	0
January	13	3	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 2 shows the distribution of electrical safety occurrences by Secretarial Office, with Environmental Management with the fewest reports and NNSA with the most reports.

Figure 2 - 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. Six of the electrical occurrences did not have an ES score. The other three occurrences are classified as shown in Table 3. The actual score for each occurrence is provided in Attachment 1.

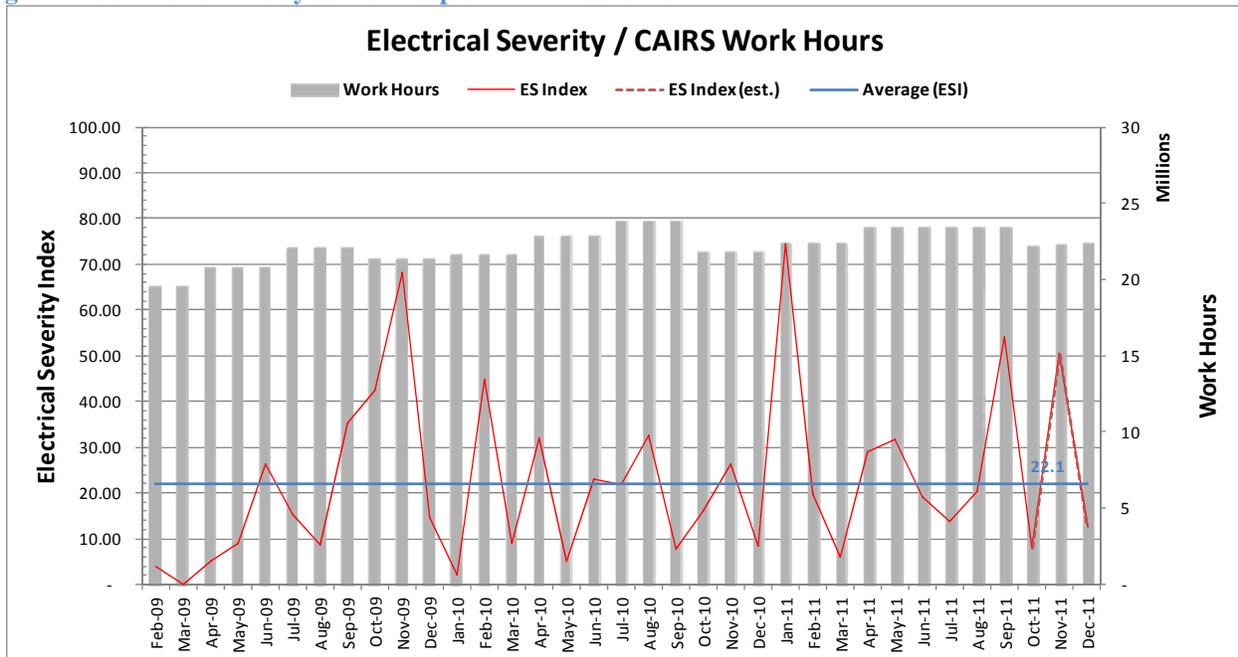
Table 3 – Classification of Electrical Safety Occurrences by ES Score

Occurrence Classification	Electrical Severity Score	Number of Occurrences
HIGH	≥ 1750	0
MEDIUM	31-1749	2
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 3 shows a calculated ESI for the DOE complex and Table 4 shows the ESI and how it has changed from the previous month.

Figure 3 - 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

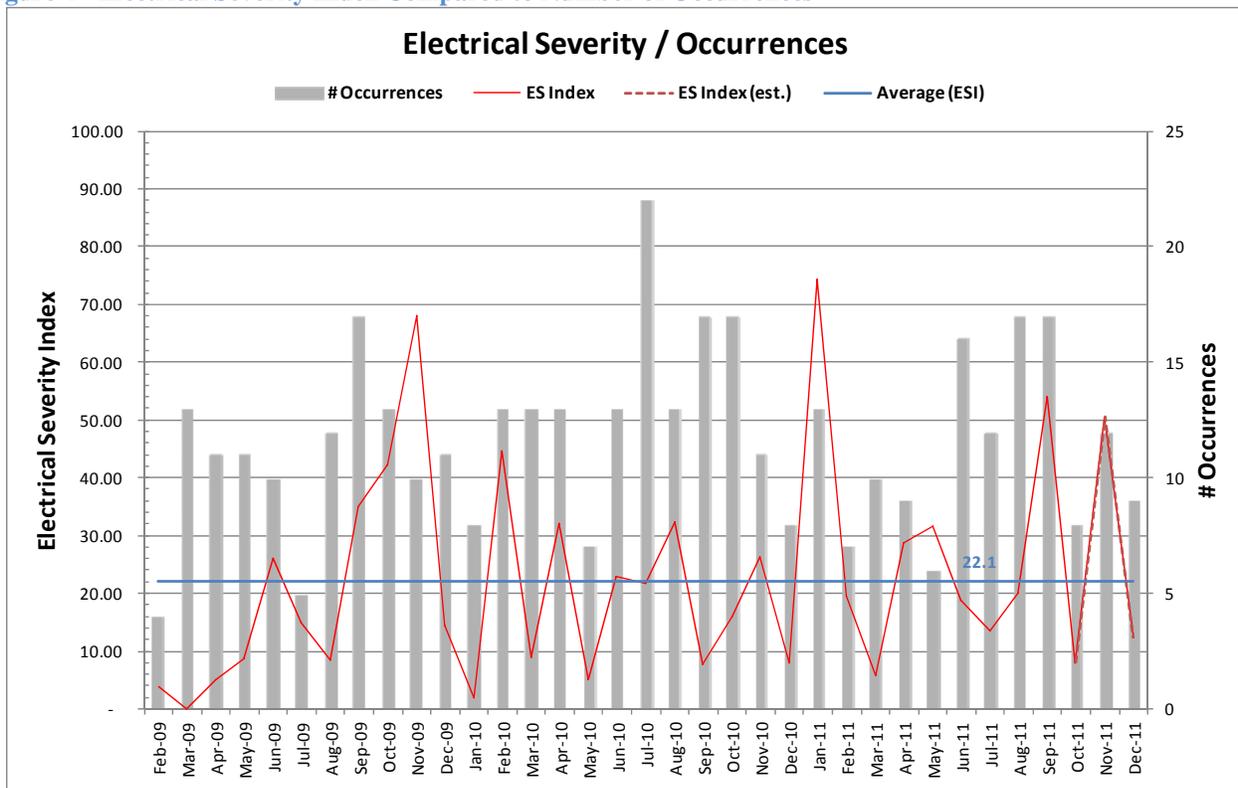
Category	November	December	Δ
Total Occurrences	12	9	-3
Total Electrical Severity	5,630	1,400	-4,230
Estimated Work Hours	22,293,632* (23,416,950)	23,416,950	+90,938
ES Index	50.51* (48.08)	12.51	-38.00
Average ESI	22.2	22.1	-0.1

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

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

Figure 4 shows the ESI with the number of Occurrences instead of Work Hours.

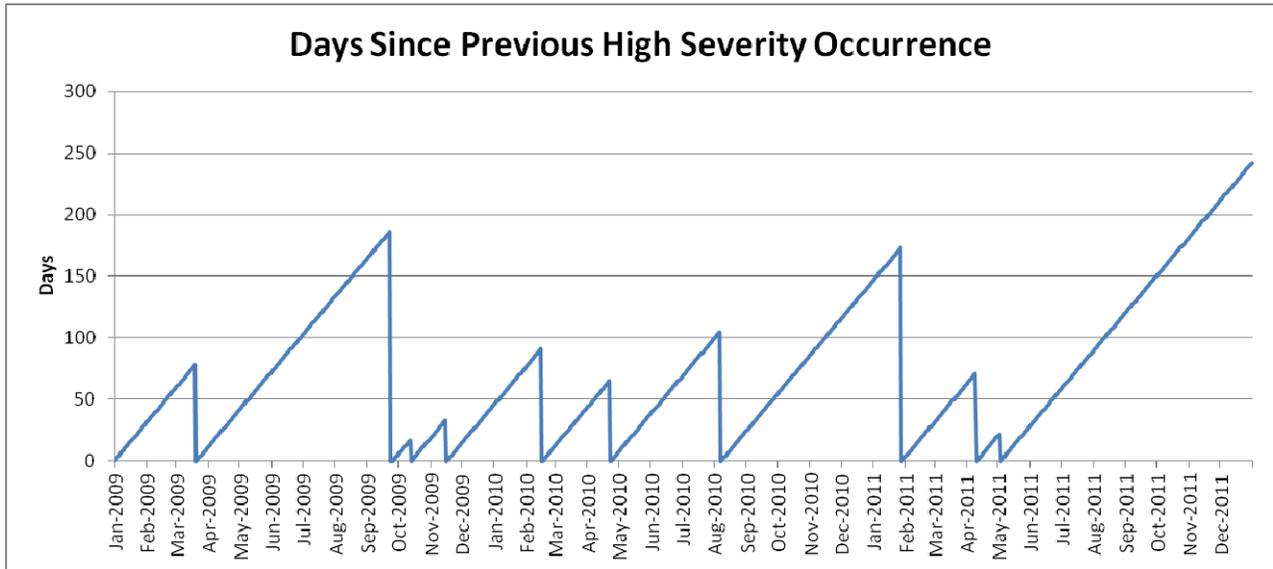
Figure 4 - Electrical Severity Index Compared to Number of Occurrences



The average ESI has remained fairly constant over the past several month and decreased slightly from November to 22.1 in December. The lowest average ESI was 19.2 in June 2010.

Figure 5 shows the number of days since the previous high severity occurrence. The present interval is 240 days. The previous longest interval was 181 days in 2009.

Figure 5 - Days since Previous High Severity Occurrence



Summary of Occurrences by Severity Band

For the interval December 2010 through December 2011 (current month and the past 12), Figures 6 and 7 summarize occurrences by severity band and month of discovery date by percentage of total occurrences in month and number of occurrences in month.

