

Notable Event Worksheet

(See [ES&H Manual Chapter 5200 Appendix T1 Event Investigation and Causal Analysis](#) for Instructions)

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For Word Doc

Title of Event

Event Title: Electrical Conduit Breach by Drill Bit

Date and Time of Occurrence: May 1, 2012

Notable Event Number: FML-12-0501

Event Location: Jefferson Lab; Technical Engineering & Development (TED) Building 55 Lobby

Date Notable Event Report is Due*: 6-1-12 Extended to 6-6-12

*The Notable Event Report is due to the ESH&Q Reporting Officer with 30 days of the Initial Fact Finding Meeting unless an extension is requested.

Categorization and Reporting

(To be completed by ESH&Q Reporting Officer within two hours – unless essential information is still pending)

ORPS Determination:

Date: 05/02/2012

Time: 1501

From Tina Johnson

Subject **ORPS Determination: FML-12-0501 Drilling through a J-Box, Struck 110V line**

5/2/2012 3:01 PM

To Steve Neilson

Cc Mary Logue, Ned Walker, Jennifer Williams, John Kelly, kujawa, Bert Manzlak, Dick Owen, Tina Menefee

4 more Other Actions

Steve,

Good Afternoon! As a follow-up to my voicemail yesterday afternoon, a Jefferson Lab employee was drilling through a J-box located below the "Exit" sign in the main entrance at the TED building. As he drilled through J-box and the metal stud, the employee hit a 110v line that feeds the automatic door. The employee was not injured.

This is an ORPS reportable event:

- (2) 3 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.

We will enter the ORPS notification report in a timely manner (2 days), as well as follow the JLab Notable Event process. The Fact Finding meeting has been scheduled for 8:00 am, May 3, 2012, due to the lack availability of the impacted person.

If you have any questions or concerns, feel free to contact me.

Thank you,
Tina

--
Tina Johnson
Reporting Officer/
Administrative Assistant
JSA/Jefferson Lab
12050 Jefferson Ave
Suite 602
Newport News, VA 23606
757-269-7611

10 CFR 851 Screen:

Date: 05/02/2012

Time: 1501

This event does not meet the voluntary NTS reporting criteria either as a discreet event or as a programmatic weakness.

Unless otherwise specified the following is to be completed by the Lead Investigator.

Step 1 Initial Fact-Finding Meeting

| | | | | | |
|-------------------------------------------|--------|--------------|---------|--------------------------------------------------------------------------|-------------------|
| Date: | 5-3-12 | Time: | 8:00 AM | Location: | TED Bldg 55 Lobby |
| Required Attendees: | | | | Optional Attendees: | |
| Lead Investigator: | | | | Associate Director: | |
| (Print Name): Dave Kausch | | | | (Print Name): | |
| ESH&Q Representative: | | | | TJSO Observer: | |
| (Print Name): Ned Walker | | | | (Print Name): Steve Neilson & Rick Korenta | |
| Supervisor of involved persons(s): | | | | Subject Matter Expert(s), Facility/Equipment Owner as applicable: | |
| (Print Name): Dave Kausch | | | | (Print Name): Todd Kujawa | |
| Involved or impacted person(s): | | | | (Print Name): | |
| (Print Name): Tina Johnson | | | | (Print Name): | |
| (Print Name): | | | | (Print Name): | |
| Witness(es): | | | | (Print Name): | |
| (Print Name): none | | | | (Print Name): | |

