Hazardous Energy Control Common Cause Review

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April 17, 2019
Identified Top Cross-Cutting Issue by Contractor Assurance

Hazardous Energy Control
- Executive Sponsor
- The Common Cause Analysis was completed on 1/31/2019

Contractor Assurance (CAS) identified Hazardous Energy Control (HEC) as a Top Cross-Cutting Issue in the CAS Quarterly Performance Analysis report for 4Q FY18.

- Increasing Trend in Incidents in FY18
  - 6 events identified
  - Fewer LOTO issues, however increase in personnel errors

A review of the issues identified was conducted using the BlueDragon™ Causal Analysis process. Reviewed Lockout/Tagout (L/T) evolutions performed by Hazardous Energy Control (HEC) trained personnel and of other electrical work performed by Qualified Electrical Workers at various Savannah River Nuclear Solution (SRNS) facilities.

There were 10 ORPS events: 8-2D (2) events, 1-2D (1) event, 1-2B (3) event. There was also 4-Non-ORPS events that occurred between 12/20/2017 and 12/3/2018.
Problem Statement identified by Common Cause team:

*Multiple Hazardous Energy Control and Electrical Safety Events are Consistently Being Identified*

Three Types of Events Identified:
- 5 Lockout/Tagout (L/T)
- 7 Electrical Safety (ES)
- 3 Non Lockout/Tagout and Electrical Safety (Non L/T or E/S)

Trained Personnel - There are currently:
- ~3100 HEC trained workers (Sitewide)
  - 1850 (SRNS)
- ~700 Qualified Electrical Workers (QEW) (Sitewide)
- ~300-400 Specific Task Workers (Sitewide)

Positives Identified for Hazardous Energy Control and Electrical Safety
- Program, Procedures, and Site Training
Calendar Year (CY) Total Lockouts (includes SRR)

- 2015 – 9023
- 2016 – 6489
- 2017 – 9862
- 2018 – (Data available 6/2019)

CY ORPs Reportable Events (L/T)

- 2015 – (2), Percentage of HEC events / total # of LTs - .02%
- 2016 – (4), Percentage of HEC events / total # of LTs - .06%
- 2017 – (3), Percentage of HEC events / total # of LTs - .03%
- 2018 – (4)
Six topics were identified in CY18 Q4

**ORPS Reportable 2D(2) -** Any failure to follow a prescribed hazardous energy control process that results in potential worker exposure to uncontrolled hazardous energy (e.g., live electrical power circuit, powered mechanical hazards, steam, pressurized gas, etc.); OR any discovery of an uncontrolled hazardous energy source (e.g., live electrical power circuit, powered mechanical hazards, steam, pressurized gas, etc.). This criterion does not include discoveries made by zero-energy checks and other precautionary investigations made before work is authorized to begin.

- Cut energized extension cord (**Electrical Safety Issue**)  
- Wind milling fan, mechanical hazardous energy not analyzed (**L/T issue**)  

**ORPS Reportable 2B(3) -** Any fire in a nuclear facility

- Lighting panel re-energized with light ballast issue, combined with no fire alarm and Public Address dead zone (**Non L/T or Electrical Safety issue**)  

**Administration (Non ORPS Reportable)**

- Light fixture over hood, assumption of air gap – 21 V found (**Electrical Safety Issue**)  
- Independent Verification of valve alignment to ensure valve closure (Fire Deluge atypical valve) (**Non L/T or ES issue**)  
- Safety concerns with re-pressurization of steam header (**Non L/T or ES issue**)
Additional events were identified by the Common Cause Team

**ORPS Reportable 2D(2)**
- 2D (2) – Lockout Form was not signed by worker/work group prior to start of work *(L/T)*
- 2D (2) – Lockout Form was not signed by all workers prior to SOM approving lockout removal *(L/T)*
- 2D (2) - Dropped wrench touched live conductor on O2 monitor *(ES)*
- 2D (1) - SRNL worker receives shock while changing out light ballast *(ES)*
- 2D (2) - Male Amphenol connector exposed *(ES - Legacy Design Issue)*
- 2D (2) - Subcontractor removed light cover plate to obtain asbestos sample *(ES)*
- 2D (2) - Operators did not attach hardware device (chains) properly to lock out four valves *(L/T)*

**Administration (Non ORPS Reportable)**
- Issue Investigation - Unqualified L/T Preparer prepared L/Ts under Shadowing Program *(L/T)*