Figure 6 - Occurrences by Electrical Severity Band (Percentage)

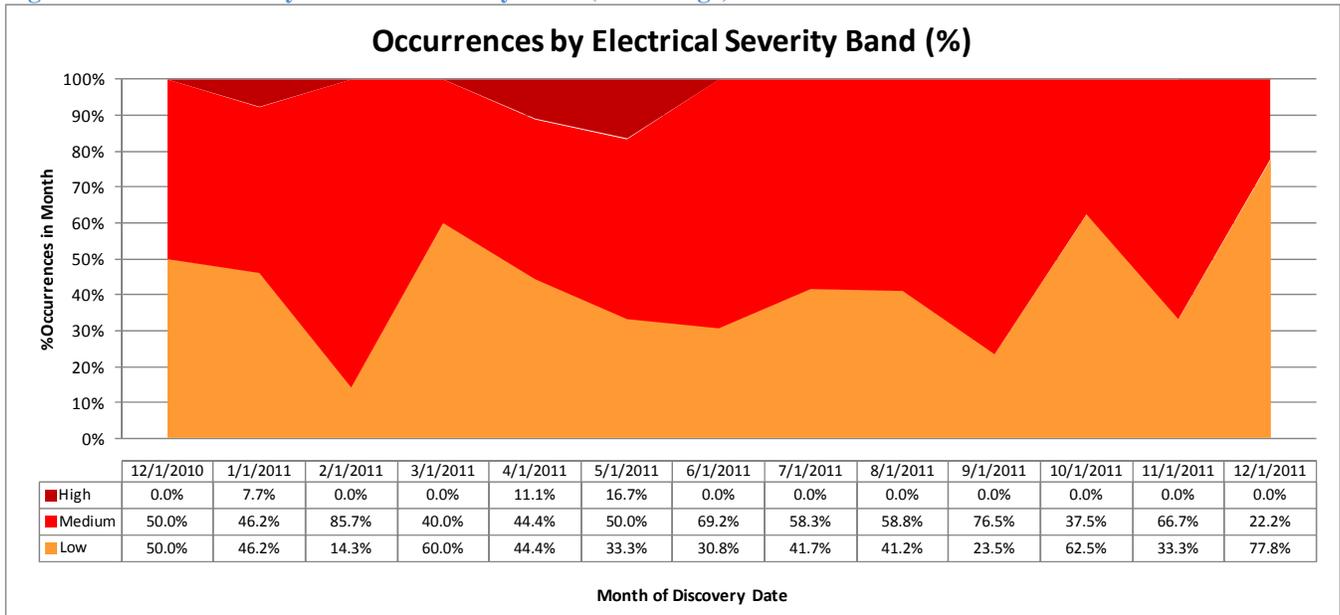
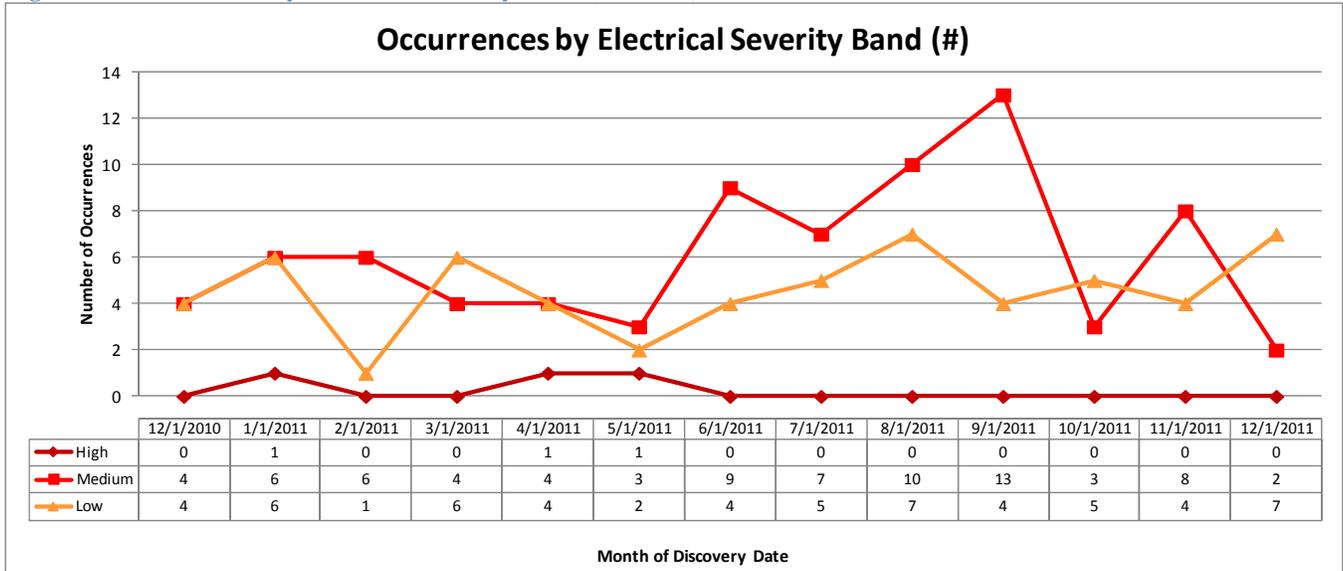


Figure 7 - Occurrences by Electrical Severity Band (Number)

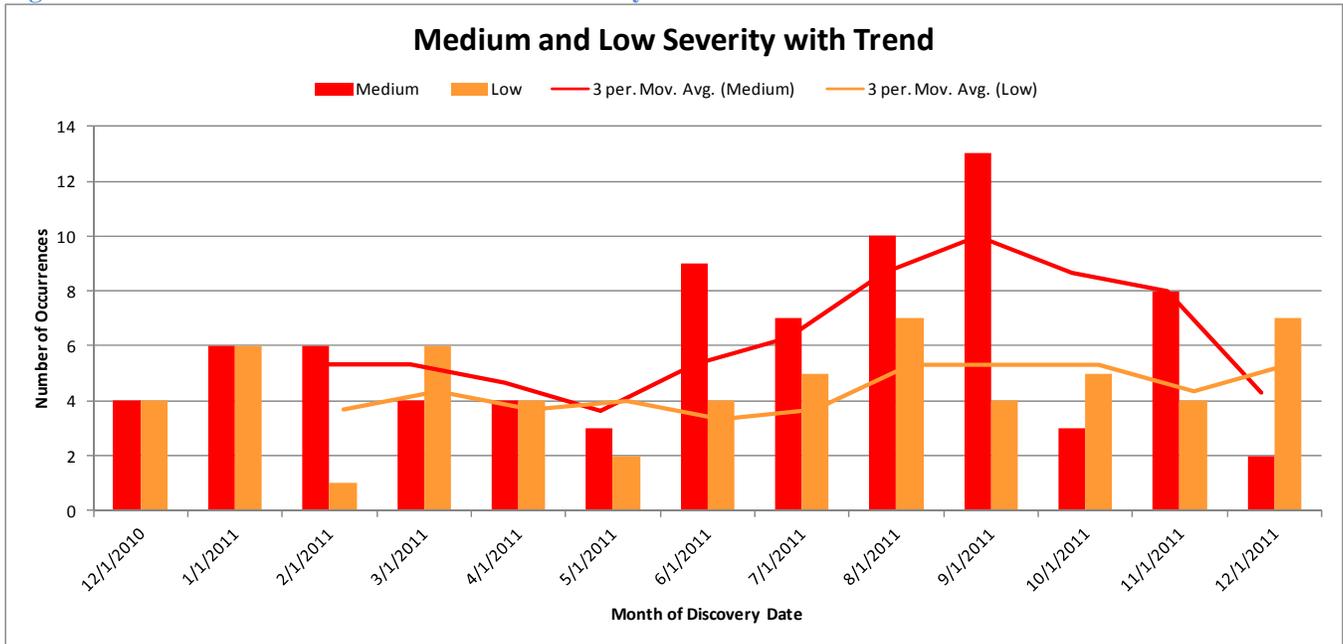


What can be seen from the previous two charts is that the number of occurrences with High electrical severity scores has remained at zero for the past seven months and that the number of occurrences with Medium scores has decreased below the number of Low severity occurrences, which is a favorable trend.

Medium and Low Severity with Trend

Figure 8 focuses on the Medium and Low severity data series for December 2010 through December 2011. Trend lines are included for each, using a 3-month moving average.

Figure 8 - Trend of Medium and Low Electrical Severity Occurrences



The 3-month moving average shows a decreasing trend in the Medium severity occurrences following the peak in September 2011. The figure also shows a slight increase in the number of of Low severity occurrences.

Additional Resources

Electrical Safety Blog

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

Electrical Safety Wiki

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

EFCOG Electrical Safety Subgroup

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

Center of Excellence for Electrical Safety

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

Contact

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Attachment 1

Electrical Safety Occurrences – December 2011

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---WGI-G2H2-2011-0008	A worker was shocked from a cut electrical line in a conduit while sealing penetrations.	X								2	2E(1)	330
2	EM-RP--WRPS-TANKFARM-2011-0025	Additional power source was discovered after performing the safe-to-work check.					X				3	2E(2)	0
3	NA--LASO-LANL-ACCCOMPLEX-2011-0008	Transformers containing capacitors moved and stored without safing.				X					3	2E(3)	0
4	NA--LASO-LANL-FIRNGHELAB-2011-0012	A contractor backhoe operator damaged a 120V energized electrical line during excavation.						X			3	2E(2)	0
5	NA--LASO-LANL-NUCSAFGRDS-2011-0003	An MCC was isolated for water intrusion concerns but was not locked and tagged out as required.				X					3	2E(3)	0
6	NA--SS-SNL-6000-2011-0005	A worker hit wiring to a 24-volt AC controller and did not use a LOTO on the 120V switch.				X					3	2E(3)	20
7	SC--ASO-ANLE-ANLELCF-2011-0001	Electrical arc fault on 208V power distribution unit when retainer clip hits conductor.									4	10(2)	1050
8	SC--BHSO-BNL-BNL-2011-0034	An electrical contractor received an electrical shock while working in an electrical panel.	X	X							2	2E(1)	0
9	SC--BSO-LBL-OPERATIONS-2011-0026	A bus shelter ceiling light conduit was removed before the work was authorized and LOTO confirmed.				X	X				3	2E(3)	0
	TOTAL		2	1	0	4	2	1	0	0			