| Agenda <i>(Ensure the pace of the meeting allows time for accurate note taking.)</i> | √ if Complete |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 1. Introduction – Provide Event Title, Date and Time of Occurrence, and Location: | √ |
| 2. Attendance - Are Required Attendees present. | √ |
| 3. Purpose of Initial Fact-Finding meeting. | √ |
| 4. Event Reconstruction – Use information to complete Section 3. <u>Summary of Event and/or Injuries</u> below. | √ |
| a. Personnel and organizations involved in the event. | √ |
| b. Conditions and actions preceding the event. | √ |
| c. Chronology (timeline) of the event; and | √ |
| d. Immediate actions taken in response to the event. | √ |
| 5. Clarify information – <u>Subject-Matter Expert</u> (SME) confirms work conditions. | √ |
| 6. <u>Stop Work</u> or the <u>Tag Out</u> Required? If “Yes” – establish the restart criteria and inform the affected Management chain. | √ |
| 7. Compensatory Actions Required? If “Yes” determine responsibility and include confirmation documentation. | √ |
| 8. Records or documentation required to confirm, clarify, or complete information (i.e., work plans, work control documents, photos, etc). | √ |
| 9. Other Questions or Concerns: Ask attendees if there are any other questions, concerns, or information that they wish to provide. | √ |

For questions or comments regarding this form contact the Technical Point-of-Contact Tina Johnson

10. Obtain TJSO Observer feedback on conduct of fact finding meeting and potential improvements.

✓

| Step 2 Investigation Team: | | Date Convened: | May 9, 2012 | |
|----------------------------|---------------------|--------------------------------------------|-------------|--|
| | | (Within 24 hours of Fact Finding Meeting.) | | |
| Role | Name | Department/Group | Phone | |
| Lead Investigator | Dave Kausch | Facilities Mgt. | 7674 | |
| Subject Matter Expert | Todd Kujawa | ES&H | 7006 | |
| Team Member, Electrician | Barry Shinault | Electrical Engineering | 5025 | |
| Team Member, Electrician | William Formichelli | Electrical Engineering | 5027 | |
| Team Member, Electrician | Charles Garrison | Electrical Engineering | 5115 | |
| <u>TJSO Observer</u> | | | | |

Step 3 Summary of Event and / or Injuries, including Initial Fact Finding Meeting information: determine the chain of events and timeline. Use attachment as necessary.

There were no injuries associated with this event.

Notes to clarify the following account of the event:

- TED F is the Technical Engineering & Development Facility consisting of three construction phases. The first phase is the construction of a new structure, Building #55 the Technical Engineering & Development Building.
- This event occurred in Building 55 at the conclusion of the construct phase and during owner occupancy.

The following summary is the account provided by John Riesbeck (the worker) immediately following the event occurrence: Today, Tuesday 05/01/2012 around 1:30 P.M. at the TED F front doors I began to relocate the hanging motion sensor further below the exit light and centered on the door. This meant extending the wiring over to the left approximately 10". The devices junction box was mounted against a metal stud immediately to the Left and recessed in the sheetrock. I attempted to drill the metal stud to open an access to the chase where I intended to remount the device. As the bit penetrated through I noticed a small yellow spark between the bit and the box. I removed the drill and examined the hole where I found I had penetrated into an electrical conduit and shorted the wire. I then called the electrical department (Bob Rice) and my supervisor (Dave Kausch).

Dave and I had discussed this job a few weeks prior and he had recommended cutting a groove in the sheetrock instead of drilling and fishing the wall. He also provided a large plate to conceal the sheetrock damage. I instead chose to attempt to drill the stud, and overlooked the need for a blind penetration permit. I have been an employee here for 5 years, am a past member of the workers safety committee, I should have known better. I always strive to conduct myself and sure that others work safely and in a manner consistent with Jlab policies, and sincerely apologies for this incident.

Notable Event Report

| Emergency Notifications Made (Subsequent to the Event): | Date | Time |
|---------------------------------------------------------|--------|--------|
| Fire, Rescue & Emergency Medical: (9-911) | NA | |
| Guard Post: x4444; 269-5822 | NA | |
| Occupational Medicine 269-7539 | NA | |
| ESH&Q Reporting Officer: 876-1750 | 5-1-12 | 2:00pm |
| Crew Chief 630-7050 | NA | |
| Industrial Hygiene: 269-7863: | NA | |

Other:

Witness Accounts: (Use attachments as necessary. Box will expand as necessary)

None

Environmental Aspects

Type of Material Released:

none

Quantity:

