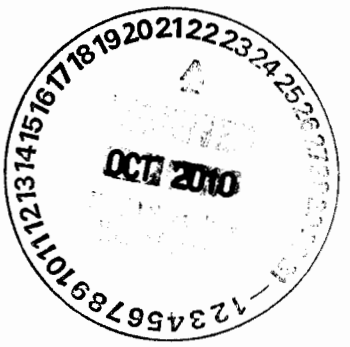
DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

October 22, 2010



The Honorable Inés R. Triay
Assistant Secretary for Environmental Management
U.S. Department of Energy
1000 Independence Avenue SW
Washington, DC 20585-0113

Dear Dr. Triay:

The Defense Nuclear Facilities Safety Board (Board) is concerned that Integrated Safety Management (ISM) processes used to plan and control activity-level work at the Waste Isolation Pilot Plant (WIPP) are not fully implemented. The safe conduct of operations and maintenance is of particular importance at WIPP because of its unique position as the Department of Energy's (DOE) only operating facility for disposal of transuranic waste.

The Board's staff conducted a review of work planning and control in the performance of operations and maintenance at WIPP from July 13–15, 2010, that revealed deficiencies in the way work is planned and executed by the site contractor, URS Washington TRU Solutions (WTS). These deficiencies include a lack of specificity in the procedures governing the conduct of work planning, a lack of clearly defined roles and responsibilities for personnel involved in the work planning and control process, and an absence of teamwork in the hazard analysis process. These deficiencies result in work procedures that do not contain necessary controls and cannot be performed as written. This fosters an environment in which workers perceive it is acceptable not to perform procedures as written.

DOE's Office of Safety Operations Assurance (EM-22) performed an assessment from March 9–12, 2010, that revealed similar deficiencies in procedures and procedure compliance. In response, WTS had taken action to improve its operations, including revamping its conduct of operations program. To date, however, these efforts have not been effective in ensuring that work is conducted with the rigor expected of nuclear operations.

The staff also observed numerous work interruptions resulting from faulty equipment. The contractor and the Carlsbad Field Office (CBFO) attributed these equipment deficiencies to higher-than-normal humidity, with no apparent consideration of the consequences or review of the extent of the condition.

A review of records for weight-handling equipment identified gaps in the certification of critical equipment used to handle transuranic waste. These deficiencies call into question the effectiveness of WTS's maintenance management system.

CBFO had not been successful in identifying and correcting the issues identified by the staff. The probable cause of this failure is that CBFO does not perform focused reviews of work planning and control, but instead relies on reviews of other WTS processes to reveal deficiencies in this area. To date, CBFO has not evaluated work planning at WIPP using the Work Planning and Control Program Guidelines issued on April 7, 2010, by the Office of Environmental Management.

The Board strongly believes that all defense nuclear facilities would benefit greatly if DOE were to issue a technical standard and guide for work planning and control supporting DOE Order 226.1A, *Implementation of Department of Energy Oversight Policy*. To be effective, the guide would need to include a Criteria and Review Approach Document for critical work activities. DOE identified the need for such a guide in Commitment 5 of the Implementation Plan for the Board's Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*, but this need has yet to be met. Oversight of work planning and control across the complex is suffering as a result. The Board has identified this need numerous times over the past few years at multiple Environmental Management and National Nuclear Security Administration sites across the complex.

Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report and briefing within 90 days of receipt of this letter outlining actions taken or planned by the Office of Environmental Management, CBFO, and WTS to address the deficiencies in work planning and control detailed in the enclosed report.

Sincerely,

Peter Winokur, Ph.D.
Chairman

Enclosure

c: Mr. Glenn S. Podonsky
Mr. Ed Ziemianski
Mrs. Mari-Jo Campagnone

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

August 30, 2010

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: C. Butch and R. Verhaagen

SUBJECT: Activity-Level Work Planning and Execution, Waste Isolation Pilot Plant

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the activity-level work planning and control activities of the contractor for the Waste Isolation Pilot Plant (WIPP), URS Washington TRU Solutions (WTS) from July 13–15, 2010. This review was conducted by two teams comprising staff members C. Butch, F. Dozier, J. MacSleyne, J. Pasko, R. Quirk, R. Verhaagen, D. Winters, and outside expert D. Boyd. The staff reviewed the implementation of Integrated Safety Management (ISM) in the planning and control of activity-level work to evaluate whether written work instructions identified appropriate hazard controls to ensure worker safety. Additionally, the staff observed the execution of operations and maintenance in the field to assess whether procedures were well written and could be performed as intended. The staff also evaluated the effectiveness of the Department of Energy's (DOE) Carlsbad Field Office (CBFO) in its oversight of these critical areas.

