

Peter S. Winokur, Chairman  
Jessie H. Roberson, Vice Chairman  
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**DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD**

Washington, DC 20004-2901



June 5, 2012

Mr. Daniel K. Hoag  
Acting Manager, Y-12 Site Office  
U.S. Department of Energy  
P.O. Box 2050, Mail Stop 8009  
Oak Ridge, Tennessee 37831

Dear Mr. Hoag:

The Defense Nuclear Facilities Safety Board (Board) considers training to be a crucial element in preparing operators to safely conduct nuclear operations at defense nuclear facilities. The Board is encouraged that Babcock & Wilcox Technical Services Y-12, LLC (B&W) and the Y-12 Site Office have recently made improvements in the areas of procedural compliance, conduct of operations, and activity-level work planning. Many of these improvements depend on training to emphasize management's expectations for safe operations, making a highly effective and properly implemented training and qualification program even more important. Consequently, the Board's staff reviewed the B&W training and qualification program at the Y-12 National Security Complex. The staff's review concluded that the training and qualification program utilizes a systematic approach to training consistent with Department of Energy requirements, but also revealed several opportunities for improvement in its implementation and effectiveness. These include (1) evaluating and enhancing the content of certain training activities, (2) more effectively utilizing continuing training to improve operator expertise, and (3) improving the implementation of the process used to identify training requirements. The enclosed report provides specific details for your consideration. The Board looks forward to hearing about any planned improvements to the training and qualification program during our next scheduled visit to Y-12.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter S. Winokur".

Peter S. Winokur, Ph.D.  
Chairman

Enclosure

c: Mr. Glenn S. Podonsky  
Mr. Steven C. Erhart  
Mrs. Mari-Jo Campagnone

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

### Staff Issue Report

April 30, 2012

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

**COPIES:** Board Members

**FROM:** D. Campbell

**SUBJECT:** Training and Qualification Program, Y-12 National Security Complex

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the training and qualification program of Babcock & Wilcox Technical Services Y-12, LLC (B&W) at the Y-12 National Security Complex (Y-12). The review was conducted March 12–15, 2012. Staff members J. Anderson, D. Campbell, D. Kupferer, J. Pasko, and C. Roscetti assessed B&W's program against the requirements of the Department of Energy (DOE) Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, and B&W's implementing procedure Y90-027, *Conduct of Training Manual* (Training Manual). The staff held discussions with personnel from B&W and the Y-12 Site Office and observed several training activities, including on-the-job training and classroom sessions. The staff reviewed the execution of training at the (1) site level (related primarily to access control), (2) Production organization level, and (3) Facilities, Infrastructure and Services organization level for nuclear workers, shift supervisors, and journeyman craft personnel.

The staff found that the Y-12 training and qualification program aligns with the requirements of DOE Order 426.2. The B&W Training Manual specifies a methodology for a systematic approach to training that generally reflects the guidance in DOE Handbook 1078, *Training Program Handbook: A Systematic Approach to Training*. However, the staff identified several gaps in the implementation of the program, including inconsistencies in the systematic approach to training that may limit the program's effectiveness. Addressing these gaps would help ensure that operators are effectively trained to perform work safely. Operational safety at Y-12 would also benefit if B&W formalized a rigorous continuing training program that is responsive to emerging needs.

**Systematic Approach to Training.** DOE Order 426.2 requires that DOE contractors utilize a systematic approach to training. Key elements of this process include a systematic analysis of the jobs to be performed and the derivation of learning objectives from this analysis. Accordingly, B&W's Training Manual outlines five phases in the implementation of a systematic approach to training. The staff identified deficiencies related to B&W's analysis and implementation phases.