Source:

Time Flow was Halted or Controlled:

For Investigation Team (✓ All That Apply):

Reportable Quantity

Impact Ground/Soil

Storm Water Channel/Drain

Sanitary Sewer

Records, Documents, Pictures, and Other References: (Copy and paste, use attachments or document links as necessary)

Photo's of the electrical conduit penetration by drill bit – Building 55, TED Lobby on May 1, 2012



Exit sign

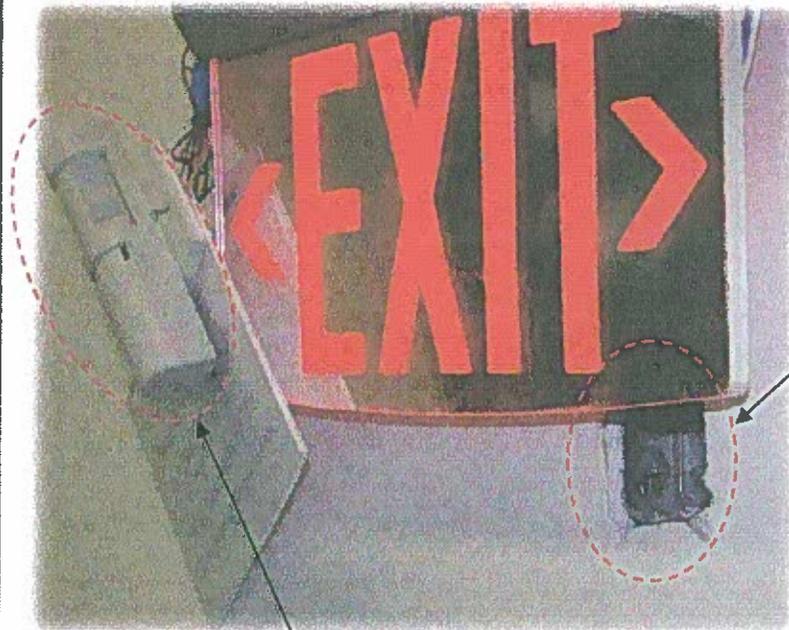
Motion sensor junction box

Background:

The rough-in of the electrical exit sign junction box and the motion sensor junction box were not well coordinated. The motion sensor j-box was not centered over the door opening. The work to be accomplished involved relocating the motion sensor to a position just under the installed exit sign and centered over the door. A PVC plastic panel was to be installed behind the motion sensor to cover the abandoned single gang rough-in.



The motion sensor j-box was roughed in off center with respect to the door opening and partially behind the exit sign.



A closer look at the low voltage motion sensor junction box.

This is the motion sensor that will be relocated to a position directly below the center of the exit sign.

Investigation Team Meeting & Discussion:

The investigation team convened on May 9, 2012, several days past the prescribed meeting date because of conflicting all staff meetings for Human Performance Improvement and a Long Shut Down safety meeting and the desire to enlist knowledgeable piers to participate in the investigation. The investigation team consists of the lead investigator who is also the workers supervisor, the Lab's electrical safety engineer in ESH&Q and three licensed electricians from the Accelerator Division. All members of the investigation team have used the Jefferson Lab Excavations and Blind Penetrations into Walls & Floors Permit (E&BPP) in the past. The lead investigator is required to sign each E&BPP as the subject matter expert (SME) for fire protection and life safety systems.

The facts of the event are readily apparent and the workers statement is quite clear and did not contradict the physical evidence of the scene. The investigation team found no reason to believe that an extent of condition check was necessary as a result of the fact finding details.

The worker is a licensed electrician in this locality, is a very reliable employee, a competent technician and very knowledgeable of the access control system he was working on. The work assignment to eliminate the conflict between the motion sensor and the installed exit sign by relocating the motion sensor is a job that had been delayed by several weeks because of other priorities. The worker had ready access to and was using all the correct tools and PPE for this job.