Observations. During the conduct of the review, the staff participated in meetings with WTS and CBFO management; interviewed workers and work planners; and observed work being performed in multiple WIPP facilities, including the contact handled (CH) waste bay, the remote handled (RH) waste facility cask loading room, and the underground. The staff identified deficiencies in WTS's work planning and control processes and its conduct of operations that indicate incomplete implementation of ISM. These deficiencies include work planning directives that do not provide adequate detail to work planners, a lack of clearly defined roles and responsibilities for those involved in the work planning and control process, and an absence of teamwork in the hazard analysis process. The result is incomplete work instructions that do not contain all necessary controls to ensure worker safety and cannot be performed as written. During the observation of activity-level work, the staff observed numerous instances of procedural noncompliance that were likely the combined result of these inadequately written procedures and low standards for conduct of operations.

The following paragraphs summarize the staff's general findings and detail deficiencies in work planning and control as measured against the core functions of ISM.

General Findings. WIPP procedures that direct the conduct of work planning do not contain sufficient detail or instruction to work planners to ensure that work is adequately scoped, hazards are identified, and hazard controls are implemented. The lack of specificity in these procedures allows for a broad interpretation of the requirements instead of providing a prescriptive level of detail that would result in consistent, well-written work instructions. Furthermore, work planning roles and responsibilities for subject matter experts (SMEs) such as radiological control technicians, industrial hygienists, and industrial safety personnel are not defined. These problems directly result in the deficient work instructions the staff observed in the field which could not be and were not followed as written and did not contain complete hazard controls.

Define the Scope of Work. Work planning instructions do not state explicitly when and how the scope of work for a particular task should be defined. As a result, the scope and boundaries of work activities are not defined in sufficient detail to allow work planning teams to determine the necessary job steps so that all hazards can be identified, appropriate controls established, and adequate work instructions developed.

This point is clearly evident, for example, in the scope of work for tasks performed under skill of the craft. The planning process for skill of the craft tasks does not require a scope of work to be defined, but instead relies on a statement of the problem such as, "Grapple hoist will not lower to position B." If the scope of work is not thoroughly defined, the problem cannot be bounded to ensure that the task-level hazards are analyzed and adequate controls are put in place. This deficiency is of particular concern because of the broad scope of work that is allowed to be performed under skill of the craft. This broad scope includes such tasks as troubleshooting the grapple hoist, as well as other maintenance that could require a lockout/tagout such as "rework HVAC equipment" and "pump rebuild." In the staff's experience across the DOE complex, work of this complexity is performed through a higher level of planning than skill of the craft, but not necessarily the highest level of planning required for the most hazardous or complex work.

Identify Hazards and Implement Controls. WTS's process for hazard analysis and identification of controls would benefit greatly from a dedicated team-based approach. The current process is nearly automatic and does not lend itself well to task-level hazard analysis. The staff identified weaknesses in the hazard analyses reviewed, including incomplete identification of hazards; hazards identified without controls specified; hazards with generic or ill-defined controls; and the inclusion of irrelevant, extraneous information in the hazard analysis. Contributing factors include an overreliance on generic preanalyzed hazards, a lack of team planning, insufficiently defined roles and responsibilities for SMEs involved in work planning, and limited training in hazard analysis.

For maintenance activities, for example, a maintenance engineer and a craft worker use a hazard identification checklist during the preplanning walkdown to identify the general work area hazards. Initially, the hazard analysis is performed solely by the maintenance engineer during the preparation of the work instruction. The maintenance engineer uses a computer-based tool, SIMON (Standardized Work Instruction of Maintenance and Operations), to insert

hazard/control statements at specific work steps while writing the work instruction. These hazard/control statements are selected primarily from a list of preanalyzed hazards and controls; they are generic and generally are not updated during the preparation of the work instruction.

