

Information Bulletin

This Bulletin is being provided to you for review, analysis, and internalization as applicable.

Title: Consistent Implementation of Hazardous Energy Control Requires Integrated Work Processes and Rigorous Human Performance

Date: June 26, 2006

Identifier: 2006-RL-HNF-0024

Lessons Learned Summary: Since the beginning of fiscal year 2006, FHI has reported a total of ten events related to Hazardous Energy Control. Nine of the ten events had a direct relationship to lockout/tagout work evolutions. As a result, management identified Hazardous Energy Control as a recurring problem and determined that, if not corrected, it could lead to an injury-producing incident. Subsequent event analysis identified several hazard energy control issues that had not been included in the original reports. Further review of these issues led to the conclusion that the work planning and hazards analysis processes were not well integrated and that workers are not applying enough rigor when executing the lockout/tagout process.

These issues are being addressed by further integrating the Work Management and Hazardous Energy Control Processes and through implementation of a Human Performance Initiative which will provide the opportunity to mitigate for our human fallibility and reduce the chance for error in planning and executing lockout/tagout. This is in addition to procedure and training revisions, as well as the issuance of two formal management communications.

Discussion of Activities: During the period October 1, 2005 thru March 9, 2006 a total of 10 occurrence reports that relate to hazardous energy control, or lockout/tagout, were issued by FHI. On March 13, 2006 nine of these reports, plus an additional one from July 2005 were reviewed to determine the existence of common issues and collective significance. Collective significance was identified leading to the declaration of a Significance Category "R" Report, EM-RL--PHMC-GENERAL-2006-0002, Repetitive Issue: Hazardous Energy Control/Lockout-Tagout Process.

Analysis: The recent failures with hazardous energy control illustrates that many of the incidents have been attributable to errors in human performance or ineffective work planning. These errors occurred because the properly trained individuals were not fully focused on the activity details essential for hazardous energy control. It is noted that problems did not occur on complex, high-risk jobs that involved highly detailed planning efforts, but instead on seemingly simple or medium-risk jobs. Human performance errors coupled with a lack of rigor in application of lock and tag requirements were evident in some of the events reviewed. Some workers had lost sight of management expectations regarding their responsibilities in the application of lockout/tagout.

Successful lockout/tagout can only be accomplished by a thorough pre-task work review that includes application of Work Management and Job Hazard Analysis requirements. Good preparation begins with an absolute knowledge of the correct scope of work and location of isolation boundaries. Other key factors include an effective pre-job briefing, current drawing reviews, document reviews, and field walk downs. Background knowledge or experience

taken from previous work performed on similar systems or "like" equipment may not be reliable. Every effort must be made to locate the correct safe work boundaries during the planning phase. Overconfidence and assumptions based on past successes and memory may lead to inaccurate decision-making. If technical reviews do not result in a high level of certainty and accuracy in isolating boundary determination, a separate work request or instruction needs to be employed to authorize the in-field review. Use of the 8-Criteria checklist is limited. Employees must remember that all 8 criteria must be present for this practice to be used. If the single energy isolation source and boundary is not 100% readily identifiable, use of the Controlling Organization lockout/tagout format must be selected as the means for hazardous energy control.

Of equal importance is the actual administrative preparation of the Tagout Authorization Forms (TAFs), 8-Criteria checklists, and tags. In addition, the comprehensive performance of safe condition checks at the work location, safe to work checks, and accuracy in hanging the locks and tags is imperative. Independent review and verification prior to performance of the safe condition check is also a very critical step in the process. Management needs to ensure employees assigned to this function are prepared and in a mental state of readiness to perform lockout/tagout duties. They also need to ensure that employees are not over-burdened with additional ancillary administrative duties which could detract from their ability to effectively carry out the activities which accompany this role. Employees, in turn, must be prepared to defend themselves against the error-likely situations which may be present in the form of complacency, high work load, time pressure, fatigue, attention span, and other competing tendencies.

Authorized workers must maintain a high level of awareness and a questioning attitude. Upon encountering any unexpected hazards or work conditions, or a perceived need for changes/departure from the original work instructions, workers need to Stop Work, address the impacts and further evaluate the effectiveness of the hazard controls planned for the task.

Examination of the 10 occurrences, along with inputs from subject matter experts (SMEs), identified several hazard energy control issues that were not included in the occurrence reports. They are:

1. Drawings Condition: The condition of some drawings and other design media were out of date, lack necessary level of detail, and may not adequately identify energy isolation boundaries. This condition is being addressed by: 1) conducting an evaluation of PHMC Engineering Requirements to determine if the existing process for the maintenance and configuration control of drawings is adequate, 2) revising Work Management and Job Hazardous Analysis procedures, and Job Hazards Analysis procedure.

2. Lack of Systems Knowledge: Some personnel who determined isolation boundaries did not possess adequate knowledge of the systems being isolated to perform this function. Although not required, system engineers were not consulted when their knowledge was essential for proper identification of isolation boundaries. This issue is being addressed by: 1) formal communication from the FH President to Project Management addressing management expectations related to hazardous energy control; and 2) direction from the FH Vice President of Safety and Health to Project Management requiring verification that the Controlling

Organization members are qualified to establish hazardous energy control safe work boundaries.

3. Field Walk Downs: In some cases field walk downs, and other means to determine safe work boundaries, were not adequate, or not performed. To address this condition the work management and Job Hazards Analysis procedures and the Work Planning Guide are being revised.