The investigation team began their discussion by reviewing the workers statement, the fact finding photos and the JLab E&BPP. The team came to a unanimous agreement, early in this meeting, that an E&BPP was not needed for the work, based on normal work planning activities before this event because the work was already within a wall cavity and the planned depth of penetration with the drill bit was only a fraction of an inch. The team members also were in agreement that if an E&BPP had been prepared for this particular job that the outcome of the work would be the same. In other words the accident investigation team was not confident that before this incident an E&BPP would have identified the conduit containing the 110 vac circuit that the worker penetrated with his drill. A lengthy discussion about the level of assurance an E&BPP provides the worker followed the early conclusions of the team members.

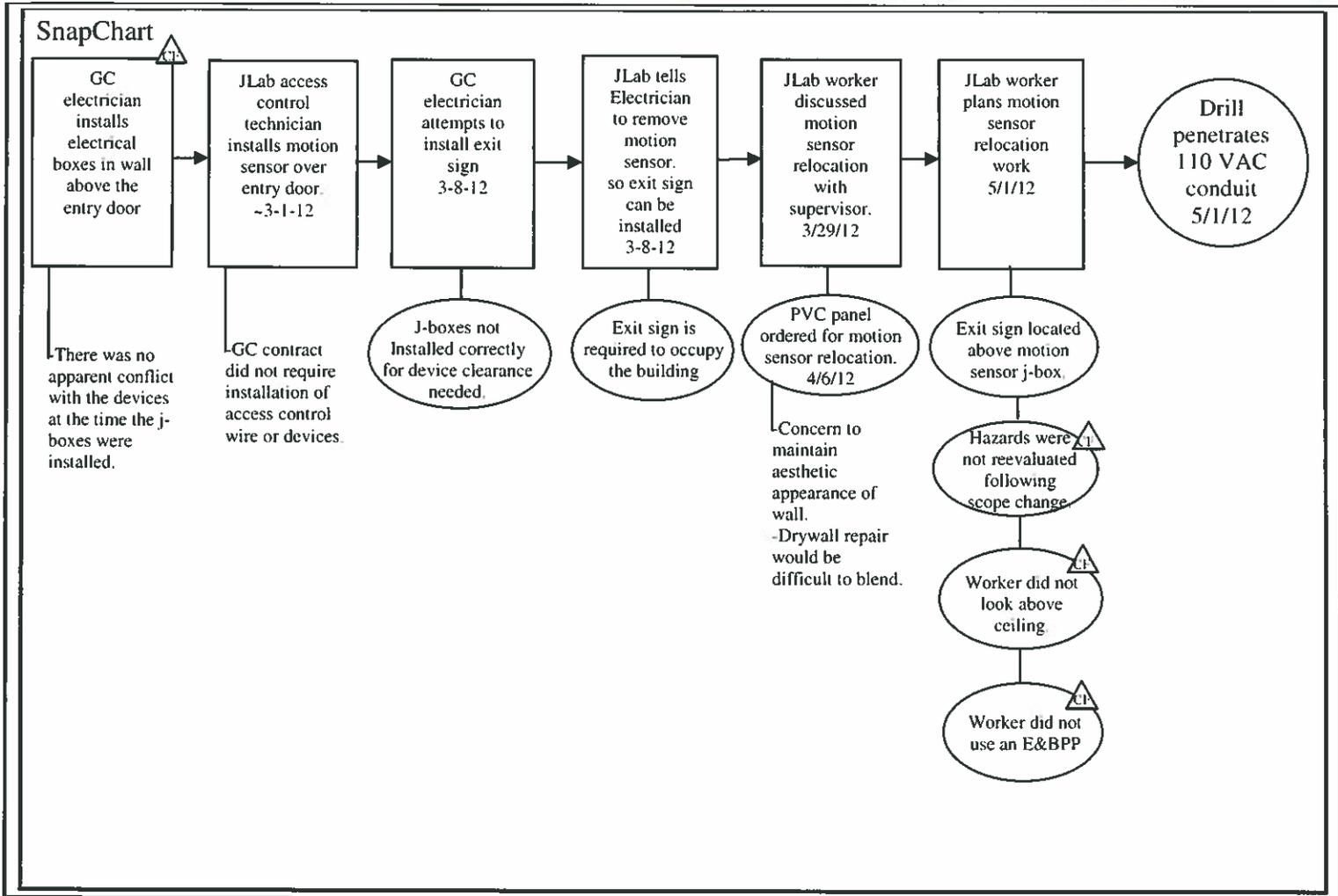
The work planning process to move the motion sensor occurred between the supervisor and the worker seven weeks before the work was started. The job was again reviewed after material arrived for the job. The worker elected to change the method of accomplishing the task. The review team was in agreement that his choice was not completely out of the norm, however, this minor change in method to route the motion sensor wire should have prompted the worker to reevaluate the hazards by involving his supervisor as a minimum. The reevaluation of hazards when job scope changes is identified in the work planning process of ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure.

