DEFENSE NUCLEAR FACILITIES SAFETY BOARD
Washington, DC 20004-2901

September 23, 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 staff of the Defense Nuclear Facilities Safety Board (Board) reviewed activity-level work planning and control processes and their implementation by the Hanford Site plateau remediation contractor, CH2M Hill Plateau Remediation Company (CHPRC). As detailed in the enclosed report, the staff identified many deficiencies in the implementation of Integrated Safety Management (ISM) at the activity level.

The staff's review revealed weaknesses in CHPRC's activity-level hazard analysis process. These weaknesses include activity-level hazard analyses that focus primarily on general work area hazards, contain nongermane and overly general information, in some cases are incomplete, and fail to identify task-specific hazards/controls or link the general work area hazards to specific work steps or activities. Work packages do not fully integrate the hazards and associated controls in the work instructions. Contributing to these deficiencies, during the work planning process, no single document is developed to identify all hazards and the necessary controls. As a result, it is not possible to ensure that the controls specified for each hazard are complete and that all the controls taken together do not conflict. These weaknesses directly affect the quality and level of detail of work instructions/packages. As a result, CHPRC's current process is over-reliant on field work supervisors to remedy these weaknesses during pre-job briefings.

The Board notes that CHPRC is currently working to improve its work planning process; in particular, it is developing changes to its institutional-level directives governing work planning and control. CHPRC is making these changes in response to weaknesses identified during the ISM System Phase II verification of February 2010, as well as operational events such as the worker exposure to nitric acid at the Plutonium Finishing Plant in March 2010. The Board believes that these efforts to improve work planning and control would benefit greatly if a technical standard for work planning and control and a guide supporting Department of Energy (DOE) Order 226.1A, *Implementation of Department of Energy Oversight Policy*, were issued in the directives system.

Based on the above observations, and pursuant to 42 U.S.C. § 2286b(d), the Board requests a report within 90 days of receipt of this letter outlining actions taken or planned by DOE's Office of Environmental Management, the Richland Operations Office, and CHPRC to address the deficiencies in work planning and control detailed in the enclosed report.

Sincerely,

Peter S. Winokur, Ph.D.
Chairman

Enclosure

c: Mr. Glenn S. Podonsky
Mr. Matthew S. McCormick
Mrs. Mari-Jo Campagnone

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

August 10, 2010

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: J. MacSleyne

SUBJECT: Activity-Level Work Planning, Hanford Plateau Remediation Contractor

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of activity-level work planning and control by the Hanford Site plateau remediation contractor, CH2M Hill Plateau Remediation Company (CHPRC). This review was conducted by members of the Board's staff C. Butch, W. Linzau, J. MacSleyne, R. Quirk, J. Troan, and R. Verhaagen from May 18–20, 2010, with a follow-up discussion on June 2, 2010. The staff reviewed the implementation of Integrated Safety Management (ISM) into activity-level work planning and control to evaluate whether work packages include appropriate controls for worker protection. This review focused on the processes used by CHPRC to develop work packages and technical procedures and the implementation of these processes at the Plutonium Finishing Plant Closure Project and the Waste and Fuels Management Project. In addition, the staff evaluated the effectiveness of the oversight of work planning and control processes by the Richland Operations Office (RL).

Observations. The staff identified a number of weaknesses in the implementation of ISM at the activity level, including a hazard analysis process that provides an insufficient focus on task-specific hazards and their associated controls, and incomplete integration of hazards and associated controls into work instructions. These weaknesses directly affect the quality and level of detail of work instructions/packages and their subsequent implementation in the field. The staff believes that these weaknesses represent shortcomings of the institutional-level directives governing work planning and their implementation in the field.

The staff notes that CHPRC is currently working to improve its work planning process; in particular, it is developing changes to its institutional-level directives governing work planning and control. CHPRC is making these changes in response to weaknesses identified during the ISM System Phase II verification of February 2010, as well as operational events such as the worker exposure to nitric acid at the Plutonium Finishing Plant in March 2010.

Specific observations resulting from the staff's review are presented below, organized according to the core functions of ISM.

