

Secretarial Office: Science
Lab/Site/Org: Lawrence Berkeley Laboratory
Facility Name: Operations Division
Subject/Title: Unescorted Entry into Active Laser Area - No Exposure, No Injuries
Date/Time Discovered: 12/10/2010 15:46 (PTZ)
Date/Time Categorized: 12/10/2010 16:16 (PTZ)
Report Type: Final
Report Dates:

Notification	12/14/2010	20:12 (ETZ)
Initial Update	12/14/2010	20:33 (ETZ)
Latest Update	03/28/2011	14:35 (ETZ)
Final	03/28/2011	14:35 (ETZ)

Significance Category: 3
Reporting Criteria: 10(3) - A near miss, where no barrier or only one barrier prevented an event from having a reportable consequence. One of the four significance categories should be assigned to the near miss, based on an evaluation of the potential risks and the corrective actions taken. (1 of 4 criteria - This is a SC 3 occurrence)

Cause Codes: A3B1C04 - Human Performance Less Than Adequate (LTA); Skill Based Errors; Infrequently performed steps are performed incorrectly -->couplet - NA
A4B3C11 - Management Problem; Work Organization & Planning LTA; Inadequate work package preparation
A4B4C01 - Management Problem; Supervisory Methods LTA; Tasks and individual accountability not made clear to worker
A1B2C01 - Design/Engineering Problem; Design output LTA; Design output scope LTA
A4B3C08 - Management Problem; Work Organization & Planning LTA; Job scoping did not identify special circumstances and/or conditions
A6B1C02 - Training deficiency; No Training Provided; Training requirements not identified
A3B1C07 - Human Performance Less Than Adequate (LTA); Skill Based Errors; Omission/repeating of steps based on assumptions for completion -->couplet - NA
A5B3C01 - Communications Less Than Adequate (LTA); Written Communications Not Used; Lack of written communication
A5B4C05 - Communications Less Than Adequate (LTA); Verbal Communications LTA; Information sent but not understood

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

-->couplet - NA

A4B1C01 - Management Problem; Management Methods Less Than Adequate (LTA); Management policy guidance / expectations not well-defined, understood or enforced

A4B1C03 - Management Problem; Management Methods Less Than Adequate (LTA); Management direction created insufficient awareness of the impact of actions on safety / reliability

A5B1C01 - Communications Less Than Adequate (LTA); Written Communication Method of Presentation LTA; Format deficiencies

A5B1C07 - Communications Less Than Adequate (LTA); Written Communication Method of Presentation LTA; Unclear / complex wording or grammar

ISM:

4) Perform Work Within Controls

Subcontractor Involved:

No

Occurrence Description:

On 12/10/2010, an LBNL electrician entered an active class IV laser laboratory without escort.

On 12/06/2010, a Facilities electrician received work order WDJ425 from his work lead to install a switch box and a power cord on a vacuum pump in B2 room 308. He went to the job site to find out the scope of the work and was escorted by a lab staff to the lab. Upon discovering he needed additional tools and materials, he left the lab and notified the Chemical Sciences Division (CSD) laser lab scientist that he needed additional materials to complete the job. He was told that the earliest he could access the lab was 12/10/2010. He then informed his work lead about the new job schedule and the work scope.

On 12/10/2010, the electrician informed the CSD researcher by phone and e-mail that he would start work that day as scheduled. He reported that when he arrived at the lab around 0745 hours, he did not notice if the laser light was on. He entered the lab by using the code that he had acquired by observing the numbers being entered when he was escorted in four days prior. Upon entering the lab, he put the laser safety goggles on, and placed the tools and materials inside the lab. He then left the lab to obtain approval from lab personnel to work there. At around 1000 hours, he returned to the lab and was let in by ringing a bell. He proceeded to work on the pump and encountered some difficulty with the installation of the magnetic starter. He then sought assistance from a coworker. Both he and the coworker were

Cause Description:

wearing laser light protected glasses. During trouble-shooting, the CSD researcher came to the laboratory and questioned the work experience of the electrician. After the electrician left, the researcher e-mailed Facilities line management about the electrician's entering the laser lab without escort when he first entered the lab that morning.

Causal Factor 1: The Work Lead did not discuss or address the work area hazards and controls with the Electrician for the work on 12/10/2010.

Root Cause 1: The Work Lead chose not to review Work Order hazards and controls with the Electrician. Work Lead did not give the Electrician any work instruction other than to contact the work requestor. The Electrician had limited experience entering active laser areas the pre-job briefing was inadequate. Work Lead left access related training to the Requester. Interviews with other Work Leads did not find this to be standard practice. - A3B1C04, A4B4C01, A4B3C11, A4B1C03

Causal Factor 2: The work order contained limited safety information.

