

United States Government

Department of Energy
Portsmouth/Paducah Project Office

memorandum

DATE:

15 OCT 2004

REPLY TO:

ATTN OF: PPPO:KOZLOWSKI

PPPO-01-210-05

SUBJECT: **PORTSMOUTH/PADUCAH PROJECT OFFICE ELECTRICAL SAFETY
PERFORMANCE CHALLENGES AND GOALS ANALYSIS**

TO: Paul Golan, Acting Assistant Secretary

In accordance with your memorandum dated July 13, 2004, attached is the DOE Portsmouth/Paducah Project Office (DOE/PPPO) Electrical Safety Performance Challenges and Goals analysis.

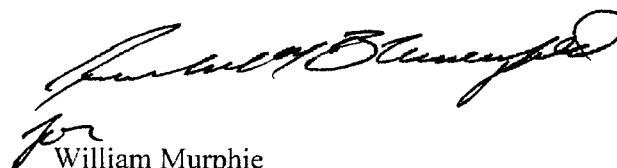
Our analysis focused on the areas indicated in your memorandum, specifically evaluating: 1) Review performance data for electrical safety at each site; 2) Determine the underlying causes and activities that result in electrical safety issues; and 3) Develop and approve an action plan to improve performance that is tailored to the unique challenges at each site.

The Electrical Safety Performance review performed at the Portsmouth and Paducah sites did not identify issues requiring action specific to electrical safety. However, actions were identified related to program performance as follows:

1. DOE/PPPO Facility Representatives and project personnel will continue to monitor these areas of concern (i.e., excavation, blind penetration, energized electrical work, electrical demolition, electrical wiring errors and vehicles striking overhead lines) in the DOE oversight program.
2. DOE/PPPO will verify implementation of ISM at both Portsmouth and Paducah in FY 2005.

If you have any questions concerning this, please contact me at (859)219-4000 or have a member of your staff contact David Kozlowski at (859)219-4009.

Sincerely,


William Murphie
Manager
Portsmouth/Paducah Project Office

P. Golan

2

PPPO-01-210-05

Attachment

cc:

I. Triay, EM-3

P. Bubar, EM-3

D. Kozlowski, DOE/PPPO

G. Bazzell, DOE/PPPO

J. Saluke, DOE/PPPO

**DOE Portsmouth/Paducah Project Office
Electrical Safety Performance Action Plan
October 15, 2004**

1.0 Purpose:

In accordance with the Assistant Secretary, Office of Environmental Management memorandum of July 13, 2004, DOE/PPPO performed an electrical safety performance assessment at the Portsmouth and Paducah sites to develop specific plans targeting weaknesses following electrical safety events.

2.0 Approach:

For both the Portsmouth and Paducah sites, DOE/PPPO Facility Representatives performed the following actions:

1. Reviewed performance data for electrical safety at each site.
2. Determined the underlying causes and activities that resulted in electrical safety issues.
3. Develop and approve an action plan to improve performance that is tailored to the unique conditions found at each site.

3.0 Discussion:

The following sections identify the actions taken at both the Portsmouth and Paducah sites and the final action plan is based upon the results of these reviews.

3.1 Portsmouth Site Review: The review focused on six areas of interest associated with electrical hazards at DOE facilities (excavation, blind penetration, energized electrical work, electrical demolition, electrical wiring errors and vehicles striking overhead lines). The following sections identify results of this assessment.

3.1.1 Occurrence Reporting and Processing System Reports

BJC provided copies of Occurrence Reporting and Processing System (ORPS) reports and a listing of BJC fact sheets for the site. There have been no near misses or injuries reported for electrical hazards in FY2004. There has only been one incident in FY2004 associated with an electrical wiring error (fire damage to an unoccupied field office trailer due to electrical code deficiencies in the wiring). Corrective actions for this event included establishment of a procedure to perform electrical installation inspections for trailers and temporary structures.

An electrical wiring error was discovered during initial voltage checks of the transformer installation for X-627 construction. However, this error was discovered and corrected before power was applied to X-627 equipment. There have been several non-events where abandoned wiring has been uncovered during excavation activities. The insufficient number of electrical safety events and conditions precluded performing trend analysis for FY2004.