Define the Scope of Work—The institutional directive that governs work planning—PRC-PRO-WKM-12115, *Work Management*—sets forth the expectation that a team planning process including job site walkdowns is used for planning work. Based on discussions and interviews with CHPRC personnel conducted by the staff during this review, it appears that a team planning process is utilized and that craft workers actively participate in these walkdowns. However, CHPRC does not have a formal process documenting or retaining the feedback obtained during these walkdowns, and therefore, the rigor and effectiveness of these walkdowns cannot readily be assessed. In addition, based on the work packages reviewed by the staff, it is not evident how the results of the walkdowns feed into the work planning process or how CHPRC ensures that comments are appropriately dispositioned or considered in the hazard analysis process. The staff notes that job site walkdowns are a key aspect of the hazard analysis process and that the failure to document the outcomes of these walkdowns represents a missed opportunity. The benefit provided by documenting and retaining the results of these walkdowns is particularly evident in the case of complex jobs, for which planning occurs over a period of weeks or months during which disruptions can occur to the continuity of the work planning teams.

Analyze the Hazards, and Develop and Implement Controls—CHPRC accomplishes its activity-level hazard analysis primarily using a computer-based automated job hazard analysis (AJHA) tool. This is the most detailed activity-level hazard analysis process used by CHPRC. The AJHA tool is used both to perform the hazard analysis and to provide documentation of the results. The AJHA is normally completed during a tabletop session with a team comprising work planners, subject matter experts (SMEs), the field work supervisor, and craft workers. Typically, the resulting AJHA is then used by work planners to aid in the preparation of the work instruction and is included as part of the work package for use by the field work supervisor.

The staff noted several deficiencies in the AJHAs reviewed, including hazard analyses that focused almost exclusively on general work area hazards, lacked a task-specific focus at the appropriate level, and included overly generic or nongermane hazards and controls. Furthermore the general hazards and associated controls listed in the AJHAs could not readily be linked to the specific tasks or activities to be performed. Department of Energy (DOE) Guide 440.1-8, *Implementation Guide for Use with 10 CFR Part 851 Worker Safety and Health Program*, specifies that two of the principal elements of an activity-level hazard analysis include the breakdown of operations and procedures into their component tasks, and the identification of hazards associated with each task and the controls necessary to protect workers against those hazards.

Collectively, the weaknesses of the AJHAs reviewed led the staff to question the usefulness of the tool and the rigor and thoroughness of the hazard analysis process. The staff notes that adequate performance of the hazard analysis is a prerequisite to effectively documenting and implementing hazard controls in the work instruction.

As an example, the staff reviewed one work package for removal of legacy piping from a glovebox. While the AJHA in the work package included a task breakdown, no associated hazards were identified or controls specified for the associated task steps. Residual liquid was expected during the performance of this activity, and the AJHA generically listed as a hazard

"chemicals, wastes, or hazardous materials in the system," providing no specific information. In lieu of such information, the AJHA directed the reader to a document not contained within the work package for information regarding the specific hazardous chemicals. As a result of this lack of specificity, neither nitric acid nor plutonium, two of the hazards of concern, were specified or discussed within either the AJHA or the work instruction. These hazards would likely have been identified during a task-specific hazard analysis.

In addition to the lack of task-specific hazard analysis, the AJHAs reviewed contained information that was both extraneous and nongermane. For example, one AJHA reviewed by the staff included general statements such as "Not wearing proper PPE [personal protective equipment] during work activities could pose a hazard to personnel" and a generic requirement to "communicate other hazards and control measures prior to commencing work." The inclusion of such overly generic statements is of questionable value and serves to dilute the effectiveness of the hazard analysis.

The staff observed that no mechanism is in place and no single document is developed during CHPRC's work planning process to ensure that the hazards identified and the controls required to complete a work activity safely are appropriately documented, deconflicted, and implemented. As a result, the hazards and controls identified in the AJHA and other documents included in the work package, such as Radiological Work Permits or Industrial Hygiene (IH) sampling plans, are not consistently specified.

The staff reviewed one work package for excavation activities at the Waste Retrieval Project (WRP). The AJHA had been issued prior to and was not subsequently revised following approval of the WRP retrieval plan and revision of the IH sampling plan. As a result, the controls specified in these documents were inconsistent. For example, the list of chemicals with specific threshold or action levels was inconsistent between the IH sampling plan and the AJHA. The AJHA did not specify monitoring for vinyl chloride even though it was listed on the IH sampling plan; conversely, the AJHA specified monitoring for hydrazine, which was not specified in the IH sampling plan. The AJHA specified the use of ground-penetrating radar (GPR) to characterize the excavation area in the trench, while the WRP retrieval plan stated that GPR was not required, and the technical procedure used to perform work was altogether silent with regard to the use of GPR. These examples illustrate the need to develop a single document that can be used to ensure that hazards are identified; that controls are appropriately developed; that the controls specified in the various documents within the work package are consistent; and that if controls are changed in one document, that change is accurately reflected throughout the work package.