Key

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

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

Attachment 1

Electrical Safety Occurrences – December 2011

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---WGI-G2H2-2011-0008	A worker was shocked from a cut electrical line in a conduit while sealing penetrations.		X		X					X			
2	EM-RP--WRPS-TANKFARM-2011-0025	Additional power source was discovered after performing the safe-to-work check.	X				X				X			
3	NA--LASO-LANL-ACCCOMPLEX-2011-0008	Transformers containing capacitors moved and stored without safing.		X			X				X			
4	NA--LASO-LANL-FIRNGHELAB-2011-0012	A contractor backhoe operator damaged a 120V energized electrical line during excavation.		X	X	X					X			X
5	NA--LASO-LANL-NUCSAFGRDS-2011-0003	An MCC was isolated for water intrusion concerns but was not locked and tagged out as required.	X				X				X			
6	NA--SS-SNL-6000-2011-0005	A worker hit wiring to a 24-volt AC controller and did not use a LOTO on the 120V switch.		X			X				X			
7	SC--ASO-ANLE-ANLELCF-2011-0001	Electrical arc fault on 208V power distribution unit when retainer clip hits conductor.	X		X	X					X			X
8	SC--BHSO-BNL-BNL-2011-0034	An electrical contractor received an electrical shock while working in an electrical panel.	X		X	X					X			
9	SC--BSO-LBL-OPERATIONS-2011-0026	A bus shelter ceiling light conduit was removed before the work was authorized and LOTO confirmed.	X		X		X				X			
	TOTAL		5	4	4	4	5	0	0	0	9	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

Production GUI - New ORPS

ORPS contains 55541 OR(s) with 58851 occurrences(s) as of 2/7/2012 6:57:22 AM
Query selected 9 OR(s) with 9 occurrences(s) as of 2/7/2012 2:21:28 PM

Download this report in Microsoft Word format. 

1)Report Number: [EM---WGI-G2H2-2011-0008](#) After 2003 Redesign
Secretarial Office: Environmental Management
Lab/Site/Org: Separations Process Research Unit
Facility Name: G2/H2 Facilities
Subject/Title: Electrical Shock Event During G2 Penetration Sealing
Date/Time Discovered: 12/18/2011 11:00 (ETZ)
Date/Time Categorized: 12/18/2011 12:56 (ETZ)
Report Type: Notification
Report Dates:

Notification	12/21/2011	10:33 (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: A4B3C08 - Management Problem; Work Organization & Planning LTA; Job scoping did not identify special circumstances and/or conditions

ISM: 2) Analyze the Hazards

Subcontractor Involved: No

Occurrence Description: A SPRU DP worker received a mild electrical shock from a live electrical line while sealing penetrations in the common wall for the G1 and G2 facilities. The worker was not injured and was taken to medical for evaluation. The worker was released for return to work.

The work involved sealing and placement of fire stop in wall penetrations between the G1 and G2 facilities. The worker was pushing seal material into a previously cut conduit line when he received a tingle to his hand and saw an arc within the conduit. The electrical line was recessed in the conduit and not visible on initial inspection.

This penetration/conduit was located above the ground level and only

accessible by aerial lift. Interference removal required for accessing this area limited the ability of a pre-job inspection of this work site.

The source of the electrical line is from the G1 Building which is under KAPL control. KAPL is investigating the source of the line. The separation of utilities for "cold and dark" of the G2 facility took place in 2009 and 2010.

Cause Description: To be determined after causal analysis.

Operating Conditions: G2 Facility in D&D

Activity Category: Facility Decontamination/Decommissioning

Immediate Action(s): Suspended work activities. Transported worker to medical facility for evaluation. KAPL is investigating the source of the electrical line. Scheduled fact finding.

FM Evaluation: Installation of the fire stop material on this penetration is on hold. This does not impact the overall schedule for construction of the G2 enclosure.

DOE Facility Representative Input:

DOE Program Manager Input:

Further Evaluation is Required: Yes.
Before Further Operation? No
By Whom: Operations Mgr/ESHQ Mgr
By When:

Division or Project: Separations Process Research Unit (SPRU)

Plant Area: G2/G2 Common Wall

System/Building/Equipment: G2 Facility

Facility Function: Environmental Restoration Operations

Corrective Action 01:

Target Completion Date: 02/01/2012	Actual Completion Date:
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Lessons(s) Learned: Complete causal analysis and develop corrective action plan.

HQ Keywords: To be determined after causal analysis
01A--Inadequate Conduct of Operations - Inadequate Conduct of Operations (miscellaneous)
01N--Inadequate Conduct of Operations - Inadequate Job Planning (Other)
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 December 18, 2011, a Disposition Project worker received a mild electrical shock from an energized electrical line while sealing penetrations in the common wall between the G1 and G2 facilities. The worker was not injured and was taken to medical for evaluation and released for work. The worker was pushing seal material into a previously

cut conduit line when he received a tingle to his hand and saw an arc within the conduit. The electrical line was recessed in the conduit and was not visible on initial inspection. This penetration/conduit was only accessible by aerial lift. Interference removal required for accessing this area limited the ability of a pre-job inspection of this work site. The source of the electrical line is from the G1 Building which is under the control of Knolls Atomic Power Laboratory (KAPL). KAPL is investigating the source of the line. Work was suspended and a fact finding was scheduled.

Similar OR Report Number: 1. To be determined.

Facility Manager:

Name	HALL, DAVID M
Phone	(865) 253-1655
Title	ESH&Q MANAGER

Originator:

Name	HALL, DAVID M
Phone	(865) 253-1655
Title	ESH&Q MANAGER

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
12/18/2011	11:12 (ETZ)	R. Crossman	DOE FR

Authorized Classifier(AC):

2)Report Number:

[EM-RP--WRPS-TANKFARM-2011-0025](#) After 2003 Redesign

Secretarial Office:

Environmental Management

Lab/Site/Org:

Hanford Site

Facility Name:

Tank Farms

Subject/Title:

Additional Power Source Discovered After Eight-Criteria Checklist Safe-To-Work Check Performed

Date/Time Discovered:

12/08/2011 14:25 (PTZ)

Date/Time Categorized:

12/08/2011 14:35 (PTZ)

Report Type:

Final

Report Dates:

Notification	12/13/2011	15:33 (ETZ)
Initial Update	01/19/2012	12:51 (ETZ)
Latest Update	01/27/2012	11:48 (ETZ)
Final	01/27/2012	11:48 (ETZ)

Significance Category:

3

Reporting Criteria:

2E(2) - Any unexpected discovery of an uncontrolled electrical hazardous energy source (e.g., live electrical power circuit, etc.). This criterion does

not include discoveries made by zero-energy checks and other precautionary investigations made before work is authorized to begin.

Cause Codes:

A3B3C05 - Human Performance Less Than Adequate (LTA); Knowledge Based Error; Incorrect assumption that a correlation exists between two or more facts

-->couplet - NA

A4B1C02 - Management Problem; Management Methods Less Than Adequate (LTA); Job performance standards not adequately defined

A3B3C06 - Human Performance Less Than Adequate (LTA); Knowledge Based Error; Individual underestimated the problem by using past events as basis

-->couplet - NA

ISM:

2) Analyze the Hazards

3) Develop and Implement Hazard Controls

Subcontractor Involved:

No

Occurrence Description:

On December 08, 2011, while performing work on an annulus leak detector (ENRAF) for tank 241-SY-102, an additional 120 volt alternating current (VAC) electrical power source was discovered. The scope of work under work package TFC-WO-11-5342 was to remove ENRAF SY102-WSTA-LDT-151 from the tank's annulus riser to allow tools to be inserted into the annulus to displace or remove debris that was directly beneath the ENRAF's displacer.

After identifying the electrical isolation point and agreeing upon the safe-to-work check location at the morning's pre-job briefing, the ENRAF was to be isolated in accordance with the eight-criteria checklist. The workers, an electrician and an instrument technician tasked to remove power and control wiring, performed the specified safe-to-work check and installed their authorized worker locks (AWL). During the work, the workers identified an unanticipated condition - unexpected set of wires. The electrician checked this set of wires for voltage and found 120VAC present.

The sequence of activities was as follows.

The workers removed the weather cover of the ENRAF and verified the presence of 120VAC at the ENRAF power wires. The workers then removed the source of power by turning the local hand switch to the OFF position and observed the 120VAC de-energize. This satisfied the agreed upon safe-to-work check. The workers then installed their AWL on the local hand switch. The electrician disconnected and terminated the three power conductors while the instrument technician locked the motor of the ENRAF in place. The workers then disconnected and terminated the signal wires for the ENRAF. The workers noted the presence of additional (blue)

wires connected to the terminal strip that were similar to the signal wires - not a normal configuration for an annulus ENRAF. The workers checked the voltage on the blue wires and found 13 volts across the wires, but 120VAC to ground. The workers recognized that there was a second source of power in the ENRAF and stopped work, reinstalled the weather cover and exited the tank farm.

It should be noted this ENRAF was operated on temporary power for a period of over one year as a part of a major tank farm electrical outage and had recently been returned to service. This temporary power was supplied to only the ENRAF motor and operating circuitry, but the annunciator alarm loop had been de-energized for the entire outage. This was the first maintenance evolution performed on any of the 241-SY tank farm annulus leak detector ENRAFs since normal power had been restored to the farm.

Cause Description:

The causes of this event were determined using Apparent Cause Analysis utilizing Why Analysis methodology as defined in the ESHQ Manual, Quality Administration, TFC-ESHQ-Q_C-C-01, "Problem Evaluation Request."

