

# Project Hanford Lessons Learned

**Title:** Hazardous Energy Control Failures Lead to Worker Injury

**Date:** December 21, 2005

**Identifier:** 2005-RL-HNF-0045

## Lessons Learned Summary:

A maintenance worker was injured when hazardous energy was unexpectedly released from an instrument air compressor because the hazardous energy process did not physically control the configuration of a drain valve (lock and tag) to prevent operation once a safe condition check had been established. The hazardous energy control process is relied upon to protect workers and must be followed explicitly to ensure worker safety. The performance of the safe-to-work check is required to be performed by ALL involved crafts prior to the start of the work if the lockout/tagout is left installed overnight or if the configuration has changed. While mistakes are not expected, they may occur and this is the final check that the worker has to make sure they will not get injured.

## Discussion of Activities:

Two workers were performing Preventative Maintenance (PM) on one of two 100 psig instrument air compressors located in 291-Z. They went to work after hazardous energy control had been installed by the Controlling Organization (CO). The hazardous energy boundary was prescribed in the approved maintenance procedure and duplicated on the Tag-out Authorization Form (TAF). The boundary did not include locking open a vent path as prescribed in the Hanford Site Lock & Tag procedure, although the vent path was required to be opened and drained by the maintenance procedure and TAF. Rather, two four inch cross-over gate valves were isolated and the second valve was locked and tagged. The vent path was errantly closed sometime between the first and second day of maintenance and a leak path existed between the two closed isolation valves and the compressors. This allowed the compressed air to slowly accumulate and explains why the controlling organization safe condition check and employee safe to work check passed at the time of the original isolation. On the second day of work one of the workers removed a bolt from the air compressor high pressure head and was exposed to the compressed air and carbon buildup. The worker had a red contact area on his left forearm and small blood blisters from contact with the air and carbon buildup. The employee safe to work check was not adequately performed the second day.

## Analysis:

Procedures provided very specific direction regarding the isolation of the air compressor and subsequent removal of energy which was duplicated on the Tagout Authorization Form (TAF). However the application of the lockout process (preparation, technical review, and approval) missed the need to fully control the safe condition as identified in the Hanford Lockout Tagout procedure HNF-PRO-081. The procedure states, "If possible, keep the equipment depressurized by locking open a vent or drain valve in the isolated portion of the system..." The lock & tag administrator did not recognize the requirement to lock open the vent path as specified in the procedure.

While not specifically identified, a minimum safe-to-work check can be a repeat of the safe condition check. In this case verifying the pressure was removed from the system through the filter separator vent valve and attempting to start the compressor is a valid safe-to-work check. A safe-to-work check is required to be performed by ALL involved crafts as specified in the Hanford Lockout Tagout procedure. Section 5.4.3 of the procedure states, "Perform a Safe-to-Work Check: Prior to the start of the work; If the lockout/tagout is left installed overnight; If the configuration has changed." The performance of this safe-to-work check was not complete. While verification of the isolation valve positions was performed, along with the installed tags, the verification of the vent path was not performed by the new worker or the worker continuing the task from the previous day. At a minimum this verification would have identified the failure to control the configuration of the vent valve. Inspection of the filter separator drain valve (HV-PA-1005) was not performed.

The development of the lockout tagout was duplicated from the work procedure and past Tagout Authorization Forms (TAF) that did not physically control the configuration of the drain valve (lock and tag) to prevent operation once the safe condition check was established.

Contributing to this event was that the authorized worker did not recognize the need to perform a safe-to-work check on all of the hazards identified by the TAF. The typical and appropriate safe-to-work check for most maintenance activities is the check that the motor will not run. However, the limited scope of this safe-to-work check missed the fact that the drain valve had closed and the safe condition check was no longer valid.

**Recommendations:**

Lock and tag documentation should not be duplicated from past forms.

Perform safe condition checks on all hazards identified by the TAF.

**Estimated Savings/Cost Avoidance:** Not determined

**Priority Descriptor:** Yellow/Caution

**Work / Function:** Conduct of Operations-General

**Hanford Functional Categories:** Associated Causal Factors - N/A

**Hazard:** Pressurized systems

**ISM Core Function:** Perform Work Within Controls

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**Authorized Derivative Classifier:** N/A

**Reviewing Official:** Gerald Whitney

**Keywords:** Air Compressor, Lockout/Tagout, Hazardous Energy Control

**References:** Occurrence report: EM-RL--PHMC-PFP-2005-0015