*Analysis Phase*—The analysis phase of the systematic approach to training, per DOE Handbook 1078, is used to identify performance-based training requirements, typically through the completion of a job task analysis. DOE Handbook 1078 and the B&W Training Manual require that essential documentation of the job task analysis process (e.g., action steps, logs, meeting notes, decisions made) be retained to provide a rationale to support subsequent training policy decisions. B&W personnel could not produce this documentation for any job reviewed by the staff during this review. The staff also noted one case—involving the core qualification profile for an operator position in Building 9204-2E (the Quality Evaluation Assemblyperson)—in which B&W failed to perform a task analysis. As a result of the incomplete task analysis, B&W cannot demonstrate that the training objectives for the Quality Evaluation Assemblyperson address all required tasks.

Task statements listed on B&W’s job task analyses exhibit varying levels of detail. For many certified positions, the task statements are specific (e.g., “place Oxide Dissolver in warm stand-by”). For other positions, such as qualified shift managers, task statements are vague (e.g., “provide oversight for operations”). Due to the lack of detail in these instances, B&W personnel could not clearly show how they derived performance standards, skills, knowledge, and abilities as required by DOE Order 426.2 and the B&W Training Manual. As a result, some positions with identical task statements have a different set of training courses. B&W personnel could not demonstrate, in these cases, which sets of training courses are appropriate or whether they identified a complete set of training objectives tailored to reinforce the principles and learning objectives uniquely applicable to each worker. In the case of the lockout/tagout refresher training course, discussed below, the lack of specificity resulted in several learning objectives being omitted from the course.

B&W completes a task-to-training matrix (TTM) containing the results of the job task analysis process. The B&W Training Manual identifies the TTM as “one document that can be used to guide maintenance of a training program,” and states that “the TTM serves as a configuration management document for the development and implementation of the training program.” The TTMs reviewed by the staff did not fulfill these functions. None reflected the format suggested by the B&W Training Manual, and some required content was absent (e.g., learning objectives, training selection category, training setting, and training sequence). The staff noted cases in which a specific task was absent from the task analysis but present in the TTM. The staff also noted cases in which a specific course was not included on the TTM but was identified as a training requirement by the electronic tracking system.

*Implementation Phase*—DOE Order 426.2 requires and the B&W Training Manual notes that a training program must consist of a combination of classroom training and on-the-job-training (OJT). B&W’s program incorporates a variety of training delivery mechanisms. For the most specific job tasks of certified operators, however, a large fraction of operator training consists of OJT activities. Most classroom training addresses objectives related to general access or programmatic requirements. Operators would benefit from a better mix of classroom training to augment the OJT they receive for their job-specific tasks. For example, seminars on advanced system characteristics, tabletop walkthroughs of advanced accident scenarios, and classroom instruction covering one-line diagrams in support of system walk-downs for new trainees would be beneficial.

OJT activities are conducted according to a performance documentation checklist. Each checklist lists several related procedures and includes a single performance objective (i.e., “Given the OJT Standards, the employee will be able to demonstrate the necessary skills and knowledge, as applicable to the position”). The lack of specificity in the performance objectives and in the definitions of required skills and knowledge causes OJT to be largely expert-based. As a result, specific learning objectives are determined by the individual trainer on a case-by-case basis, and may not be consistent or complete. More detailed objectives for OJT would ensure trainees receive a consistent level of knowledge during the qualification and certification process.

**Continuing Training.** DOE Order 426.2 states, “Continuing training programs must be established to maintain and enhance the knowledge and skills of operators.” The Order specifies some high level training topics, and asserts that contractor management may re-qualify personnel once they have completed the continuing training program, including requisite examinations, but does not provide particularly robust detail for what constitutes an effective continuing training program. DOE Handbook 1118, *Guide to Good Practices for Continuing Training*, provides some additional details on expectations for both fixed and flexible continuing training.

B&W personnel execute a number of activities that may be considered “continuing training.” These include fixed courses specified as part of the recertification or requalification profile for certified and qualified positions (administered primarily on a 2-year cycle). Flexible elements include Y-12 Site-Level Flexible Continuing Training (focused on sitewide issues but not issues related to specific divisions or groups of operators), training on procedures and safety basis changes, distribution of lessons learned, seminars in criticality safety, discussions during pre-job briefings, and seminars conducted by the Operational Performance Improvement group. Each of these elements is a necessary part of continuing training and helps ensure responsiveness to new information.