The apparent cause was determined to be failure to properly confirm a single source of energy for an Eight-Criteria Checklist lockout. (A3B3C05) [AC01]

The analysis team determined the cause for this event to be the failure of the Controlling Organization Administrator (COA) to properly confirm a single source of energy for use of an eight-criteria lockout. This error is considered to be an isolated human performance issues that will be addressed on an individual culpability basis by management in accordance with procedure. However, for this event, the COA did not properly follow procedure and expectations provided in training and subsequent communications for verifying a single source of power for use of the eight-criteria lockout per the Hanford Site Lockout/Tagout procedure DOE-0336, which is a failure of the first barrier in the process.

A contributing factor was determined to be the mindset that a drawing's dotted line symbol was associated only with low voltage signal lines. (A3B3C06) [CC01]

The analysis team determined a contributing factor to the above apparent cause was less than adequate understanding of drawing symbols resulted in the failure to recognize the 120 volt alternating current (VAC) instrument leads from the 271-SY building annunciator - the COA's mindset was that the dotted line symbol on the drawing were associated only with low voltage signal lines (i.e., less than 50 volts). With this mindset established, the COA did not question the multiple conduits going to the ENRAF or,

during his visual verification, the fact the conduits went underground identifying the energy isolation point was not correct as required per DOE-0336 for the performance of the Eight-Criteria Checklist. This was contrary to the expectations for determining if the isolation is readily identifiable.

A second apparent cause was determined to be poor communication of expectations and enforcement of requirements for the performance of verification and concurrence to identify the energy isolation point was correct. (A4B1C02) [AC02]

Another cause for this event was a poor communication of expectations and enforcement of requirements for the performance of the COA and Authorized Worker (AW) verification and concurrence to identify the chosen energy isolation point was correct. It was determined the COA incorrectly understood the expectations on compliance with the Hanford Site Lockout/Tagout procedure DOE-0336 for verification with the AW that the chosen isolation point was correct and concurrence to use the eight-criteria lockout method. This incorrect understanding resulted in failure to comply with the procedure. Expectation on how to comply with "verify and concur the identified energy isolation point is correct" within DOE-0336 for the COA and AW needs to be institutionalized and communicated to personnel involved with completing Eight-Criteria Checklists and obtaining concurrence for its use by the AW involved with the work.

As part of the extent of condition review, the analysis team determined the design of the annunciator system at SY Farm is the only system that used 120VAC signal line; the other tank farms utilize a low voltage annunciator signal. Thus, this issue is bounded to the SY Farm. The analysis team discussed work schedule for SY Farm with Work Control and determined no ENRAF or annunciator affecting work was ongoing or planned in the near future.

Also, the analysis team determined other COAs or Operations Engineers (OEs) may have the same misunderstanding of dotted line symbols on drawings and need to be briefed on the lessons learned from this event. Additionally, the expectations for verification of eight-criteria isolation as required per DOE-0336 needs to be developed and communicated to all COAs and OEs to ensure expectations are clear and performed in a consistent manner.

The corrective actions for this event will address clarifying verification expectations in the Lock and Tag Expectations and Guidance, plan TFC-PLN-133, and communicating the lessons learned from this event to personnel involved with verifying eight-criteria lockout isolation.

Operating Conditions: Does not apply.
Activity Category: Maintenance
Immediate Action(s): Work was stopped and the worksite was placed in a safe condition. An event investigation scheduled.
FM Evaluation: It is imperative that the expectation for the verification and concurrence of isolation is clearly communicated and understood for a successful lockout/tagout (LOTO) program. Due diligence with regards to positively identify isolation of an energy source using drawings (and cross checking with other facility/system drawings), field walkdowns, and previous Tagout Authorization Forms is necessary to ensure proper LOTO performance and safety of personnel. Due to the questioning attitude of the electrician when an unexpected condition was discovered, this event did not have a negative impact to personnel or the facility.

This report was reviewed with, and approved by, Lisa A Domnoske-Rauch, TF OPERATIONS DIVISION, on January 27, 2012.

DOE Facility Representative

Input:
DOE Program Manager
Input:

Further Evaluation is Required: No

Division or Project: Washington River Protection Solutions LLC (WRPS)

Plant Area: 200 West

System/Building/Equipment: Leak Detection/241-SY-102/ENRAF

Facility Function: Nuclear Waste Operations/Disposal

Corrective Action 01:	Target Completion Date: 03/15/2012	Tracking ID: WRPS-PER-2011-2353.1
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Revise Plan TFC-PLN-133, Lock and Tag Expectations and Guidance, to define the expectations for Controlling Organization Administrators to obtain concurrence from the Authorized Worker(s) that the identified energy isolation point is correct for an eight-criteria lockout. [AC02-01]

Objective Evidence: Copy of revised TFC-PLN-133.

Actionee: Turner, Dennis M

Corrective Action 02:	Target Completion Date: 04/30/2012	Tracking ID: WRPS-PER-2011-2353.2
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Brief Operations Engineers and Controlling Organization Administrators on the expectation to obtain concurrence from the Authorized Worker(s) for eight-criteria lockout and the change in Plan TFC-PLN-133, Lock and Tag Expectations and Guidance, defining the expectations for Controlling

Organization Administrator and Authorized Worker concurrence. [AC02-02]

Objective Evidence: Copy of briefing material and rosters of Operations Engineers and Controlling Organization Administrators attending briefing.

Actionee: Turner, Dennis M

Corrective Action 03:

Target Completion Date: 02/15/2012	Tracking ID: WRPS-PER-2011-2353.3
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Brief Operations Engineers and Controlling Organization Administrators on the lessons learned regarding the meaning of dotted line symbols on drawings in that the symbols can indicate electrical power source or a low voltage signal. [CC01-01]

Objective Evidence: Copy of briefing material and rosters of Operations Engineers and Controlling Organization Administrators attending the briefing.

Actionee: Turner, Dennis M

Corrective Action 04:

Target Completion Date: 02/15/2012	Tracking ID: WRPS-PER-2011-2353.4
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Issue tailgate regarding the meaning of dotted line symbols on drawings in that the symbols can indicate electrical power source or a low voltage signal. [CC01-02]

Objective Evidence: Copy of the tailgate material.

Actionee: Turner, Dennis M

Lessons(s) Learned:

Personnel involved in determining when an eight-criteria lockout can be used must be aware that completion of the Eight-Criteria Checklist and the criteria that "the equipment has a single energy source that can be readily identified and isolated" is just one aspect of this process. Once the Eight-Criteria Checklist is complete and signed by the Controlling Organization Administrator, indicating the eight-criteria have been met per the Hanford Site Lockout/Tagout Procedure (DOE-0336), the second step is for the Controlling Organization Administrator and Authorized Worker(s) to "verify and concur the identified energy isolation point is correct" and to "agree to use the eight-criteria or use a Controlling Organization Lockout/Tagout." The involvement of the Authorized Worker in the identification and adequacy of the isolation boundary verification is essential to proper performance of lockout/tagout and ensure safety of personnel.

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)
- 01P--Inadequate Conduct of Operations - Inadequate Oral Communication
- 01R--Inadequate Conduct of Operations - Management issues
- 12C--EH Categories - Electrical Safety
- 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On December 8, 2011, while performing work on an annulus leak detector (ENRAF) for tank 241-SY-102, an additional 120 volt alternating current (VAC) electrical power source was discovered. The scope of work was to remove ENRAF SY102-WSTA-LDT-151 from the tank's annulus rise to allow tools to be inserted into the annulus to displace or remove debris that was directly beneath the ENRAF's displacer. The ENRAF was to be isolated in accordance with the eight-criteria checklist. The workers performed the specified safe-to-work check and installed their authorized worker lock and tag (AWL). The workers removed the weather cover of the ENRAF and verified the presence of 120VAC at the ENRAF power wires. The workers then removed the source of power and disconnected and terminated the signal wires for the ENRAF, satisfying the agreed upon safe-to-work check. The workers also installed their AWL on the local hand switch. The workers noted the presence of additional (blue) wires connected to the terminal strip that were similar to the signal wires. The workers checked the voltage on the blue wires and found 13 volts across the wires, but 120VAC to ground. The workers recognized that there was a second source of power and stopped work, reinstalled the weather cover, and exited the tank farm. An event investigation was scheduled.

Similar OR Report Number: 1. None

Facility Manager:

Name	Ellis, Martin W
Phone	(509) 373-4696
Title	Manager, Base OPS Technical Support

Originator:

Name	WATERS, SHAUN F
Phone	(509) 373-3457
Title	OPERATIONS SPECIALIST

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
12/08/2011	14:50 (PTZ)	Frink, R. L.	DOE-ORP
12/08/2011	14:50 (PTZ)	Saueressig, D. J.	WRPS
12/08/2011	14:50 (PTZ)	Crary, N. L. Jr.	MSA-ONC

Authorized Classifier(AC):

3)Report Number: [NA--LASO-LANL-ACCCOMPLEX-2011-0008](#) **After 2003 Redesign**
Secretarial Office: National Nuclear Security Administration
Lab/Site/Org: Los Alamos National Laboratory
Facility Name: Accelerator Complex
Subject/Title: Transformers Containing Capacitors Moved and Stored Without Safing
Date/Time Discovered: 12/14/2011 16:05 (MTZ)
Date/Time Categorized: 12/14/2011 16:47 (MTZ)
Report Type: Final

Report Dates:

Notification	12/20/2011	18:07 (ETZ)
Initial Update	01/26/2012	15:10 (ETZ)
Latest Update	01/26/2012	15:10 (ETZ)
Final	01/26/2012	15:10 (ETZ)

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

Cause Codes:

ISM: 2) Analyze the Hazards

Subcontractor Involved: No

Occurrence Description: Management Synopsis: On Thursday, 12/14/2011 at approximately 16:00, a P-25 employee was walking outside in the vicinity of the Neutron Time of Flight (NTOF) Flight Path Emergency Generator when he noticed two transformers with labels identifying them as direct current capacitors (2.5 uF, 1125 J) sitting outside. He saw there were no visible signs of shorting straps/devices that would indicate the capacitors were electrically safe. He reported the situation to Facility Operations and the area was immediately roped-off by the Facility Coordinator. The Laboratory's Chief Electrical Safety Officer determined that there was no electrical hazard associated with the capacitors because they had not been charged in over 6 years.