Root Cause 2: Hazard Management System information does not push specific laser area information (Class 1, 2, 3B, or 4) to the MAXIMO work order system.- A1B2C01

Causal Factor 3. The Electrician's Job Hazard Analysis (JHA) does not contain laser area hazards and controls.

Root Cause 3: The JHA is not sufficiently designed to identify all hazards associated with entering laser areas. The JHA for the electrician work group does not mention hazards or controls for accessing laser lab areas and performing work around active lasers. Facilities employees do not believe that they work in Laser areas. Training is provided for resident Laser lab users and not for outside workers who may be entering for ancillary reasons such as changing a light bulb or repairing plumbing. - A1B2C01, A4B3C08, A6B1C02

Causal Factor 4: The pre-job orientation was less than adequate.

Root Cause 4: There is no documented guidance for performing a laser area pre-job orientation. The Electrician did not read the door signs because he had received the verbal orientation and believed that safety information had been imparted to him. The Post Doc informed the Electrician that he "should not work" in a laser lab without an escort. Pub 3000 and or relevant documentation do not include specific orientation guidance for staff who are NOT working on the laser itself, but in the same room with the laser.- A3B1C07, A5B4C05, A5B3C01

Causal Factor 5A: The Electrician did not understand the requirements to enter an active laser lab.

Causal Factor 5B: Laser lab door code is the default code.

Root Cause 5: There is no Laboratory documented policy regarding access to laser labs including laboratories use of default access codes. The Electrician observed the Post Doc using the access code to enter the lab. This code is a four-digit generic code and is the default code for most door alarms. The Electrician stated that when he noticed this code he thought/assumed the laser lab was a low hazard area because he had been given this code previously for use on a non-active laser lab. The Electrician literally translated the verbal instruction from the post doc to mean working vs. being in the lab unescorted. The Electrician did not obtain authorization to use the code in this instance. - A4B1C01, A4B1C03, A3B3C05, A3B1C07, A5B3C01

Contributing Factors:

Pertinent access requirements posted on the Door were not apparent due to excessive number of signs/labels and placement of instructions within signage. There are 11 signs on the door to the laser lab. The Guidance for Laser Lab Visitors document has the appearance of something other than an instructional sign and could be overlooked, The information was presented in a manner that new users are less likely to read due to the amount of verbiage. Access requirement information is not easy to find. - A5B1C01, A5B1C07

Operating Conditions:

Indoors, lighted, dry

Activity Category:

Research

Immediate Action(s):

- The CSD researched told the electrician not to return to work at the lab.

FM Evaluation:

- Class IV laser poses the highest hazards among all laser classes. Lasers in this class have output powers of more than 500 mW in the beam and may cause severe, permanent damage to eye or skin without being magnified by optics of eye or instrumentation. Diffuse reflections of the laser beam can be hazardous to skin or eye within the Nominal Hazard Zone.

12/14/2010 Note:

An update was submitted to amend one sentence.

01/28/2011 UPDATE:

The investigation team is drafting its causal analysis report which will be finalized after quality assurance review. LBNL is requesting a 30-

day extension to submit the ORPS final report on 02/28/2011.

2/28/2011 UPDATE:

The incident investigation report, which has been broadened to include an extent of condition review, is currently undergoing quality check and approval process. LBNL is requesting for a 30-day extension to submit the ORPS final report on 03/30/2011.

03/18/2011 UPDATE:

The incident investigation team identified five root causes, six causal factors, and several signage-related contributing factors for this event. Based on objective evidence, the team's Extent of Condition Review concluded that the access control root cause and the job hazard identification and control deficiencies are not limited to this particular incident. Those causes could apply to other similar activities.

DOE Facility Representative

Input:

DOE Program Manager

Input:

Further Evaluation is Required:

No

Division or Project:

Facilities Division

Plant Area:

B2R308

System/Building/Equipment: Building 2 Room308 Laser Lab

Facility Function:

Laboratory - Research & Development

Corrective Action 01:

Target Completion Date:05/18/2011 **Actual Completion Date:**

Facilities Management should review historical performance of the Work Lead to determine if disciplinary action is warranted and document the determination. (LBNL CATS#8579-1)

Corrective Action 02:

Target Completion Date:12/18/2011 **Actual Completion Date:**

The Facilities Division should consider conducting periodic audits of pre-job briefings to ensure effectiveness. (LBNL CATS#8579-2)

Corrective Action 03:

Target Completion Date:12/18/2011 **Actual Completion Date:**

EH&S should update the Hazards Management System to push laser class information to the MAXIMO work order system. (LBNL CATS#8579-3)

Corrective Action 04:

