

Problems and hazards could be addressed prior to performing the work in a radiation area. During the dry-run of the lanyard replacement operation, workers were removing the remote-handling device from a well using a crane. While moving the device from a vertical position to a horizontal position, the device rotated, and the cable was released from one side of the device causing it to fall. The design of the remote-handling device assumed it would be in a vertical position and did not consider the consequences involved with positioning it from vertical to horizontal. The device struck and cut a worker on the left arm just above the wrist while it was falling. The worker was taken to a hospital emergency room in Oak Ridge, where nine stitches were used to close the cut. The worker returned to work the next day with no work restrictions.

ANALYSIS: The investigation of this incident identified 1) workers were not involved in the design and work planning process; 2) the remote handling device was not part of the configuration control process; 3) problems with implementation of the work control process by responsible personnel; and 4) a lack of specificity in work control documents.

The direct cause was determined to be equipment difficulty. One end of the mechanism (choker cable) used to secure the remote-handling device to the lifting crane, slipped off the lifting post it was secured to as the device rotated while being moved from a vertical to a horizontal position. When the choker cable slipped off the lifting post, the device fell and struck a worker on the left arm just above the wrist.

The root cause was a design problem. The designer of the remote-handling device had not considered the effectiveness of the lifting configuration as the device would be moved from a vertical position to a horizontal position with simultaneous rotation caused by the weight of the lifting table. The designer only considered the device in a vertical position when designing the lifting configuration. The lifting configuration would have been effective if the device had remained in a vertical position in tension with the lifting crane. Neither workers, safety and health representatives, nor key waste management personnel participated in the design review for the remote-handling device. It should be noted that the rigging crew replaced the choker cable originally provided for the lift in the field. This replacement should have been considered a design change and reviewed by the configuration control board.

The remote-handling device was redesigned with extensive worker involvement. The lifting posts (extenders) are now solid with gussets placed between them and the body of the device. An enclosed clevis-type loop was attached to the lifting posts so the lifting cable could not slip off. The remote-handling device will be listed as a critical item per the ORNL Legacy Waste Project Operations configuration control program. Per the configuration control program, a configuration control board will review and approve any changes made to the device.

Contributing causes involved work organization/planning deficiencies. The investigation revealed several deficiencies in the implementation of the work control process.

1) Planning time was inadequate. Originally, the dry-run (using the remote handling device in a non-adverse environment on a SNF canister) was not to be performed using the work control process (approved work package). Questions arose concerning the lack of work control and a work package was quickly put together. The lease agreement for the crane used to lift the device was to expire soon after the work had originally been scheduled. Putting the work package together in a hurry contributed to the deficiencies identified in the work control process for this job. Plan-of-the-week meetings have been established to ensure adequate time to plan work. This meeting is chaired by the ORNL Legacy Waste Project Operations Manager. The Legacy Waste

Project work control procedure will be revised to include all dry-runs (walk-throughs), simulations, or similar types of activities with associated safety and health or environmental concerns.

2) The work package used during this event had not been reviewed or approved by the appropriate environmental, safety or health (ES&H) representatives. The work control process has been revised to ensure all work packages are reviewed and approved by appropriate ES & H representatives.

3) A supervisor performed the pre-task hazard review with no worker involvement. The procedure governing hazard review requires workers to participate in the review and to initial the pre-task hazard review to indicate their participation. This was not done. The Legacy Waste Project Operations Manager emphasized the need to include workers in hazard reviews. Management applied positive discipline.

4) No evaluation was made to determine if there was a need for a formal lift plan for this job. Although the investigation revealed no formal lift plan was needed for this job, an evaluation should have been made to determine if a plan was needed. The ORNL Legacy Waste Project Operations Manager in concert with appropriate operations and health and safety personnel now determine the need for a formal lift plan.

5) Personnel did not wear personal protective equipment (PPE) during this exercise. The wearing of PPE designated for the "real" job would help in evaluating the timing of the job, any difficulties related to the PPE, and could be of benefit in establishing ALARA requirements. PPE that does not add an additional risk during the dry-run will be worn when this exercise is resumed.

6) A generic/blanket work instruction was used for this event. The work instruction was written for all SNF canister removals from similar wells and did not address the use of the remote-handling device. The use of blanket work instructions has been eliminated from the work control process. A special work instruction has been written for replacement of SNF canister lanyards.

7) The supervisor at the scene when this event occurred was not experienced in the movement of SNF canisters. Procedures governing SNF movements at ORNL have been revised to require experienced supervisor(s) to participate in canister movements.

RECOMMENDED ACTIONS

* Ensure a three-site review of the Legacy Waste Project work control process and implementing procedures is performed to identify deficiencies.

* Document deficiencies identified by Action 1 above and revise work control planning/process procedures to include more rigor and a process flow diagram that identifies responsibilities for performance of the procedure.

* Make organizational changes as needed to address deficiencies identified by Action 1.

* Ensure appropriate personnel are trained to the revised work planning/control procedure(s).

* Add the remote-handling device as a critical item per the ORNL Legacy Waste Project change

control procedure.

* Provide the Bechtel Jacobs Company, LLC, Lessons Learned Organization with lessons learned for this event to be issued through the lessons learned system.

PRIORITY DESCRIPTOR Yellow/Caution

FUNCTIONAL CATEGORY(S) (DOE) Engineering Design and Construction; Conduct of Operations; Training & Qualification

FUNCTIONAL CATEGORY(S) (USER-DEFINED) EC - Engineering & Construction; OP- Conduct of Operations; TQ - Training & Qualification

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NAME OF AUTHORIZED DERIVATIVE CLASSIFIER

NAME OF REVIEWING OFFICIAL

KEYWORDS work control, planning; design, lanyard

REFERENCES Occurrence Report ORO--BJC-X10WSTEMRA-1999-0001

HAZARDS Other

WORK ACTIVITY Work Control; Material/Material Handling

FOLLOW-UP ACTION: Information in this report is accurate to the best of our knowledge. As means of measuring the effectiveness of this report please notify Joanne E. Schutt at (423) 574-1248, e-mail at s6u@ornl.gov of any action taken as a result of this report or of any technical inaccuracies you find. Your feedback is important and appreciated.