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**DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD**

Washington, DC 20004-2901



December 29, 2011

The Honorable Thomas P. D'Agostino  
Administrator  
National Nuclear Security Administration  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0701

Dear Mr. D'Agostino:

The staff of the Defense Nuclear Facilities Safety Board (Board) reviewed the work planning and control process for maintenance and production operations at the Y-12 National Security Complex (Y-12) during August 16–18, 2011. As described in the enclosed report, the Board's staff identified weaknesses in the implementation of the contractor's institutional directives for work planning and control that resulted in (1) work packages with work scopes that were too broad, (2) work instructions and technical procedures with work steps that were not broken down into task-specific steps, and (3) job hazard analyses that failed to identify task-specific hazards and controls.

The Board acknowledges the recent actions by the contractor to improve conduct of operations in response to a letter from the Board to you dated August 25, 2011. The weaknesses in work planning and control (noted here and in a letter from the Board dated January 22, 2009), if unaddressed, will adversely impact the contractor's efforts to improve conduct of operations. The Board is encouraged by the contractor's recent actions to address these weaknesses including issuance of the Work Planning and Control Performance Improvement Plan.

These recurring weaknesses indicate that oversight of work planning and control by both the contractor and the Y-12 Site Office (YSO) has been less than effective. The Board believes that effective operational oversight by both the contractor and YSO is necessary to reinforce the proper execution of work planning and control principles and to ensure sustained improvement in this area.

Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report and briefing within 120 days of receipt of this letter that details the National Nuclear Security Administration's assessment of the effectiveness of the actions taken by the contractor and YSO to address the weaknesses identified in the enclosed report.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter S. Winokur". The signature is stylized and cursive.

Peter S. Winokur, Ph.D.  
Chairman

Enclosure

c: Mr. Glenn S. Podonsky  
Mr. Theodore D. Sherry  
Mrs. Mari-Jo Campagnone

# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

## Staff Issue Report

November 4, 2011

**MEMORANDUM FOR:** T. J. Dwyer, Technical Director

**COPIES:** Board Members

**FROM:** J. MacSleyne

**SUBJECT:** Activity-Level Work Planning and Control, Y-12 National Security Complex

This report documents a review of activity-level work planning and control processes at the Y-12 National Security Complex (Y-12). Babcock & Wilcox Technical Services Y-12, LLC (B&W) manages Y-12 for the National Nuclear Security Administration's (NNSA) Y-12 Site Office (YSO). This review was performed by members of the staff of the Defense Nuclear Facilities Safety Board (Board) D. Campbell, J. MacSleyne, and R. Verhaagen and outside expert D. Volgenau during the week of August 15, 2011. The Board's site representatives, W. Andrews and D. Kupferer, also participated in the review.

The Board's staff reviewed the integration of Integrated Safety Management (ISM) into activity-level work planning and control to evaluate whether work packages include appropriate controls for worker protection. Additionally, the staff evaluated the oversight of work planning and control by YSO.

**Background.** The staff last reviewed B&W's activity-level work planning and control in October 2008; this review resulted in a letter from the Board to NNSA dated January 22, 2009. The deficiencies identified by the staff included incomplete hazard analyses; poor coordination of work management processes among maintenance, production, and health and safety organizations; and outdated work packages that did not reflect the current scope of work. In April of this year, the staff conducted a review of conduct of operations and the implementation of technical procedures at Y-12; that review resulted in a letter from the Board to NNSA dated August 25, 2011. That review examined production operations and focused on extensive observations of work execution. It revealed weaknesses in the development, quality, and execution of technical procedures. B&W is addressing those particular issues through the Y-12 Conduct of Operations Performance Improvement Plan that was issued in September 2011.

This recent work planning review had a different scope but was intended to be complementary to the staff's April 2011 review. This review focused on B&W's institutional procedures and processes for planning and control of both maintenance work and production operations and evaluated B&W's processes for identifying and analyzing hazards and implementing appropriate controls. During this review the staff evaluated the planning and

· execution of work activities at Y-12 through the core functions of ISM. The review included briefings and discussions with contractor management responsible for work planning processes, and discussions with workers, work planners, subject matter experts (SMEs), and others involved in day-to-day work planning activities. The staff reviewed several complex work packages and technical procedures supporting maintenance and production operations and observed work execution in Buildings 9212 and 9204-2E.