Target Completion Date:03/19/2012 **Actual Completion Date:**

The Facilities Division should revise MAXIMO safety application to include safety precautions indicating which laser labs are Class 3B or

- Class 4 and list associated work controls. (LBNL CATS#8579-4)
- Corrective Action 05:** **Target Completion Date:09/19/2011** **Actual Completion Date:**
EH&S and the Laser Safety Officer should develop and implement online access training for craft workers. Include direction about working vs. being in an area unescorted and the use of codes/keys requiring authorization each time. (LBNL CATS#8579-5)
- Corrective Action 06:** **Target Completion Date:06/17/2011** **Actual Completion Date:**
The Facilities Division should update JHAs for all craft workers to include laser lab access hazards and controls. (LBNL CATS#8579-6)
- Corrective Action 07:** **Target Completion Date:03/19/2012** **Actual Completion Date:**
The EH&S Division should pursue the modification of the Job Hazard Analysis to better distinguish hazards and controls associated with the laser area access, with requirements to take relevant training. (LBNL CATS#8579-7)
- Corrective Action 08:** **Target Completion Date:11/30/2011** **Actual Completion Date:**
EH&S and the Laser Safety Officer should update relevant documents to include specific orientation guidance for staff who are NOT working on the laser itself but in the same room with the laser, and include specific guidance for providing orientation for visitors/service/repair providers that they may not be in the room unescorted. Include direction about working vs. being in an area unescorted and the use of codes/keys requiring authorization each time. (LBNL CATS#8579-8)
- Corrective Action 09:** **Target Completion Date:09/30/2011** **Actual Completion Date:**
EH&S should develop a laboratory policy or guidance restricting use of default access codes in labs without card key. Change access codes annually. (LBNL CATS#8579-9)
- Corrective Action 10:** **Target Completion Date:12/19/2011** **Actual Completion Date:**
The Laboratory should develop policy or guidance regarding access authorization procedures. (LBNL CATS#8579-10)
- Corrective Action 11:** **Target Completion Date:09/29/2011** **Actual Completion Date:**
LBNL management should mandate that illuminated laser safety signs be installed at eye level when possible and relocate existing signs that do not meet this criteria. (LBNL CATS#8579-11)
- Corrective Action 12:** **Target Completion Date:12/20/2011** **Actual Completion Date:**
LBNL management should consider revising PUB300 5.9 Warning

Signs and Devices policy to restrict the number of signs placed on doors in controlled access or high risk areas. (LBNL CATS#8579-12)

Corrective Action 13:

Target Completion Date: 08/31/2011	Actual Completion Date:
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EH&S should simplify existing Visitor Guidance signage. State in bold letters "Escort Required." (LBNL CATS#8579-13)

Lessons(s) Learned:

The electrician accessed the laser space without authorization due to incomplete pre-job orientation, inadequate signage, and an incorrect understanding that the access restrictions only applied when performing actual work and not for every entry.

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
 08C--OSHA Reportable/Industrial Hygiene - Industrial Hygiene Exposure
 08K--OSHA Reportable/Industrial Hygiene - Near Miss (Other)
 12K--EH Categories - Near Miss (Could have been a serious injury or fatality)
 14E--Quality Assurance - Work Process Deficiency

HQ Summary:

On December 10, 2010, a Lawrence Berkeley Laboratory electrician entered an active Class IV laser laboratory without escort. A Class IV laser poses the highest hazards among all laser classes and can cause severe, permanent damage to eye or skin without being magnified by optics of eye or instrumentation. On December 6, a Facilities electrician received work order WDJ425 to install a switch box and a power cord on a vacuum pump in Building 2. The electrician went to the job site to find out the scope of the work and was escorted by a lab staff to the lab. Upon discovering he needed additional tools and materials, he left the lab and notified the Chemical Sciences Division (CSD) laser lab scientist that he needed additional materials to complete the job. He was told that the earliest he could return to the lab was on December 10. The electrician returned as scheduled and entered the lab using the code he had acquired by observing the numbers entered when he was escorted. He entered the lab, put laser safety goggles on, and placed his tools and materials inside the lab. He then left the lab to obtain approval from lab personnel to work there. When he returned to the lab he was let in by ringing a bell and proceeded to work on the pump. During trouble-shooting, the CSD researcher came to the laboratory and questioned the work experience of the electrician. The CSD researcher told the electrician not to

return to work at the lab.

Similar OR Report Number: 1. SC--BSO-LBL-EHS-2009-0001
2. SC-OAK--LBL-EHS-2003-0001

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HQ OC Notification:

Date	Time	Person Notified	Organization
NA	NA	NA	NA

Other Notifications:

Date	Time	Person Notified	Organization
12/10/2010	16:20 (PTZ)	Kevin Hartnett	BSO

Authorized Classifier(AC):

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