Background:

TA-53-1168 is a tractor trailer designed as a power transfer unit that had been scheduled for salvage removal and unoccupied for years. On September 21, 2011, a LANSCE Waste Management Coordinator (WMC) met two Electrical Safety Officers (ESO) who currently work for Accelerator Operations and Technology Division's High Power Electrodynamics Group (AOT-HPE) to check the equipment racks for capacitors before removal. AOT-HPE is the successor organization to the

organization that originally owned the tractor trailer. The transformers were secured in racks and not all labeling was visible without removing them from the rack. ESO1, along with another ESO (ESO2) from his group, did not take the racks apart. Based on a label on the front of the unit that identified the equipment as transformer assemblies, they determined there were no capacitors present in the assembly. However, there were direct current capacitor (2.5 uF, 1125 J) labels located on the side of the transformers that they could not see while the equipment was inside the rack.

ESO-1 is an electronics engineer with approximately 40 years of experience. His experience is primarily in large accelerator magnetic experimental work, circuit board design and other research and development work. He does not normally work with facility or facility type equipment such as transformers. He has been a group level ESO for seven years and has served on the electrical safety committee. Los Alamos Policy P101-13, Electrical Safety Program, details roles and responsibilities for group level ESOs. The 21 listed duties are collateral duties and center around supporting the specific group and line management chain to which an ESO reports. Section 2.4.8 of the Policy directs that the boundary between facility and R&D electrical activities is the wall plug or disconnect for electrical equipment used in experiments. On the day of the event, ESOs 1 and 2 were examining a lot of equipment in their capacity as group ESOs, including the equipment they examined with the WMC. ESO1 had been contacted by the WMC to examine the subject equipment. ESO1 was not sure the equipment was "owned" by his line management chain so he did not examine it as closely as he otherwise might have (This approach to ESO roles and responsibilities to outside organizations is in accordance with the guidance in P101-13), that he was in a hurry, the trailer was cold and dark, they had no tools to remove the equipment from the racks and they used flashlights to quickly move through the equipment racks and examine the equipment.

On the morning of Thursday, December 14, 2011, based on the information that there were no capacitors in the transformers, WMC removed them from the racks and transferred them with a hand cart and then in the back of a truck with the intention of storing them at TA-53 in Building 737. Building 737 is a Quonset hut where the WMCs stage materials to be removed from the site. However, because heavy equipment work was going on next to Building 737, they decided to place the two transformers under the awning on the south side of Building 737 until the next day when they could place them in Building 737. The WMC did not notice the transformers were labeled as having capacitors in them. Soon after the WMC had placed the transformers in the Waste Storage location, the P-25 employee noticed the capacitor label on the transformers and notified facility management. The area was immediately cordoned off, a

standing IWD for safing capacitors was modified (the IWD is intended for use indoors and needed modification to accommodate the outdoor winter weather conditions) and shorting straps were attached per the modified IWD on 12/15/2011.

Cause Description:

Operating Conditions: snowy and icy

Activity Category: Facility Decontamination/Decommissioning

Immediate Action(s):

- The area was immediately cordoned off.
- A standing IWD for safing capacitors was modified for use outdoors.
- The equipment was safed on 12/15/2011.

FM Evaluation: The Significance Category of this event was automatically recalculated at SC-4 on 01/01/2012. Therefore, this report is closing ORPS; however, lines of inquiry will continue to be investigated as part of the associated PFITS Issue 2011-6906.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: LANSCE FOD and AOT

Plant Area: TA-53

System/Building/Equipment: RF Modulator System

Facility Function: Accelerators

Corrective Action:

Lessons(s) Learned:

HQ Keywords:

- 01B--Inadequate Conduct of Operations - Loss of Configuration Management/Control
- 01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)
- 12C--EH Categories - Electrical Safety
- 14D--Quality Assurance - Documents and Records Deficiency
- 14E--Quality Assurance - Work Process Deficiency

HQ Summary: On December 14, 2011, a P-25 employee was walking outside in the vicinity of the Neutron Time of Flight (NTOF) Flight Path Emergency Generator when he noticed two transformers with labels identifying them as direct current capacitors (2.5 uF, 1125 J) sitting outside and saw no visible sign of shorting straps/devices that would indicate the capacitors were electrically safe. He reported the situation to Facility Operations and the area was immediately roped-off by the Facility Coordinator. The Laboratory's Chief Electrical Safety Officer determined that there was no electrical hazard associated with the capacitors because they had not been charged in over 6 years. A standing Integrated Work Document for safing

capacitors was modified for use outdoors and the equipment was safed.

Similar OR Report Number:

Facility Manager:

Name	Dan Seely
Phone	(505) 665-8363
Title	LANSCE Facility Operations Director

Originator:

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

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
12/14/2011	16:47 (MTZ)	Bruce LeBrun	NNSA

Authorized Classifier(AC): Kimberli Tanner Date: 01/26/2012

4)Report Number:

[NA--LASO-LANL-FIRNGHELAB-2011-0012](#) After 2003 Redesign

Secretarial Office:

National Nuclear Security Administration

Lab/Site/Org:

Los Alamos National Laboratory

Facility Name:

Firing Sites and HE Lab.

Subject/Title:

120V Energized Electrical Line Damaged During Excavation

Date/Time Discovered:

12/16/2011 16:18 (MTZ)

Date/Time Categorized:

12/16/2011 16:30 (MTZ)

Report Type:

Final

Report Dates:

Notification	12/22/2011	17:24 (ETZ)
Initial Update	12/23/2011	17:33 (ETZ)
Latest Update	01/31/2012	14:51 (ETZ)
Final	01/31/2012	14:51 (ETZ)

Significance Category:

3

Reporting Criteria:

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

Cause Codes:

A1B3C01 - Design/Engineering Problem; Design / documentation LTA; Design/documentation not complete

ISM:

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

Subcontractor Involved: Yes
Marcon

Occurrence Description: Management Synopsis: At 1507 on December 16, 2011, a contractor (Marcon) damaged a secondary 120V electrical line while excavating a trench for the Technical Area 40 (TA-40) Lift Station Project. The secondary electrical line serves a septic tank high-level alarm system. The work was authorized with an excavation permit and pre-job utility locates had been performed. The secondary electrical line was not detected using traditional utility locate methods (frequency locators) or the 50/60 Hz frequency method. There was no impact to personnel safety, health, or the environment as a result of this event.

A critique was held on December 20, 2011, and preliminary categorization was confirmed.

Background: At 1445 on December 16, 2011, the backhoe operator unearthed red warning tape that indicated the presence of electrical utilities while excavating a trench for the project. He immediately paused work and the LANL Utility Mapping (UMAP) crew was notified. The UMAP workers arrived and performed a survey using the Metrotech 50/60Hz to look for current in and around the area where the red electrical tape had been unearthed. Additionally, Marcon performed potholing in an attempt to identify an electrical line associated with the red tape. Neither the 50/60 Hz frequency locate nor the potholing identified an electrical line and the UMAP worker released the work activity.

The excavation works continued and at approximately 1507, the backhoe operator unearthed additional red warning tape directly above a 120V electrical conduit and, again, paused the work activity. The UMAP worker was notified and responded to the site. At this time, it was discovered that a breaker had tripped and a previously unidentified secondary 120V electrical line had been cut.

At 1555, the Weapons Facility Operations (WFO) Duty Office and Shift Operations Manager (SOM) were notified.

At 1603, the excavation activity was paused until further review.

At 1611, the SOM notified the WFO Facility Operations Director (FOD) and the programmatic residents of TA-40-1 to issue an advisory caution for waste water usage. Additionally, the SOM coordinated had the septic tank emptied to prevent a situation where the septic tank could overflow.

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

Apparent Cause Analysis and the 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.

The TA-40 Lift Station project involved trenching for the purpose of installing piping between TA-40 and TA-22. The excavation work was performed in accordance with an authorized and current excavation permit. As-built drawings were reviewed and they provided no indication that the secondary 120V electrical line was in the area. Pre-job utility locates were performed by the LANL Utility Mapping (UMAP) team. Two traditional methods were used including the Radiofrequency Method, using a Metrotech 810 transmitter and receiver, and the use of a Metrotech 50/60 Hz method, which detects current flow. Neither method detected the 120V electrical line. (Note: current flow would not be measured if pumps are not running).

In addition to the pre-job locates, UMAP workers performed additional utility locates based on requests from the contractor due to the presence of construction debris and warning tape in the backfill that was unearthed during the excavation.

On the day of the event, red warning tape indicating the presence of an electrical line was unearthed and the contractor paused the excavation to request a utility locate from UMAP. The UMAP workers arrived at the site and performed a 50/60 Hz frequency locate for current.

During the initial locates for this site a two man scan was also performed in this excavation area using a Radiofrequency locator. The method requires both the transmitter and receiver be directly over a conductive utility line in order for the line to be detected. The UMAP workers based the orientation of the utility locate on the placement of detected utilities coming out of TA-40 Building 1 (perpendicular). Subsequent to the event, it was determined the 120V electrical line ran in a different direction (diagonally). As a result of the diagonal orientation of the 120V electrical line, the UMAP workers were not in the proper orientation to detect the electrical line.

In addition to the utility locate, the contractor performed potholing but did not identify the presence of an electrical line. Furthermore, current flow using the 50/60 Hz locator would not be measured using this method if the pumps are not running.

The UMAP worker released the work activity and the electrical line was cut approximately five to ten minutes later.

The most likely cause code of this event is A1B3C01, Design/documentation not complete because the as-built drawings did not identify the 120V electrical line. Because the drawings were incomplete, workers had to rely on utility locate technology that may or may not be reliable based on several environmental factors.

Operating Conditions:

Normal

Activity Category:

Construction

Immediate Action(s):

- 1) The work was paused and notifications were made.
- 2) The SOM coordinated the emptying of the septic tank to prevent an overflow condition.
- 3) The SOM issued an advisory caution on waste water use to occupants of TA-40-1.