3.1.2 Contractor Implementing Procedures

The review also looked at the management systems in place for the work, i.e., procedures, personnel, training, hazard assessment, and oversight. These systems contain the primary elements that maintain the effectiveness of the electrical safety program. These systems were sampled on a limited basis during the review. BJC has implemented procedures intended to control electrical hazards, such as LOTO, Electrical Safety, Hazard Assessment, Excavation/Penetration Permit, and Accident

Prevention/Equipment Control Tags. These documents were reviewed but not walked down during the review.

Maintenance electricians and supervisors interviewed during this review have many years of experience in electrical work and plant activities. Maintenance electricians and supervisors are required to pass training courses (e.g., electrical safety, LOTO, etc) provided by U. S. Enrichment Corporation (USEC). Activity Hazard Analyses (AHAs) for work activities address electrical hazards and their controls. Workers review the AHAs and are briefed on the AHAs prior to work execution. Daily pre-job meetings are conducted to discuss the work, as well as the hazards and the controls identified in the AHA. Several pre-job meetings were observed; workers were able to raise safety issues for the task and discuss those issues with the supervisor and/or safety advocate.

Oversight is provided by the QA and safety organizations. Assessments, surveillances and walkthroughs have been conducted on work activities that have electrical hazards; no electrical safety issues were identified in those reports. Oversight is also provided by the BJC and subcontractor safety Subject Matter Experts (SMEs) and building operators. Some subcontractor activities (e.g., construction of X-627) have 100% oversight by subcontractor safety SME, as well as spot checks by the BJC Safety Advocates. There were no indications that these programs have identified any recent electrical safety issues. In addition, work activities may be subject to mini-readiness and management reviews prior to starting work. FY2004 work activities in X-3002, X-627, X-345, and X-1000 have involved electrical hazards. The work activities for X-3002, X-627 and X-345 went through BJC readiness reviews and were reviewed and authorized by BJC SORC. There were no significant electrical issues in the readiness reviews noted during this review.

In the documents provided, indications of a active feedback and lessons learned system regarding electrical safety were evident. For example, the "I Care/We Care" program identified an electrical safety issue associated with the X-3002 substations. DC voltage had never been completed for the X-3002 substations and was needed for safe operation of the breakers and substation. Without the DC voltage, critical functions such as under voltage and over voltage protection to the substations were compromised. A project in X-3002 has been removing temporary wiring and installing permanent wiring where needed. The temporary wiring was installed during construction of the facility in the 1980s. Construction was never completed, and the facility sat idle for a number of years. Temporary wiring (e.g., overhead cranes, fire alarm systems, etc) was not replaced when the facility began to be used again. BJC generated a Lesson Learned when workers discovered that a transformer disconnect could be re-energized with the LOTO lock in place (June 2002).

During inspection of X-1000 prior to restoration after several years of being unused, WASTREN inspections of the electrical systems identified damaged arc chutes and severe burning and/or welding of contacts and contact surfaces. Breakers could not have operated as designed and could have caused a fire. This Lesson Learned was shared with USEC due to X-112, X-1007 and X-1020 being constructed about the same time as X-1000 and might have the same breakers installed.

3.2 Paducah Site Review: A review was conducted to review performance data for electrical safety at Paducah. The review included review of occurrence reports from FY 2004, a review of lockout/tagout and electrical safety procedures implemented at the

site, canvassing of the Safety professionals for any known electrical safety incidents, and an interview with one of the Front Line Managers for the Decontamination and Decommissioning (D&D) crew regarding the only reported electrical shock incident.