2D(1) Any unexpected or unintended personal contact (e.g., burn, shock, injury, etc.) with a hazardous energy source (e.g., live electrical power circuit, mechanical hazards, steam, pressurized gas, etc.).
Areas of Concern

The team identified seven areas that the identified issues reside within -

• **Conduct of Operations**
  – Procedure Compliance
  – Control of Equipment and Systems
  – Communications
  – Issue Investigations resulting in LTA corrective actions

• **Worker performance (Assessors, Managers, SOMs, STRs, Workers, L/T Prepares, Planners, Engineers)**

• **Management expectations**
  ‣ Accountability
  ‣ Mentoring
    – Lack of proficiency in the execution of work by Qualified worker
  ‣ Ownership (Manager and Worker)
  ‣ Questioning Attitude
  ‣ Communication between Manager and Worker
    – Are you ready for work?
    – Have you done this before?
    – How long ago did you perform this?

• **Less than adequate facility training**
  – Facility specific on hardware devices
  – Proficiency of workers

• **Hazard recognition by all**

• **Work planning**

• **Legacy equipment condition**
Contributing Factors and Common Causes

**Contributing Factors identified were:**
- Human Performance issues (Workers, Managers/SOMs, Engineering, FLMs, STRs, Preparers, Planners)
- Conduct of Operations issues
- Less than Adequate (LTA) Facility training
- Training pre-requisites for HEC have not been established

**Common Causes identified were:**
- Proficiency (execution of work) of Workers
- Procedure non-compliance
- Worker Performance LTA
- Work Planning LTA

**Conduct of Operations Procedure, Facility and Program Managers -**
- Ensuring personnel are trained in the use of procedures and verifying that personnel receive appropriate training to achieve and maintain proficiency in their assigned tasks as procedure revisions occur.

**Quality Assurance Manual, Procedure:**
- 1.0 Purpose - This procedure provides Quality Assurance (QA) requirements for training, qualification, and certification of personnel performing or managing activities affecting quality to assure that suitable proficiency is achieved, documented, and maintained.
The 2014 Causal Analysis team determined that errors were made because personnel either:

• Didn't understand the intent of/detail in the procedure, specifically as it relates to their role/function, or
• Lacked proficiency in the execution of the HEC – LOTO processes. Discrete pieces of the process in several of the incidents were not executed well.

One Causal factor included:

• The authorization of numerous personnel to perform L/T functions without a way to maintain proficiency in functions they do not routinely perform. The additional personnel increased business flexibility, but the added personnel performing these critical tasks may not be conducive to maintaining the level of proficiency needed to eliminate these types of errors.

One Recommendation included:

• Facility Managers should consider proficiency of personnel when conducting L/T functions and assess the need to reduce the number of HEC trained personnel.

Root Cause Analysis

Based on the similarity of the findings in 2014 and 2018 the team determined the Root Cause to be:

• Lack of proficiency in the execution of work by the qualified worker
Corrective Actions Identified

13 OFIs and 1 Finding

CA-1: Review training qualification cards to ensure they are adequate.
CA-2: Perform a task analysis of the Lockout/Tagout process to determine the necessary prerequisite training, classroom training, and practical training needed to perform the various functions within the program.
CA-3: Based on the task analysis developed for the Lockout/Tagout process, evaluate revision of the HEC qualification program including the addition of facility specific practical training and an evaluation of the development of multiple qualification paths based on specific tasks. Additional actions will be added as necessary based on the evaluation.
CA-4: Develop an Off-Year Refresher training for HEC (for all roles).
CA-5: Issue a letter from the Chief Operation Officer (COO) for facilities/Programs to reduce the number of HEC trained personnel based on the need for L/T activities for all roles and responsibilities.
CA-6: Revise SLIC/SERB charters to define R2A2 for the groups to be engaged in corrective action development issued in Fact Findings/Issue Investigations for HEC and Electrical Safety issues.
CA-7: Revise Issue Investigation procedure to include an independent member of the Senior Electrical Review Board and Site Lockout Interpretations Committee member as well as an independent member.
CA-8: Develop performance Metric for HEC.
CA-10: Revise the HEC MFO template to include a LOI to observe execution of L/Ts by all roles / responsibilities.
CA-11: Add and Define additional codes for electrical safety to separate the issues so that issues may be binned/trended appropriately in issues database.
CA-12: Schedule an External Independent Assessment of the HEC Program.
CA-13: Develop a case study of the HEC Common Cause Analysis
CA-14: Develop videos to supplement case study to be used in tool box meetings/PJB/etc.