FM Evaluation:

There was no impact on the facility. The 120v electrical line was repaired and the septic tank level alarm operability was restored.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

TA-40 Lift Station Project

Plant Area:

TA-40

System/Building/Equipment: Septic tank high level alarm

Facility Function:

Balance-of-Plant - Site/outside utilities

Corrective Action 01:

Target Completion	Actual Completion
Date: 01/31/2012	Date: 01/31/2012

Title: Annotate As-Built Drawings

Action: ES-UI will ensure the appropriate as-built drawings have been annotated to reflect the 120V secondary electrical line and the newly discovered utility running beneath it.

Deliverable: Memo from ES-UI stating the drawings have been annotated.

Responsible Organization: ES-UI

See PFITS 2011-7013, Action 1 for action closure and objective evidence

Lessons(s) Learned:

HQ Keywords:

01B--Inadequate Conduct of Operations - Loss of Configuration Management/Control

07D--Electrical Systems - Electrical Wiring

08F--OSHA Reportable/Industrial Hygiene - Industrial Operations Issues

08J--OSHA Reportable/Industrial Hygiene - Near Miss (Electrical)

11G--Other - Subcontractor

12G--EH Categories - Industrial Operations

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

HQ Summary:

On December 16, 2011, a contractor backhoe operator damaged a secondary 120-volt electrical line while excavating a trench for the Technical Area 40 (TA-40) Lift Station Project. The secondary electrical line serves a septic tank high-level alarm system. The work was authorized with an excavation permit and pre-job utility locates had been performed. The secondary electrical line was not detected using traditional utility locate methods or the 50/60 Hz frequency method. There was no impact to personnel safety, health, or the environment as a result of this event. A critique was held on December 20.

Similar OR Report Number:

1. NA--LASO-LANL-FIRNGHELAB-2010-0006
2. NA--LASO-LANL-HEMACHPRES-2008-0002
3. NA--LASO-LANL-HEMACHPRES-2009-0010

Facility Manager:

Name	Christian Lopez
Phone	(505) 667-6782
Title	WFO Facility Operations Director Designee

Originator:

Name	HAKONSON-HAYES, AUDREY C
Phone	(505) 667-9364
Title	OCCURRENCE INVESTIGATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
12/20/2011	12:00 (MTZ)	Steve Frye	NNSA

Authorized Classifier(AC): Kimberli Tanner Date: 01/31/2012

5)Report Number:

[NA--LASO-LANL-NUCSAFGRDS-2011-0003](#) After 2003 Redesign

Secretarial Office:

National Nuclear Security Administration

Lab/Site/Org:

Los Alamos National Laboratory

Facility Name:

Nuclear Safeguards

Subject/Title:

Motor Control Center Lockout/Tagout Discrepancy Discovered during Walk-Down

Date/Time Discovered:

12/07/2011 13:22 (MTZ)

Date/Time Categorized:

12/08/2011 09:23 (MTZ)

Report Type:

Final

Report Dates:

Notification	12/12/2011	18:45 (ETZ)
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Initial Update	01/20/2012	17:37 (ETZ)
Latest Update	01/20/2012	17:37 (ETZ)
Final	01/20/2012	17:37 (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:

A3B2C03 - Human Performance Less Than Adequate (LTA); Rule Based Error; Too much activity was occurring and error made in problem solving -->couplet - A4B1C04 - Management Problem; Management Methods Less Than Adequate (LTA); Management follow-up or monitoring of activities did not identify problems

ISM:

4) Perform Work Within Controls

Subcontractor Involved:

No

Occurrence Description:

MANAGEMENT SYNOPSIS: On December 8, 2011, at 1230, while conducting a walk-down in the basement of Technical Area 35, Building 2 after the facility had experienced flooding in C Wing of the first floor, the NNSA facility representative observed the motor control center (MCC) that fed Electrical Panel PP9 had not been locked and tagged out per Laboratory Procedure P101-3, "Lockout/Tagout for Hazardous Energy Control." The facility representative became concerned that because the electrical panel and the MCC were located on different floors someone could have accidentally re-energized the MCC potentially impacting the health and safety of personnel. On December 7, 2011, a portion of C Wing experienced flooding from frozen reheat coils in the ceiling. Water flowed from the ceiling through Electrical Panel PP9, in the hallway, and into some offices of C Wing. Following notification, the TA-35 Science and Technology Operations (STO) acting operations manager initiated flood mitigation activities. As a precaution, he isolated the MCC with the intent to lock and tag it out later; however, he inadvertently forgot to do so due to his oversight of multiple on-going flood mitigation activities in C Wing. After notification on December 8, 2011, the TA-35 STO operations manager locked and tagged out the MCC. There was no impact to workers, operations or the facility from the lockout/tagout discrepancy.

Based on the initial information provided, the STO Facility Operations Director Designee categorized the event as sub-threshold reportable on December 8, 2011, at 0923. Then at 1611 after further review, the STO FOD Designee re-categorized the event as reportable under the Hazardous Energy criterion.

Cause Description:

According to Laboratory Procedure P101-3, "Lockout/Tagout for Hazardous Energy Control," a Laboratory red lock and tag will be applied to equipment and machinery that could pose a danger to personnel safety.

In this instance and upon discovery, the facility representative became concerned that because the electrical panel and the MCC were located on different floors, the MCC could have been accidentally re-energized by personnel who were unaware of the flooding conditions in a portion of the facility or the reason(s) for its isolation and could have potentially impacted the health and safety of personnel. The STO acting operations manager subsequently indicated that he had intended to lock and tag out the MCC after he had isolated it, but inadvertently forgot to do so due to his oversight of multiple on-going flood mitigation activities at the time. The human performance causal factor that best describes this equipment lockout/tagout discrepancy is (A3B2C03) Too Much Activity was Occurring and Error Made in Problem Solving coupled with (A4B1C04) Management Follow-Up or Monitoring of Activities Did Not Identify Problems. Corrective Actions 1 through 3 address these causal factors.

Operating Conditions:

Emergency Response to Water Release

Activity Category:

Emergency Response

Immediate Action(s):

1. The TA-35 STO acting operations manager initiated flood mitigation efforts.

2. On December 8, 2011, after the reheat coils were repaired, the water was restored to the heating system. On December 9, 2011, the heating system to the affected area was restored.

3. Due to water in overhead ceiling tiles and its potential impact to the light fixtures, electricians isolated the power. Under a work ticket, electricians locked and tagged out Panel LP28 and then repaired the damaged light fixtures in the hallway.

4. The TA-35 operations management isolated the fire protection system and established a fire watch for the affected area. On December 9, 2011, the fire protection system was returned to service and the fire watch was ceased.

FM Evaluation:

Time pressure related to a myriad of activities needed to mitigate flooding in the building was an apparent error precursor to the event. The event served as a good reminder to FOD personnel to follow the Conduct of Operations principles even when responding to urgent abnormal conditions.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

Science and Technology Operations Division

Plant Area: TA-35-2 Basement
System/Building/Equipment: Motor Control Center
Facility Function: Balance-of-Plant - Offices

Corrective Action 01:

Target Completion Date: 12/08/2011	Actual Completion Date: 12/08/2011
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Title: Locked and Tagged Out the Motor Control Center

Action Description: Following notification, the TA-35 Science and Technology Operations (STO) operations manager locked and tagged out the MCC.

Responsible Organization: STO-DO

Deliverable: Documentation showing the MCC was locked and tagged out.

PFITS Closure ID: 2011-6804

See PFITS Closure ID for action closure and objective evidence.

Corrective Action 02:

Target Completion Date: 12/14/2011	Actual Completion Date: 12/14/2011
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Title: Briefed STO Operations Managers of Event Lessons Learned

Action Description: During the plan of the week meeting, the Science and Technology Operations Deputy Facility Operations Director discussed the lack of equipment lockout/tagout for the TA-35-2 flooding event and facility turnover activities with the STO operations managers. The STO Deputy FOD emphasized the need to ensure that all lockout points are identified during an emergency situation.

Responsible Organization: STO-DO

Deliverable: Documentation showing that the STO Deputy FOD discussed the event lessons learned with STO operations managers.

PFITS Closure ID: 2011-6804

See PFITS Closure ID for action closure and objective evidence.

Corrective Action 03:

Target Completion Date: 01/20/2012	Actual Completion Date: 01/20/2012
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REVISION OR EXTENSION OF THIS ACTION REQUIRES FACILITY OPERATIONS DIRECTOR APPROVAL.

Title: Replace Breakers in the Affected Electrical Panel

Action Description: The TA-35 Science and Technology Operations (STO) operations management will issue a work ticket for electricians to replace the breakers in Electrical Panel PP9.

Responsible Organization: STO-DO

Deliverable: A copy of the completed work ticket that shows the breakers in Electrical Panel PP9 were replaced.

Due Date: 02/29/2012

PFITS Closure ID: 2011-6804

See PFITS Closure ID for action closure and objective evidence.

Lessons(s) Learned:

HQ Keywords:

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

HQ Summary:

On December 8, 2011, while conducting a walk-down in the basement of Technical Area 35, Building 2, the NNSA facility representative observed the motor control center (MCC) that fed Electrical Panel PP9 had not been locked and tagged out. On December 7, due to flooding in the hallway of C Wing from frozen reheat coils in the ceiling, water had been observed flowing from the ceiling and through Electrical Panel PP9. At the time, craft and other workers were working in the hallway, ceiling, and office areas to mitigate the flooding. As a precaution, the TA-35 Science and Technology Operations (STO) acting operations manager had isolated the MCC with the intention to lock and tag it out at a later time, but inadvertently forgot to do so. Following notification on December 8, the TA-35 STO operations manager locked and tagged out the MCC. There was no impact to workers, operations, or the facility from the lockout/tagout discrepancy. The reheat coils were repaired and the heating system was restored. The damaged light fixtures in the hallway were repaired, and the fire protection system was restored. The TA-35 STO operations management will issue a work ticket for electricians to replace the breakers in Panel PP9.