Following the initial meeting the SME sent a note to the investigation team that the National Electrical Code (NEC) requirements for the proper use of raceways and junction boxes does not include drilling holes in an approved junction box for the passage of the electrical conductors that the system is designed to protect. The NEC approved method to accomplish this planned work would have been the removal of a "knock-out" portion of the junction box and the installation of an approved conduit fitting such as a strain relief to allow the low voltage wire to exit. The NEC permits the installation of low voltage cabling in a building without raceways and junction boxes, however, where raceways and junction boxes are used all installation rules are to be followed.

The investigation team obtained a copy of the Los Alamos National Laboratory (LANL) Penetration Permit (form 2074) for review and application to this event. The committee was in agreement that use of the LANL penetration permit may possibly have avoided the outcome of this work, due to the fact that the LANL permit check list has a specific direction to investigate above the ceiling. We attempted to look in the space above the ceiling in the TED entry foyer to determine if the conduit configuration could be observed. The access panel to the space above the drywall ceiling is locked with a key and was not accessible to the investigation team or the worker on the day of the event.

The building construction drawings were reviewed to determine if electrical sub-contractor installed the motion sensor and exit sign junction boxes according to the design documents. The installation drawings do not include a detail that shows dimensions for this installation. One interior elevation drawing does show the entry door structure but does not include the exit sign or motion sensor. The installing electrician had little guidance beyond previous experience to guess at the amount of space that may be needed between the two junction boxes.

Two team members have received some training in the TapRoot method of accident investigation. The TapRoot Cause Tree was used to evaluate this event.



| Causal Analysis: (Use attachment as necessary) | |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Root Cause: | The work package was less than adequate. The employee changed the scope of the task and failed to reanalyze the hazards and develop and implement the appropriate hazard controls. This included failing to complete a visual inspection of the ceiling and wall prior to completing the task as well, and, completing the Excavations and Blind Penetrations into Walls & Floors Permit. |
| Contributing Causes: (List as many as apply.) | <p>The construction drawings available for subcontractors and employees to use need improvement. The drawing package did not contain enough detail to coordinate the installation of the exit sign and the motions sensor. No institutional mechanisms exist to help guide a design team on this minor level of detail.</p> <p>Discussion: The drawing package for the TED construction does not contain an interior elevation detail to coordinate the installation of the exit sign selected for this building and an access control motion sensor which both needed to be installed centered over the glass wall door opening. A wall mounted exit sign typically installs centered over the electrical box that is installed in the drywall. The exit signs specified for this installation hangs well below the electrical box installed in the drywall and partially covered the junction box installed below the exit sign for a motion sensor. The installation was not apparently deficient until an attempt was made to install both the exit sign and the motion sensor.</p> |

| Extent of Condition Check | Responsible Person(s) | <u>JLab CATS Number</u> | Target Date |
|---------------------------|-----------------------|-------------------------|-------------|
| | | | |