4. Controlling Organization: Preparers and Technical Reviewers have been overconfident. In some cases these individuals, who had experienced some success in the identification of safe to work boundaries unaided, were overconfident in their abilities. And, in some cases, lacked confidence in the drawings, and (when expedient) chose to proceed without the services of a systems engineer. This condition is being addressed by: 1) revising the Work Management and Job Hazards Analysis procedures and the Work Planning Guide; and 2) direction from the FH Vice President of Safety and Health to Project Management requiring verification that the Controlling Organization members are qualified to establish hazardous energy control safe work boundaries.

5. Time/Schedule Pressures: There were some cases where safe work boundaries have been misidentified by the Controlling Organization due to the perception of time/schedule pressure in getting the task completed. Scheduling of the task did not always adequately address the amount of time it would take to properly identify the safe work boundaries. This condition is being addressed by: 1) revising the Work Management and Job Hazards Analysis procedures and the Work Planning Guide; and 2) formal communication from the FH President to Project Management addressing management expectations related to hazardous energy control.

6. Technical Reviewer Failures: There have been cases where the Controlling Organization Technical Reviewer failed to identify errors made by the Tagout Authorization Form (TAF) preparer. This is attributed to the human tendencies to see what one wants to see and to have confidence in one's colleagues. This condition is being addressed by: 1) formal communication from the FH President to Project Management addressing management expectations related to hazardous energy control; and 2) written correspondence from the Office of the Vice President, Safety and Health to Project Management requiring verification of controlling organization member's qualifications.

7. Controlling Organization Operating On Backshift with Limited Personnel: Schedule demands led to TAF preparation on backshifts when system engineers and other experts with potential essential input were not available. This resulted in the TAFs with inadequately identified safe to work boundaries. This condition is being addressed by: 1) revising and integrating the Work Management and Job Hazards Analysis processes and the Work Planning Guide; and 2) formal communication from the FH President to Project Management addressing management expectations related to hazardous energy control.

8. The Hazards Analysis and Work Planning Processes: These closely related processes do not require identification of the safe work boundaries during the work planning process. This condition is being addressed by revising and integrating the Work Management and Job Hazards Analysis procedures and the Work Planning Guide.

9. Safe Condition Check: Errors occurred because the check was not made at the work location and the hazardous energy followed the path which was not anticipated. Procedures do not require the safe condition check be made at the work location when possible. Also, safe condition checks have been incorrectly identified on the TAFs due to human error. These conditions are being addressed by: 1) revising and integrating the Work Management and Job Hazards Analysis procedures and the Work Planning Guide; 2) formal communication from the FH President to Project Management addressing management expectations related to hazardous energy control; 3) revising the Lockout/Tagout procedure to require that the safe condition check be performed at the work location; and 4) written correspondence from the Office of the Vice President, Safety and Health to Project Management requiring verification of controlling organization members qualifications.

10. Safe to Work Check Not Performed: In one occurrence a Safe to Work Check was not performed consistently and adequately by the worker to identify changes in configuration which had occurred overnight after the initial check. These conditions are being addressed by: 1) formal communication from the FH President to Project Management addressing management expectations related to hazardous energy control; and 2) submittal of the lessons learned to the FH Lesson Learned Coordinator.

11. Authorized Worker Locks and Tags Using the 8-Criteria: There has been a tendency to use AW lockout/tagout using the 8-Criteria instead of the Controlling Organization due to the expediency in paperwork and the fact it only requires the Authorized Worker and CO to verify and concur that the identified energy isolation point is correct. While it is the intent of the Lockout/Tagout procedure that an 8-Criteria task can only be used when the single isolation source is in line of sight and/or is positively known to provide the energy isolation, it does not clearly define the limits in the use of the 8-criteria. Since the 8-Criteria process does not contain a positive check to ensure the single isolation hazardous energy source has been correctly identified and isolated prior to the release of work, reliance on correct application of lockout/tagout protocols is essential to keep hazardous energy from the workers. This condition is being addressed by revising the Lockout/Tagout procedure to clearly define the requirements and limitations for the use of the 8-Criteria method.

12. Work Scope Exceeded: There have been occasions where personnel have worked outside of the established work instructions. This has been due to work instructions not being adequately defined or communicated. During the work evolution, the worker's instinctive reaction was to continue the job such as troubleshooting when a problem was encountered, and a personal decision to consider the work within their "skill of the craft". These conditions are being addressed by: 1) formal communication from the FH President to Project Management addressing management expectations related to hazardous energy control; and 2) submittal of the lessons learned to the FH Lessons Learned Coordinator.

Recommendations:

- All facility managers should effectively communicate and discuss with affected employees their expectations for conduct of lockout/tagout to minimize the potential for future events.

- Training organizations should review and incorporate this lesson (where applicable) into Hazardous Energy Control-lockout/tagout training.

Cost Savings/Avoidance: Not evaluated

Work Function: Conduct of Operations - Lockout/Tagout

Hazards: Electrical/NEC

Keywords: Electrical, hazardous energy control, shock, repetitive issue

Originator: Fluor Hanford, Inc., Submitted by Dennis Wiatrak, Health and Safety

Contact: Project Hanford Lessons Learned Coordinator; (509) 372-2166; e-mail: PHMC_Lessons_Learned@rl.gov

References:

EM-RL--PHMC-GENERAL-2006-0002, EM-RL--PHMC-FFTF-2005-0005, EM-RL--PHMC-FFTF-2005-0006, EM-RL--PHMC-FFTF-2006-0001, EM-RL--PHMC-PFP-2005-0015, EM-RL--PHMC-PFP-2005-0029, EM-RL--PHMC-PFP-2006-0003, EM-RL--PHMC-SNF-2006-0002, EM-RL--PHMC-SNF-2006-0003, EM-RL--PHMC-SNF-2006-0007, EM-RL--PHMC-200LWP-2006-0001

Distribution: General - All PHMC Programs and Projects