Similar OR Report Number: 1. NA--LASO-LANL-RADIOCHEM-2011-0003

Facility Manager:

Name	Rick Alexander
Phone	(505) 665-7020
Title	STO Deputy Facility Operations Manager

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
12/07/2011	13:22 (MTZ)	Susan Stewart	NNSA
12/08/2011	09:26 (MTZ)	Susan Stewart	NNSA
12/08/2011	16:13 (MTZ)	Susan Stewart	NNSA
12/12/2011	13:40 (MTZ)	Susan Stewart	NNSA
12/12/2011	13:40 (MTZ)	John Krepps	NNSA

Authorized Classifier(AC): Steve Long Date: 01/20/2012

6)Report Number:

[NA--SS-SNL-6000-2011-0005](#) After 2003 Redesign

Secretarial Office:

National Nuclear Security Administration

Lab/Site/Org:

Sandia National Laboratories - SS

Facility Name:

SNL Division 6000

Subject/Title:

Failure to Follow a Prescribed Hazardous Energy Control Process in Building 6969

Date/Time Discovered:

12/14/2011 12:45 (MTZ)

Date/Time Categorized:

12/14/2011 15:38 (MTZ)

Report Type:

Notification

Report Dates:

Notification	12/15/2011	16:55 (ETZ)
Initial Update		
Latest Update		
Final		

Significance Category:

4

Reporting Criteria:

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

Cause Codes:

ISM:

- 1) Define the Scope of Work
- 2) Analyze the Hazards
- 4) Perform Work Within Controls

Subcontractor Involved:

No

Occurrence Description:

Member of the Workforce (MOW) was connecting the garage door pressure sensor wiring to the 24 volt AC controller in Building 6969

following a maintenance activity. MOW disconnected the power source to the controller and verified zero energy, but failed to apply a lockout device to the 120 volt AC energy isolation switch.

This event scores a 20 on the severity tool as follows: Electrical Hazard Factor: 10 (120VAC), Environmental Factor: 0 (dry); Shock Proximity Factor: 1 (Within limited approach boundary); Arc Flash Proximity Factor: 0 (not possible at 120 VAC); No PPE mitigation, no injury.

Cause Description: Critique/Fact Finding Performed: 12/14/2011
Operating Conditions: Normal
Activity Category: Maintenance
Immediate Action(s): Interviewed manager and MOW, discussed LOTO and training requirements.
FM Evaluation: EOC #23734
DOE Facility Representative Input:
DOE Program Manager Input:
Further Evaluation is Required: Yes.
Before Further Operation? No
By Whom: Causal Analysis Team
By When:
Division or Project: 6000/216
Plant Area: Remote Area
System/Building/Equipment: Garage Door Controller/6969/Hi-Bay/Robotic Vehicle Range RVR
Facility Function: Laboratory - Research & Development
Corrective Action:
Lessons(s) Learned:
HQ Keywords: 01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)
08H--OSHA Reportable/Industrial Hygiene - Safety Noncompliance
12I--EH Categories - Lockout/Tagout (Electrical or Mechanical)
14E--Quality Assurance - Work Process Deficiency
HQ Summary: On December 14, 2011, a Member of the Workforce (MOW) was connecting garage door pressure sensor wiring to a 24-volt AC controller in Building 6969 following a maintenance activity and did not use a lockout device. The MOW had disconnected the power source to the controller and verified a zero-energy condition, but failed to lockout the 120-volt AC energy isolation switch. The manager and MOW discussed lockout/tagout and training requirements. There were no injuries.
Similar OR Report Number:
Facility Manager:

Name	Gerald J. Langwell
------	--------------------

Phone	(505) 844-9082
Title	ES&H Coordinator

Originator:

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

HQ OC Notification:

Date	Time	Person Notified	Organization
12/14/2011	17:29 (MTZ)	DOE/HQ/EOC	DOE/HQ

Other Notifications:

Date	Time	Person Notified	Organization
12/14/2011	16:33 (MTZ)	Craig Nimmo	6012
12/14/2011	16:37 (MTZ)	Jake Deuel	6532
12/14/2011	16:46 (MTZ)	EOC	4236
12/14/2011	19:02 (MTZ)	Veronica Martinez	DOE/SSO
12/14/2011	19:02 (MTZ)	Heather Trumble	DOE/SSO

Authorized Classifier(AC): Jake Deuel Date: 12/15/2011

7)Report Number:

[SC--ASO-ANLE-ANLELCF-2011-0001](#) After 2003 Redesign

Secretarial Office:

Science

Lab/Site/Org:

Argonne National Laboratory East

Facility Name:

Leadership Computing Facility

Subject/Title:

Electrical arc fault on 208V power distribution unit.

Date/Time Discovered:

12/05/2011 15:30 (CTZ)

Date/Time Categorized:

12/06/2011 10:30 (CTZ)

Report Type:

Notification/Final

Report Dates:

Notification	12/08/2011	17:01 (ETZ)
Initial Update	12/08/2011	17:01 (ETZ)
Latest Update	12/08/2011	17:01 (ETZ)
Final	12/08/2011	17:01 (ETZ)

Significance Category:

4

Reporting Criteria:

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

Cause Codes:

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

Subcontractor Involved: Yes
Server Technology

Occurrence Description: At 1530 on December 5,2011, a vender service engineer was installing optical fiber cables in a new cabinet server rack. He was working at the base of the rack and when he stood up his upper arm bumped into a metal wire bail on a cabinet power distribution unit (CDU) attached to the back of the rack. The metal bail is a retainer clip used to securely hold a standard type plug into the CDU receptacle. The bail flexed on the hard contact and an end slipped out of its normal mooring slot and slid into a heat vent hole behind the mooring slot. There was a small arc at the hole into which the metal bail end slipped. The circuit breaker for this section of the CDU tripped. The CDU is a commercial, UL approved device (Server Technology) operating at 208V. The worker did not make any direct skin contact with the electrical current or the arc. He was wearing a jacket and a shirt underneath the jacket. The arc fault did leave a black five millimeter mark on the jacket sleeve above the elbow.

Investigation found that this is a unique type of event. Before a CDU is powered on in a new assembly, most or all of the electronic components are installed and the power cords attached to the CDU. However, network cabling of the components may be done when the cabinet system is powered down or powered up as other operations or diagnostics require, such as testing of components and software. Once a plug has been installed into a CDU receptacle and the bail snapped over the plug, the chance of disengaging the bail and causing a similar arc fault is remote. A high oblique force is needed to distort and dislodge the bail from its normal mooring socket and force it back to contact a vent hole. However, during population of a rack this type of event is certainly more likely to occur as modules are being positioned and connected and generally there is a high variety of activity around the rack.

The Laboratory's Electrical Safety SME calculated the Electrical Severity Index for this incident and determined it to be 1050.

Cause Description:

Operating Conditions: Normal

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

Immediate Action(s): Several actions were initiated to prevent a future incident:

When populating a rack, heavy duty non conducting tape will be placed over the holes nearest the bails, so that if accidentally dislodged, the bail

will slip along the surface of the CDU and not fall into a vent hole. The temperatures of the CDUs are already monitored, so any potential for overheating the CDU would be noted. The tape will be removed once the installation operations are completed.

Bails will not be installed and left to hang free until needed. They will be added at the time a plug is expected to be inserted into the receptacle, (until the vendor has developed an acceptable bail design fix).

A meeting was held with all staff engaged in Leadership Computing Facility Operations and informed of the incident and trained in how bails will be managed in the future.

The Core Machine Room Facility Manager was informed so that he is aware of this type of design issue and can do an extent of condition on similar CDUs in similar racks in the Building 240 Machine Room Facility.

Several further actions will be taken:

A lessons learned will be developed and submitted for both local and Complex wide dissemination.

The incident will be discussed with the vendor to see if a more permanent remedy can be found to prevent any future occurrences. (The vendor is already working with Argonne staff on a remedy and has suggested a simple bail design improvement that will be tested to see if it reduces or eliminates the risk of an arc fault.)

All Corrective Actions will be placed into the Argonne Issues Management Tracking System for local tracking to completion.

FM Evaluation:

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: Leadership Computing Facility

Plant Area: Machine Room

System/Building/Equipment: Cabinet Power Distribution Unit, Core Machine Room, Building

Facility Function: Laboratory - Research & Development

Corrective Action:

Lessons(s) Learned:

HQ Keywords: 07D--Electrical Systems - Electrical Wiring

- 08J--OSHA Reportable/Industrial Hygiene - Near Miss (Electrical)
- 11F--Other - Inadequate Design
- 11G--Other - Subcontractor
- 12C--EH Categories - Electrical Safety
- 14E--Quality Assurance - Work Process Deficiency
- 14F--Quality Assurance - Design Deficiency
- 14G--Quality Assurance - Procurement Deficiency

HQ Summary:

On December 5, 2011, while a vender service engineer was installing optical fiber cables in a new cabinet server rack, his upper arm bumped into a metal wire bail on a cabinet power distribution unit (CDU) attached to the back of the rack causing a small electrical arc. The metal bail is a retainer clip used to securely hold a standard type plug into the CDU receptacle. The bail flexed on the hard contact and an end slipped out of its normal mooring slot and slid into a heat vent hole behind the mooring slot which caused the arc. The circuit breaker for this section of the CDU tripped. The CDU is a commercial, UL approved device (Server Technology) operating at 208 volts. The worker did not make any direct skin contact with the electrical current or the arc. He was wearing a jacket and a shirt underneath the jacket. The arc fault did leave a black 5 millimeter mark on the jacket sleeve above the elbow. The Laboratory's Electrical Safety SME calculated the Electrical Severity Index for this incident and determined it to be 1050. The vendor is already working with Argonne staff on a remedy and has suggested a simple bail design improvement that will be tested to see if it reduces or eliminates the risk of an arc fault. Corrective actions were initiated and management was notified.