The hazard analyses and work instructions are routed to the SMEs individually for their review and approval. Because their roles and responsibilities in this process are not defined, what is expected of the SMEs when they review a work package is unclear. This approach does not leverage the synergy of team planning and leads to missed hazards. Additionally, while the maintenance engineer or subsequent SMEs can edit the automatically generated hazards/controls during their review, the controls remained generic in all work packages reviewed by the staff. This weakness is likely a consequence of the ill-defined roles and responsibilities of the SMEs and their lack of involvement during the planning process. Further contributing to the weak hazard identification and analysis is that the training in activity-level hazard analysis provided to those involved in work planning is limited to a 2-hour course, SAF-107. Additional examples of weaknesses in hazard analysis and control include the following:

- Neither the hazard identification checklist nor the automated job hazard analysis for an RH waste emplacement operating procedure identified radiological hazards or their controls.

- A maintenance work procedure identified two different chemicals for use and referenced only one Material Safety Data Sheet. It specified controls as: "Personnel shall be familiar with the chemical manufacturer's Material Safety Data Sheet for chemicals used during the performance of this work." It also contained a generic mitigating step. "All personnel involved in the performance of this work discuss hazards, precautions, and mitigating actions to be taken for the chemicals being used."

- Precautions and limitations in an RH waste handling procedure included: "During the procedure the compressor may be turned on, off, or drained, as necessary," and "Mechanical means may be used to assist in the opening and closing of the FC [Facility Cask] lock pins, if necessary." Neither of these statements constitutes precautions or limitations.

- During an interview with the staff, a work team charged with moving temporary storage room bulkheads was asked to identify the most hazardous step in the process. They responded that forklift position was critical to prevent slippage of a bulkhead segment, which could potentially crush a worker. This did not appear as a precaution in the procedure.

Perform Work Within Controls. The staff's observations of activity-level work in the field revealed procedural noncompliance in every instance. The staff observed workers performing steps not in the procedure, not performing steps, and performing steps out of sequence. Poor coordination and communication were also evident during performance of some procedures. These deficiencies were likely the result of poorly written procedures that cannot be

followed as written, inadequate knowledge among most workers as to the expectations associated with continuous-use procedures, and a willingness by workers to continue despite the inadequate instruction. Additionally, many procedures appear to have been written to give workers maximum flexibility. A better alternative would be to designate essential procedural steps that require step-by-step control and distinguish them from those that do not. Some examples of these observations include the following:

- During CH waste operations, a worker added an extra step to the procedure by cycling a valve to isolate the vacuum pump suction to obtain a stable gauge reading.

- A radiological control technician (RCT) performed surveys on contact rather than at 30 cm as required by the CH waste procedure.

- In a procedure designated as continuous-use, an RCT completed numerous steps to perform swipes of an RH waste canister. The RCT was working in the waste service room, one level below a waste handling technician who was performing steps from the same procedure at the control panel in the cask loading room. There was no communication between the RCT and the technician to ensure the procedure steps were performed in order.

- The RH waste emplacement procedure was recently revised to include additional steps to prevent damage to the 480-volt Facility Cask Transfer Car (FCTC) power cable. It is not clear that the reason for this change was clearly communicated to the handlers or that the new procedural steps were sufficient to prevent damage to the cable. During performance of the procedure, the staff observed the cable impinge on the FCTC cask supports as the FCTC passed the cable reel. This contact continued as the car was driven past the reel.

Feedback and Improvement. The contractor has identified the need to improve conduct of operations at the site; however, it is unclear that WTS's current efforts will lead to the needed improvement. A DOE Office of Safety Operations Assurance (EM-22) assessment conducted from March 9–12, 2010, identified the failure to perform procedures as written. The staff believes that, unless the work planning process is improved so that procedures can be performed as written, procedural compliance will not improve.