| Corrective Action(s) | <u>JLab CATS Number</u> | Target Date |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|
| The JLab Excavations and Blind Penetrations into Walls & Floors Permit was not used for this job, however, during the investigation, it was determined that the permit is not strict enough and it allows a technician latitude to avoid using the permit. The JLab permit is also confusing because it includes both digging activities and wall/floor penetration activities. These two activities will seldom if ever be accomplished on the same job. A separate permit for each of these activities will simplify each permit. Sperlazza | NE-2012-14-01 | 12/01/2012 |
| Consider making blind penetration permits mandatory for all situations. Use Los Alamos' blind penetration permit as guidance. This permit is mandatory for all instances of wall and floor penetration but also allows simpler approval for the picture hanging type of penetration. The practical check list of this permit forces the technician planning the work to either thoroughly investigate the wall cavity or lie about the investigation. The investigation team believes that when a JLab technician is faced with a check box the JLab culture and work ethic would result in a thorough investigation prior to the penetration. Sperlazza | NE-2012-14-01 | 12/01/2012 |
| Once the Excavation and Blind Penetration Permit has been revised, retrain the personnel that will be required to use them. Sperlazza | NE-2012-14-01 | 03/31/2013 |
| | | |

| Lessons Learned (Confer with Division/Department Lessons-Learned Coordinator) (Use attachment as necessary) | <u>JLab COE Number</u> |
|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| All the construction work required to build a building should be included in the design documents for the general contractor to accomplish. | - |
| A decision to make a minor work scope changes should always be followed by a hazard reevaluation before proceeding with the work. | - |
| | |

Investigation Team Confirmation:

The below signees, confirm to the best of their knowledge, that the information presented in this document is accurate and complete.

| Role | Print | Signature | Date |
|-------------------|---------------------|------------------------------------------------------------------------------------|---------|
| Lead Investigator | Dave Kausch |  | 6/19/12 |
| SME | Todd Kujawa |  | 6-19-12 |
| Team Member | Barry Shinault |  | 6-19-12 |
| Team Member | William Formichelli |  | 6-19-12 |
| Team Member | Charles Garrison |  | 6-19-12 |

Upon confirmation submit document to the ES&H Reporting Officer for completion and distribution.

Documentation of Findings: (To be Completed by ESH&Q Reporting Officer)

| | |
|------------------------------|---------------------------------------------------------------------------------------------------------------|
| Notable Event Number: | FML-12-0501 |
| CATS Number: | NE-2012-14-01 |
| JLab COE Number: | N/A |
| ORPS Number: | SC--TJSO-JSA-TJNAF-2012-0006 |
| NTS Number: | N/A |
| CAIRS Entry: | N/A |
| DOE Cause Code: | A4 - Management Problem B3 - Work Organization & Planning LTA C11 - Inadequate work package preparation |
| ISM Code: | Analyze the Hazards, Develop and Implement Hazard Controls |

Acceptance/Acknowledgement of Facts

| | Print | Signature | Date: |
|------------------------------------------|-----------------------|--------------------------------------------------------------------------------------|-----------|
| Associate Director/ Department Manger | <u>John R Sprouse</u> |  | 19 Jun 12 |

Distribution:

- ES&H Reporting Officer (Original)
- Associate Director/Department Manager
- Division Safety Officer
- Investigation Team Members

Form Revision Summary

- Revision 1.3 – 01/31/12** – Updated ESH&Q Reporting Officer assignment from SSmith to CJohnson per MLogue Edited to clarify process steps.
- Revision 1.2 – 10/20/11** – Updated ESH&Q Reporting Officer assignment from JKelly to SSmith per MLogue.
- Revision 1.1 – 05/24/11** - Edited to clarify process steps.
- Revision 1 – 11/23/10** – Updated to reflect current laboratory operations.

| ISSUING AUTHORITY | FORM TECHNICAL POINT-OF-CONTACT | APPROVAL DATE | EXPIRATION DATE | REV. |
|-------------------|---------------------------------|---------------|-----------------|------|
| ESH&Q Division | Tina Johnson | 10/19/09 | 10/09/12 | 1.3 |

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