Similar OR Report Number:

Facility Manager:

Name	DYRKACZ, GARY R
Phone	(630) 252-7478
Title	ALD ESH COORDINATOR

Originator:

Name	DYRKACZ, GARY R
Phone	(630) 252-7478
Title	ALD ESH COORDINATOR

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
12/05/2011	15:45 (CTZ)	Gary Dyrkacz	ANL-CLS
12/05/2011	20:04 (CTZ)	Rick Stevens	ANL-CLS
12/06/2011	06:12 (CTZ)	Paul Kearns	ANL-OTD
12/06/2011	08:30 (CTZ)	Craig Schumann	DOE-ASO

Authorized Classifier(AC):

8)Report Number: [SC--BHSO-BNL-BNL-2011-0034](#) After 2003 Redesign

Secretarial Office: Science

Lab/Site/Org: Brookhaven National Laboratory

Facility Name: Brookhaven National Laboratory (BOP)

Subject/Title: Electrical Worker Sustains Electric Shock

Date/Time Discovered: 12/15/2011 08:15 (ETZ)

Date/Time Categorized: 12/15/2011 09:00 (ETZ)

Report Type: Update

Report Dates:

Notification	12/16/2011	16:40 (ETZ)
Initial Update	01/30/2012	09:49 (ETZ)
Latest Update	01/30/2012	09:49 (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:

ISM:

Subcontractor Involved: Yes
Roppelt

Occurrence Description: At Brookhaven National Laboratory (BNL) on December 15, 2011, an electrical contractor received an electrical shock while working in an electrical panel. The worker received minor electrical burns to his hand and was treated at the Occupational Medical Clinic and returned to work.

The electrical panel had been locked and tagged out prior to the incident. The worker conducted zero energy checks minutes before receiving the electrical shock. An investigation to determine the source of energy that caused the electrical shock is underway.

Cause Description:

Operating Conditions: Normal Operations

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

Immediate Action(s): The worker was treated at the Occupational Medical Clinic and returned to work.

FM Evaluation: An investigation to determine the source of energy that caused the electrical shock is underway.

1-30-2012, Update: Work on the causal analysis and corrective action plan are ongoing. It is anticipated that the final report will be issued by 3-09-2012.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: Yes.
 Before Further Operation? Yes
 By Whom: R. Costa
 By When: 03/09/2012

Division or Project: Blue Gene Q Project

Plant Area: Blue Gene Computer

System/Building/Equipment: Building 515

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

HQ Summary: On December 15, 2011, an electrical contractor received an electrical shock while working in an electrical panel. The worker received minor electrical burns to his hand and was treated at the Occupational Medical Clinic and returned to work. The electrical panel had been locked and tagged out before the incident. The worker had conducted zero energy checks minutes before receiving the shock. An investigation to determine the source of energy that caused the shock is underway.

Similar OR Report Number:

Facility Manager:

Name	SCHAEFFER, MICHAEL
Phone	(631) 344-7941
Title	MODERNIZATION PROJECT OFFICE DIVISION MANAGER

Originator:

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

HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
12/15/2011	08:30 (ETZ)	R. Costa	BNL
12/15/2011	09:05 (ETZ)	R. Desmarais	BHSO/DOE

Authorized Classifier(AC):

9)Report Number: [SC--BSO-LBL-OPERATIONS-2011-0026](#) **After 2003 Redesign**
Secretarial Office: Science
Lab/Site/Org: Lawrence Berkeley National Laboratory
Facility Name: Operations Division
Subject/Title: LOTO Violation During Bus Shelter Ceiling Light Conduit Removal - No Exposure, No Injury
Date/Time Discovered: 12/07/2011 12:00 (PTZ)
Date/Time Categorized: 12/07/2011 15:00 (PTZ)
Report Type: Final

Report Dates:

Notification	12/09/2011	19:57 (ETZ)
Initial Update	01/13/2012	18:40 (ETZ)
Latest Update	01/13/2012	18:40 (ETZ)
Final	01/13/2012	18:40 (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:

A3B1C07 - Human Performance Less Than Adequate (LTA); Skill Based Errors; Omission/repeating of steps based on assumptions for completion -->couplet - NA
 A3B3C03 - Human Performance Less Than Adequate (LTA); Knowledge Based Error; Individual justified action by focusing on biased evidence -->couplet - NA
 A4B4C01 - Management Problem; Supervisory Methods LTA; Tasks and individual accountability not made clear to worker
 A4B4C06 - Management Problem; Supervisory Methods LTA; Job performance and self-checking standards not properly communicated

ISM:

4) Perform Work Within Controls

Subcontractor Involved:

Yes
 Webcor/Bauman Construction

Occurrence Description:

At about 12:00 noon on 12/07/2011, the LBNL Facilities Electrical Supervisor noticed that a worker from Bauman Construction had removed the bus shelter structure near Building 74 before electrical isolation was confirmed and the work was authorized.

On 12/06/2011, Webcor, the controlling contractor of the tiered subcontractor Bauman Construction, notified the LBNL project team that they planned to remove the bus shelter outside of B74. Since there was a ceiling light in the bus shelter, LOTO was required. Facilities personnel informed Webcor that additional investigation was required before work can begin. The subcontractor workers none-the-less removed the bus shelter from its foundation and demolished the electrical conduit supplying power to the bus shelter ceiling light without verifying the absence of hazardous energy. This is a violation of the established OSHA requirements for electrical safety procedures. LBNL electricians subsequently determined that electrical energy was isolated from the ceiling light.

Cause Description:

Apparent Causes:

1. There was a lack of subcontractor oversight; Webcor did not assure that all Bauman workers attended the LBNL Subcontractor Safety Orientation. (A4B4C01, A4B4C06)

2. There was a Human Performance Improvement (HPI) related cause. The Bauman worker proceeded to perform work without "work authorization". The Bauman worker was present at a meeting where LBNL Facilities stated additional investigation needed to be performed before work could proceed. In the workers statement he acknowledged that he had not verified with Webcor that the work could proceed. The Bauman worker stated he had received training from Webcor on the requirements of LOTO. However, the Bauman worker failed to perform "zero energy" verification, contrary to this safety training. (A3B1C07, A3B3C03)

Operating Conditions:

daylight, sunny, dry

Activity Category:

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

Immediate Action(s):

N/A: The removal was discovered after it was done.

FM Evaluation:

- LBNL Project Team members held a stand-down meeting with the subcontractor (Bauman) workers in the afternoon of 12/07/2011.

- Facilities held a job-wide stand-down meeting with all subcontractors in the morning of 12/08/2011.

- The demolished electrical conduit and wire provided power to the ceiling light in the bus shelter and ran between a street lamp pole and the bus shelter. There was no damage to the lamp pole.

01/12/2012 UPDATE:

Besides the immediate compensatory measures listed above, the following actions were taken:

1. The Bauman worker responsible for demolition of the bus shelter and

- the LOTO violation was removed from the project.
2. At the 12/8/2011 all hands stand-down meeting, personnel reviewed the policies regarding "work authorization" and adherence to LBNL safety requirements.
 3. A meeting was held between Facilities Division Director and principles of Webcor to discuss LBNL safety expectations and the importance of adherence to all LBNL safety requirements.
 4. On 12/08-09/2011, all Capital Projects workers attended the training at Subcontractor Safety Orientation sessions.

The apparent cause analysis report recommended three corrective actions that have been entered into the LBNL Corrective Action Tracking System (CATS) as Immediately Corrected Issues (ICI). Furthermore, corrective actions developed as part of the Recurrent Construction Subcontractor Management Issue (ORPS# SC--BSO-LBL-DIR-2011-0001) should provide additional barriers to prevent recurrence of similar work authorization violations.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required: No

Division or Project: Facilities Division

Plant Area: B74

System/Building/Equipment: Bus Shelter near Building 74

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

Corrective Action 01:

Target Completion Date: 12/08/2011	Actual Completion Date: 12/08/2011
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The Subcontractor Safety Orientation has been revised to stress the concept of "work authorization" (i.e. JHA's and permits). (LBNL ICI#1541)

Corrective Action 02:

Target Completion Date: 12/08/2011	Actual Completion Date: 12/08/2011
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The Safety Coordinator for Webcor was trained to conduct the Subcontractor Safety Orientation to insure as new workers are assigned to Webcor projects that LBNL orientation is provided.(LBNL ICI#1540)

Corrective Action 03:

Target Completion Date: 12/08/2011	Actual Completion Date: 12/08/2011
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All subcontractors and tiered subcontractors are preparing and reviewing daily JHA's or Pre-Task Hazard Analysis forms as part of

the "Plan of the Day" safety meeting.(LBNL ICI#1542)

Lessons(s) Learned:

Project Managers and Construction Managers should ensure that subcontractors are properly managed, and that the required training and understanding of work authorization is re-enforced.

HQ Keywords:

- 01K--Inadequate Conduct of Operations - Lockout/Tagout Noncompliance (Electrical)
- 01M--Inadequate Conduct of Operations - Inadequate Job Planning (Electrical)
- 01N--Inadequate Conduct of Operations - Inadequate Job Planning (Other)
- 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 December 7, 2011, the Lawrence Berkeley National Laboratory (LBNL) Facilities Electrical Supervisor noticed that a worker from Bauman Construction had removed the bus shelter structure near Building 74 (B74) before electrical isolation was confirmed and the work was authorized. On December 6, Webcor, the controlling contractor of the tiered subcontractor Bauman Construction, notified the LBNL project team that they planned to remove the bus shelter outside of B74. Since there was a ceiling light in the bus shelter, LOTO was required. Facilities personnel informed Webcor that additional investigation was required before work could begin. However, the subcontractor workers removed the bus shelter from its foundation and demolished the electrical conduit supplying power to the bus shelter ceiling light without verifying the absence of hazardous energy. This is a violation of the established Occupational Safety and Health Administration requirements for electrical safety procedures. The demolished electrical conduit and wire provided power to the ceiling light in the bus shelter and ran between a street lamp pole and the bus shelter. There was no damage to the lamp pole. LBNL electricians subsequently determined that electrical energy was isolated from the ceiling light. A stand-down meeting was held with the applicable subcontractor workers, and also a job-wide stand-down meeting was held with all subcontractors.

Similar OR Report Number: 1. SC--BSO-LBL-OPERATIONS-2010-0022

Facility Manager:

Name	Jennifer Ridgeway
Phone	(510) 486-6339
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
12/07/2011	15:11 (PTZ)	Mary Gross	BSO
12/07/2011	15:11 (PTZ)	Kevin Hartnett	BSO

Authorized Classifier(AC):

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