WTS's corrective actions for the EM-22 assessment report included the use of a senior supervisory watch (SSW) as a means of oversight, performance assessment, and reinforcement of expectations for conduct of operations. The staff reviewed the recently issued WP 04-CO.01-1 Rev. 0, *Conduct of Operations Program: Operations Organization and Administration*, and observed that the roles and responsibilities of the SSW are not adequately detailed. The use of an SSW to improve conduct of operations will be effective only if specific expectations for the conduct of the watch are clearly communicated, and those assigned as SSWs are appropriately trained and qualified.

Material Condition. The breadth of work the staff was able to observe was limited by numerous work interruptions. During the 3 days the staff was present, faulty machinery halted operations on multiple occasions. Examples include a fault in the grapple hoist during RH waste operations, failure of two underground ventilation fans, failure of two continuous air monitoring systems, two failures in the waste hoist braking system, and an event in which one CH waste dock bay door closed spontaneously on a forklift. These equipment deficiencies were attributed to higher-than-normal humidity due to recent rainfalls. The staff is concerned that, although the contractor stopped the work to resolve the specific issues at hand, at no time during these abnormal conditions was it evident that the contractor or CBFO considered slowing down or stopping operations to determine the extent of the condition.

In one instance when the orientation of the facility transfer cask was being changed from vertical to horizontal, approximately one cup of water was observed to leak from the shield valve motor casing. Despite this unexpected condition, operations continued. The RH workers are accustomed to operating this cask in a degraded condition. RH waste handling procedures allow mechanical means to be used to assist in opening and closing the facility cask locking pins. As a result, the staff observed the handlers strike the locking pins with a wooden stick in order to free them to operate. At the time of the observed operation, the cask top was coated with a layer of grime, as well as a significant amount of salt. More frequent cleaning of the cask (currently performed every 3 months) could lessen the need for this application of force.

During the staff's review, WTS was unable to produce complete certification records for the Adjustable Center of Gravity Lift Fixture (ACGLF) used to handle CH waste. Additionally, interchangeable ACGLF extension legs were not serialized, and as a result WTS was unable to produce any objective evidence documenting the performance of the required annual inspection. WTS suspended waste handling activities using the ACGLF until proper certification of the legs was ensured. WTS reported this issue in the DOE occurrence reporting and processing system on July 16, 2010.

The above deficiencies call into question the effectiveness of WTS's maintenance management system.

Carlsbad Field Office. CBFO had not identified the issues documented in this report. This can be attributed in part to the fact that CBFO does not conduct focused assessments of WTS's work planning and control. Rather, CBFO relies on multiple cross-cutting assessments of other program areas to identify work planning and control issues. Additionally, CBFO has yet to perform an assessment of WTS using the work planning and control program guidelines issued by the Office of Environmental Management on April 7, 2010. This document, designed for site offices and contractors alike, had not been provided to WTS until 1 week prior to the staff's review.

The staff believes that CBFO's oversight would benefit from DOE's issuance of a technical standard for work planning and control within the directives system and a guide supporting DOE Order 226.1A, *Implementation of Department of Energy Oversight Policy*. To be effective, the guide would need to include a Criteria and Review Approach Document

for critical work activities. DOE indentified the need for such a guide in Commitment 5 of the Implementation Plan for the Board's Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*, but this need has yet to be met.

As a final note, the last independent external evaluation of the implementation of ISM at WIPP was performed in August 2002 by the DOE Office of Independent Oversight and Performance Assurance. The conclusion of this evaluation was "... the ISM program at WIPP is generally effective." The staff's review identified a number of indicators suggesting an external ISM verification is in order.

Conclusion. The staff's review of work planning and control and the performance of maintenance and operations at WIPP revealed a number of deficiencies. These deficiencies include a lack of specificity in the procedures governing the conduct of work planning, a lack of clearly defined roles and responsibilities for personnel involved in the work planning and control process, and an absence of teamwork in the hazard analysis process. The consequences of these deficiencies are work procedures that do not contain all necessary controls and cannot be performed as written and a failure of workers to perform procedures precisely as written. Based on the number of equipment failures observed, moreover, the staff questions the effectiveness of WTS's maintenance programs.