3.2.1 Occurrence Reporting and Processing System Reports

There was one occurrence report, which involved an electrical safety issue. ORO—BJC-PGDPENVRES-2004-0007 involved a forklift striking an overhead line and dislodging it from the pole. The line was a low voltage communications line and was verified to be de-energized by Power Operations staff prior to the driver exiting the forklift. The focus of this occurrence report was striking the overhead line, as this was the second such event at Paducah within a three-month period. The DOE/PPPO Manager issued a letter to the contractor requesting a causal analysis of these two events and a corrective action plan. The letter also put the contractor on notice that any further such occurrences may result in a reduction in fee under the contract. The contractor response dated June 18, 2004, addressed the problem with overhead lines but did not identify any corrective actions associated with the electrical safety issues as the appropriate actions were taken by the operator and plant staff.

3.2.2 Contractor Implementing Procedures

The following two procedures relating to electrical safety were reviewed:

- USEC CP2-SH-IS1065, *Instruction for Lockout/Tagout*, Revision 8, Change A, effective July 28, 2004, for Bechtel Jacobs Company LLC.
- BJC-EH-2009, *Electrical Safety*, Revision 0, effective September 10, 2003.

The first procedure is a USEC procedure that is used by all entities for implementation of LOTO at the Paducah site. This procedure implements the requirements of 29 CFR 1910 and includes requirements for independent verification of the permit scope, functional verification of the permit implementation, training requirements, and use and application of locks and tags. The BJC version of the procedure includes an appendix to identify the differences in procedure references and assignment of responsibilities. The LOTO's implemented under this procedure are typically the responsibility of USEC as they operate and maintain most of the electrical system in the plant.

The second procedure is a BJC procedure that applies to work on or near energized electrical equipment or equipment that has been de-energized but is not under a LOTO permit (single energy source). The procedure cites both 29 CFR 1910 and 29 CFR 1926 as source documents for implementation of these controls. This permit provides guidance on the responsibilities and actions required for safe performance of work by personnel on or near electrical equipment or circuits that may be energized.

3.2.3 Electrical Shock Incident

Based on questioning of safety professionals and Facility Managers at the Paducah site, only one incident involving an electrical shock was identified. This was the result of electrical static in the hose of a vacuum system used in conjunction with the sponge blasting operation of fluorine cells by the D&D crew.

The sponge blasting equipment includes a high-pressure air operated blasting system using sponge balls as the blasting media. The blaster is skid mounted and contains the blasting unit, a vacuum unit and a tank, which holds the sponge media. The electrical shock incidents occurred when operating the vacuum system to clean up the sponge

media for reuse. The equipment is all grounded to a common ground on the skid.

The vacuum unit has a flexible hose, which has a ground wire embedded in the flexible hose and is equipped with a PVC nozzle on the end. After the first reported incident, a continuity check was performed to ensure the grounding mechanism was functional. This continuity check verified the ground was functioning as designed. As a precaution, the hose was wrapped with insulating tape to ensure the static would be grounded through the designed ground and not through the user. An engineering representative contacted the manufacturer who offered no additional guidance on how the static discharges might be reduced.

Following a second reported incident, use of electrically insulated gloves (lineman's gloves) was allowed but was not required. The continuity of the ground wire was verified again to ensure the ground remained functional. This appeared to reduce the incident rate of the static discharge but did not eliminate it as sparking of the vacuum nozzle was observed. Additionally, the electrically insulated gloves were cumbersome as this work was being performed in a contamination zone and the PPE requirements were already limiting the mobility of the workers hands.

Following a third reported shock incident (the user was not wearing the electrically insulated gloves), the PVC nozzle was removed and a rod was placed inside the nozzle to provide the needed rigidity of the end of the hose. The removal of the PVC nozzle and installation of the rod has eliminated the occurrences of static discharge and the resulting electrical shocks.

4.0 Recommended Action Plan

The Electrical Safety Performance review performed at the Portsmouth and Paducah sites did not identify issues requiring action specific to electrical safety. However, actions were identified related to program performance as follows:

1. DOE/PPPO Facility Representatives and project personnel will continue to monitor these areas of concern (i.e., excavation, blind penetration, energized electrical work, electrical demolition, electrical wiring errors and vehicles striking overhead lines) in the DOE oversight program.
2. DOE/PPPO will verify implementation of ISM at both Portsmouth and Paducah in FY 2005.