Perform the Work—CHPRC's process and requirements for pre-job briefings are described in PRC-PRO-WKM-14047, *Pre-Job Briefings and Post-Job Reviews*, and supplemented by project-specific pre-job briefing forms. The current pre-job briefing process requires the field work supervisor (FWS) to discuss the specific hazards and their associated controls. The work package for a particular job should provide the information for this pre-job briefing. However, the work packages reviewed by the staff did not provide the required level of detail regarding the task-specific hazards and their associated controls required to support the

FWS's pre-job briefing. The staff believes that hazards and their associated controls need to be integrated into the work instruction. It is unrealistic to expect the FWS to review and discuss these key elements during the pre-job briefing from memory, without their inclusion in the work package.

During the review, CHPRC management communicated their expectation that the FWS is responsible for verifying that the assigned workers are appropriately qualified and have received the required training. The work packages reviewed by the staff included specific training requirements solely in the AJHAs. This information is currently scattered throughout the AJHA and as such is not readily located. One 14-page-long AJHA reviewed by the staff contained, dispersed throughout, nine separate required training courses. The current process requires the FWS to determine what activities will be performed, search through the AJHA to identify the required training, and then confirm that the assigned individuals are qualified. The staff notes that the current format of the AJHA places an unnecessary burden on the FWS to sort through a lengthy AJHA and to identify the required training.

CHPRC has recently begun using the Hanford Site Worker Eligibility Tool, a computer-based tool that provides a list of eligible workers based on craft type, required medical qualifications, and specific training courses. However, this tool does not appear to be efficiently coordinated with the training requirements specified in the AJHA. The staff believes that integration of the training requirements specified by the AJHA with this eligibility tool would aid the FWS in determining that the assigned workers are appropriately qualified and trained.

Based on the above observations, the staff believes that CHPRC's work planning process is overly dependent on the FWS and the pre-job briefing process to remedy these weaknesses on the spot. It is unrealistic to expect the FWS to cover items during the pre-job briefing that are not readily supported by the AJHA or the work package.

Feedback and Continuous Improvement—Several external and internal reviews have identified this ISM function as an area requiring improvement at CHPRC. The staff notes that feedback and improvement is recognized as a weak area of work planning and control across the DOE complex. CHPRC and other contractors in the DOE complex can benefit from participation in the ISM and Quality Assurance subgroup of the Energy Facility Contractors Group as it attempts to tackle this difficult problem.

DOE Oversight—The staff notes that RL has identified work control issues similar to those discussed above and formally communicated them to CHPRC. In response to these observations, CHPRC is developing changes to its institutional-level directives governing work planning and control.

RL's oversight of work control is accomplished primarily by the facility representatives (FRs) as part of their day-to-day oversight activities, with input from SMEs. In addition to routine oversight provided by FRs, RL's oversight includes a work control surveillance that is generally accomplished annually. The staff believes that RL's use of a surveillance procedure with defined lines of inquiry enhances its work control oversight.

The staff believes that RL's oversight would also benefit from the issuance within the DOE directives system of a DOE technical standard for work planning and control 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. The need for such a guide was identified by DOE 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.

The staff notes that the Work Planning and Control Guidelines issued on April 7, 2010 by the DOE Office of Environmental Management's Office of Safety Operations Assurance (EM-22) are a step in the right direction. However, all defense nuclear facilities would benefit greatly if the guidance was disseminated in a more permanent form within the DOE directives system.

Conclusion. The staff's review of work planning and control revealed weaknesses in CHPRC's hazard analysis process. These weaknesses include activity-level hazard analyses that focus primarily on general work area hazards, contain nongermane and overly general information, in some cases are incomplete, and in general fail to identify task-specific hazards/controls or link the general work area hazards to specific work steps or activities. Work packages do not fully integrate the hazards and associated controls in the work instructions. Contributing to these deficiencies, during the work planning process, no single document is developed to identify all hazards and the necessary controls. As a result, it is not possible to ensure that the controls specified for each hazard are complete and that all the controls taken together do not conflict.