**Observations.** The staff's review revealed weaknesses in the implementation of B&W's institutional directives for work planning and control. These weaknesses affect the quality and content of the procedures and work packages used to direct activity-level work and ultimately affect the conduct of work in the field. During the review, the staff noted cases in which work was not executed according to procedure. These weaknesses indicated that B&W's and YSO's oversight of work planning and control is less than effective. The combined effects of the weaknesses identified during this review led the staff to conclude that B&W requires significant improvement in the implementation of the work planning and control process, and increased operational oversight by both B&W management and YSO to reinforce the proper execution of work planning and control principles. B&W should consider evaluating whether its institutional directives support effective implementation of the existing process. The following sections present the staff's specific observations with respect to the core functions of ISM.

*Define the Scope of Work*—At Y-12, work planning for production operations is governed by the Technical Procedure Process (Y15-232), while work planning for maintenance activities is governed by the Integrated Work Control Manual (IWCM, Y18-012). Both processes require the performance of an activity-level hazard analysis in accordance with different chapters of the Job Hazard Analysis (JHA) manual (Y73-045). Both processes require the definition of work scope that is sufficiently detailed to facilitate identification and analysis of health and safety hazards. Several work packages reviewed by the staff, however, defined the scope of work too broadly. This lack of specificity in the scope of work extended to many of the work instructions, technical procedures, radiological work permits (RWP), and automated job hazard analyses (AJHA) reviewed by the staff. In addition, the staff noted cases in which work steps in procedures/work instructions were not broken down into task-specific steps. While the lack of specificity in the scope of work and the work steps may increase operational flexibility, this leads to problems in identifying and analyzing hazards and specifying appropriate controls.

The staff reviewed a complex maintenance work package for repair of a leaking capped port in the intermediate evaporator in Building 9212. The scope of work identified only the location of the leak; the specific work step stated only that pipefitters would “repair leaking capped port.” The work instruction did not discuss or specify limitations on the actions that could be performed during the course of the repair. For example, while not necessary for this specific repair, the work instruction contained no prohibitions on welding, cutting, or grinding, all of which were discussed in the RWP and AJHA associated with this work package. This condition results in a work instruction that is subject to broad interpretation and can lead to scope creep if the initial repair actions are not successful. The staff also noted a broadly defined scope of work in Building 9204-2E production operations where some dismantlement activities are performed by B&W using generic procedures that apply to many systems.

*Identify Hazards and Implement Controls*—B&W performs activity-level hazard analyses primarily using a computer-based AJHA tool that documents the results. The current implementation of B&W’s hazard analysis process results in AJHAs that are unnecessarily long (one was 25 pages), include a work scope which is too broad, lack specificity, and obscure the necessary hazard controls. The AJHAs, work instructions, and RWPs provide workers and their supervisors with a menu of hazards and controls from which to select instead of prescribing appropriate controls for the hazards specific to the job being performed. For example, the staff observed a maintenance evolution during which the workers used personal protective equipment (PPE) that was not specified in the work package and did not use the PPE that had been specified. Moreover, the AJHA tool does not allow for updating the fields within the AJHA, which would be required to update or change controls. As a workaround, site personnel make changes, such as documenting the correct RWPs, in the remarks section rather than in the body of the document.

The staff believes that these weaknesses result from poor process implementation that is contrary to B&W’s JHA manual, which states, “The JHA will be focused on the task specific hazards associated with the job.” Based on interviews, the work planners appear to appropriately assemble a hazard analysis team, perform a job site walk-down, and subsequently assemble for a tabletop session to enter identified hazards into the computer-based AJHA tool. Once the hazards have been entered, the AJHA is routed through the SME members of the team, who then enter the appropriate controls. The AJHA tool allows the users to select controls that have been input previously into the system. While customized controls can be input into the AJHA, it appears that the generically described hazards, in combination with the ease of reusing controls previously entered into the AJHA, contributes to the prevalence of generic controls. While the members of the work planning team review and approve the final AJHA, they hold no further meetings to collectively analyze the hazards or to discuss and deconflict the selected controls; this conflicts with the JHA manual, which requires the team to “Review the established controls (including the required permits) to ensure they do not conflict or create additional hazards.”