Very few, if any, of the continuing training elements cited above are formalized in a program and coordinated across or within organizations to assess and improve operator expertise. The lack of coordinated program-level goals or assessments outside of the recertification/requalification cycle inhibits the effectiveness of B&W’s continuing training. While B&W meets the requirement to conduct “continuing training,” and high level topics are appropriately covered, a formal program has not been established to be responsive to operator needs or to look forward to future operational challenges. The methods suggested in DOE Handbook 1118 for assessing personnel strengths and weaknesses and tailoring continuing training accordingly would help ensure that the B&W training program meets the intent of the DOE Order 426.2 requirement for continuing training.

**Specific Course Content.** The staff observed a number of training activities. Several—for example, the Applied Engineering Fundamentals classroom training course—were well executed. For others, however, the staff noted problems associated with both scope and content.

*Annual Refresher Training in Lockout/Tagout*—The training session observed by the staff did not cover all documented objectives. Specifically, instruction on procedural requirements related to caution tagging was lacking. Additionally, the course provided only cursory information on the control of hazardous energy sources, methods for isolation of

hazardous energy, positive protection, and the use of diagrams. For the TTMs that required training on Lockout/Tagout, there were no corresponding hazardous energy control or positive protection courses listed for the Lockout/Tagout task statement. The lack of training on these topics in the annual Lockout/Tagout refresher course and the lack of additional training courses listed on the TTM under the Lockout/Tagout task statement create a gap in training on the Lockout/Tagout process. The lack of detail in the task statement for lockout/tagout likely contributes to this gap. Finally, there was no written examination.

*Training in Conduct of Operations*—This training, developed as part of a sitewide Conduct of Operations Improvement Plan, is a considerable upgrade relative to previous web-based training. The course includes hands-on simulator training and discussion of relevant lessons learned. Throughout the course, however, the staff observed that the training was confined primarily to the implementation of placekeeping (the primary course objective). While required placekeeping is a new policy at Y-12, and the training stressed rigorous procedural compliance, the training's overall value was compromised when certain concepts were determined to be out of scope. On the simulator, for example, calibration stickers were not applied to gages, expected readings/conditions were not discussed, unverified operator aides were used, and appropriate personal protective equipment was not required. Valves included in the valve lineup were all normally open valves. This is not representative of the types of valves encountered in an operating facility, which could include locked, throttled, or normally shut valves, so that the training's practical value was limited. Poorly defined expectations for worker communication during the completion of continuous-use procedures resulted in ineffective performance of the simulated task. Finally, there was no written examination.

**Feedback and Improvement.** B&W often uses training to implement corrective actions in response to operational events. In many instances, this training is conducted during pre-job or shift briefings. B&W was unable to show how the effectiveness of this training is assessed, as specified in the evaluation phase per DOE Handbook 1078. Training personnel stated that the enhanced floor surveillance and senior supervisory watch programs may follow up on known issues; it would be beneficial, however, if these programs were required by management to explicitly determine whether the training has been effective. A formalized continuing training program, as discussed above, would also help management improve the feedback loop, thereby making the training program more responsive and effective in limiting the recurrence of operational events.

B&W uses examinations to assess the effectiveness of training for some courses. Operational evaluations (i.e., graded walkthroughs) and oral exams also are part of the recertification/requalification cycle. Currently, these examinations result only in a pass/fail determination. In order to more thoroughly assess the effectiveness of training, B&W would benefit from analyzing examination results to identify specific areas of operator need. Currently, an operator could fail on all questions related to a particular learning objective but pass the exam overall. In such instances, additional focus on this particular learning objective during the training sequence may be warranted.