The staff reviewed an AJHA which covered the repair of valve and piping leaks. The AJHA listed as hazards “radiological materials, contamination, or radiological areas” but did not quantify these hazards or provide any specific detail regarding their source or location; in this case, the primary radiological hazard was uranyl nitrate. Another AJHA, for oxide dissolver operations, listed hazardous voltages of up to 600 volts DC inside of a control cabinet. At no point during this activity, however, were workers exposed to this voltage. Furthermore, workers had not been trained to work in the vicinity of energized equipment and therefore could not perform the operation if this voltage were present.

In many cases, the AJHAs failed to identify task-specific hazards/controls or link the general work area hazards to specific work steps or activities. The staff notes that the weakness associated with defining the scope of work and the lack of task-specific work steps hinder the performance of a task-specific hazard analysis. The work packages did not fully integrate the hazards and associated controls into the work instructions, and some specific hazards and their controls were not clearly communicated to workers. For example, the staff reviewed a procedure for uranium machining operations; the AJHA for this procedure did not identify a chip fire as a potential hazard during machining of pyrophoric materials. In the same AJHA, lock-out/tag-out

was specified as a control during cleaning activities; however, the associated procedure did not indicate when a lock-out/tag-out should be used or indicate that one was required.

*Perform Work within Controls*—The weaknesses discussed above directly affect the quality and level of detail of work instructions and procedures. B&W is heavily dependent on the field work supervisor to remedy these weaknesses so as to ensure that the hazards are identified and appropriate controls selected, instead of clearly communicating in the work package the hazards and controls associated with the task at hand. Leveraging the expertise of the SMEs as part of the work planning teams would facilitate identifying the optimal set of controls and communicating them to workers rather than relying on the field work supervisor to identify hazards and select their associated controls during the pre-job briefing.

During execution of work, the staff observed cases in which workers skipped steps in technical procedures, performed steps out of order, or did not perform them as written; workers performed other actions outside the procedures and contrary to expected actions covered during pre-job briefings. These issues were similar to those identified by the staff in its April 2011 review of conduct of operations. The staff believes the issues associated with the work planning and control process discussed above contributed to the weaknesses observed during execution of work. For example, the staff believes conduct of operations suffers if work packages contain extraneous information of little use to those supervising and performing the work (e.g., AJHAs and RWPs that contain generic and nongermane information) or if work steps lack sufficient detail. The staff believes further that efforts to improve conduct of operations will not have a long-term effect unless they are implemented in conjunction with efforts to address the work planning and control process and its implementation.

*Feedback and Improvement*—Many of the weaknesses identified during this review are similar to those documented in the staff's 2008 review (e.g., those associated with hazard analyses and defining the scope of work). The staff's review of recent assessments by contractor management revealed none devoted solely to assessing work planning and control, and those that were somewhat related contained no substantive critical comments. Subsequent to this review, B&W issued a Work Planning and Control Performance Improvement Plan. The staff believes that this plan, in conjunction with the Y-12 Conduct of Operations Performance Improvement Plan, will address many of the weakness identified in this report if effectively implemented. The staff notes that sustained improvement in this area is dependent on continuous and effective oversight to ensure that B&W management's expectations are clearly communicated and reinforced. The staff will continue to evaluate the effectiveness of these actions.

**Assessments by the Y-12 Site Office.** The staff reviewed YSO assessments conducted by SMEs and Facility Representatives and found that, as with the staff's review of 2008, YSO had not identified deficiencies in B&W's work planning and control observed by the staff during this review. The assessments reviewed by the staff did not provide substantive observations regarding B&W's work planning and control. This fact, coupled with the lingering issues from the 2008 review, led the staff to conclude that YSO lacks an effective oversight and assessment program for monitoring and improving the contractor's activity-level work planning and control process.