Department of Energy
National Nuclear Security Administration
Washington, DC 20585

June 13, 2008

OFFICE OF THE ADMINISTRATOR

Mr. Darrell Kohlhorst
President and General Manager
Babcock & Wilcox Technical Services Y-12, LLC
Y-12 National Security Complex
Bear Creek Road
Oak Ridge, Tennessee 37831-8245

NEA-2008-01

Dear Mr. Kohlhorst:

The Department of Energy (DOE) has investigated the facts and circumstances regarding the March 15, 2007, uranium machine turnings (chips) fire in building 9204-2E at the Y-12 plant. Babcock & Wilcox Technical Services Y-12, LLC, (B&W Y-12) was provided the results of the onsite investigation in a report dated February 20, 2008. B&W Y-12 elected to forgo the opportunity for an enforcement conference, and indicated that it found the investigation report accurate and accepted the results of the investigation.

Based on my evaluation of the evidence in this matter, I have concluded that B&W Y-12 violated 10 C.F.R. Part 830, *Nuclear Safety Management*, and 10 C.F.R. Part 835, *Occupational Radiation Protection.* Accordingly, I am issuing the enclosed Preliminary Notice of Violation (PNOV) with three Severity Level II violations, one Severity Level III violation, and a proposed civil penalty of $123,750.

I am concerned by the consequences of this event and the underlying deficiencies revealed by it. As a result of the chip fire, approximately 110 workers received occupational doses of uranium. Although these doses were low, they could have been significantly higher if more material had ignited.

The event was also significant in that it highlighted deficiencies in a number of B&W Y-12's responsibilities: training, procedural adequacy, emergency response, and readiness verification and assessment activities. Clearly, B&W Y-12 had multiple opportunities through its readiness verification and contractor assurance processes to identify the procedural inadequacies; however, they failed to do so.

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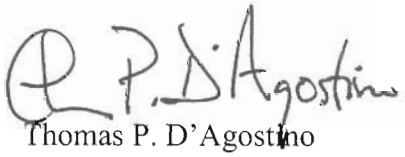
In calculating the civil penalty, no mitigation was warranted for self-identification of the violations as the event itself revealed the violations. With respect to B&W Y-12's investigation and corrective actions, the Department found the event investigation to be detailed and thorough, and the immediate corrective actions to be appropriate. Partial mitigation (25 percent) was applied in recognition of these positive responses. Full mitigation for corrective actions is not warranted based on specific concerns discussed in detail in the investigation report. These included a lack of rigor and formality in the extent-of-condition review; the informal disposition of opportunities for improvement identified in the event investigation; and, the closure of specific corrective actions without supporting documentation.

Pursuant to 10 C.F.R. § 820.24, *Preliminary Notice of Violation*, B&W Y-12 is required to respond within 30 days of the date of this letter and to follow the instructions specified in the enclosed PNOV. After reviewing any response to the PNOV, including any proposed additional corrective actions entered into the Noncompliance Tracking System, I will determine whether further enforcement action is necessary to ensure continuing and effective compliance with DOE nuclear safety requirements.

Sincerely,



Thomas P. D'Agostino
Administrator

Enclosure

cc: Conard Stair, B&W Y-12
Richard Azzaro, DNFSB

Preliminary Notice of Violation

Babcock & Wilcox Technical Services Y-12, LLC
Y-12 Plant

NEA-2008-01

As a result of a Department of Energy (DOE) investigation into the circumstances surrounding the March 15, 2007, uranium machine turnings (chips) fire in building 9204-2E at the Y-12 plant, multiple violations of DOE nuclear safety requirements were identified. The fire occurred during the open-air transfer of dry uranium chips generated during operations in the linear glovebox (GB02). The fire generated smoke and uranium airborne radioactivity and led to worker exposures and the evacuation of the building. The resulting assigned doses to the individual exposed workers ranged between 1 and 99 millirem. The glovebox and its operations had recently been transferred from building 9204-4 to building 9204-2E.

Violations were identified in the adequacy and implementation of work controls and radiological procedures, the adequacy of training, and the effectiveness of independent and management assessment programs. The violations have been determined to be three Severity Level II violations and one Severity Level III violation. A civil penalty of $123,750 is proposed.

In accordance with Title 10 C.F.R. Part 820, Appendix A, *General Statement of Enforcement Policy*, the violations are listed below. Citations specifically referencing the quality assurance criteria of 10 C.F.R. § 830.122 also represent a violation of § 830.121(a), which requires compliance with those quality assurance criteria.

VIOLATIONS

I. Uranium Machine Turnings (Chips) Fire Event

A. Personnel Training and Qualification

Section 830.122(b) (1) states that DOE contractors are to "Train and qualify personnel to be capable of performing their assigned work."

Contrary to this requirement, training provided by Babcock & Wilcox Technical Services Y-12, LLC (B&W Y-12) was inadequate because it failed to ensure that workers were fully capable of performing their assigned tasks. Specifically, the training that was provided did not fully inform workers regarding specific operational hazards and was not adequate to

ensure emergency response responsibilities and required actions were effectively implemented. The following examples were identified:

1. Training provided to Assembly/Quality Evaluation division glovebox operators failed to adequately inform operators of the fire hazards associated with uranium chips, dry chip transfers outside the gloveboxes, and the increased risks due to uranium hydride. Although training on pyrophoric metals was provided to glovebox operators, the B&W Y-12 investigation and the DOE Office of Enforcement's review identified that the operators' training provided only general information, focusing on large fires within gloveboxes, fire suppression methods, and fire effects on glovebox materials. The training materials did not address the specific pyrophoric hazards associated with uranium chips and their dry transfer in air, nor did it address the increased and well-recognized risks posed by uranium hydride.

2. The B&W Y-12 post-event investigation of the emergency response to the chip fire identified several deficiencies in emergency response training, which significantly hampered a timely and effective response to the fire. These deficiencies demonstrate that facility emergency response training was not fully effective. The identified deficiencies included the following:

    a. Not all facility personnel were familiar with emergency actions necessary to evacuate the facility. During the event, facility personnel initially directed an "orderly evacuation" from the material access area rather than an immediate evacuation of the facility. The building emergency plan does not address the concept of an "orderly evacuation."

    b. Some building 9204-2E personnel did not initially evacuate to a designated assembly station.

    c. Security personnel impeded the evacuation/accountability process by holding a group of evacuees at a loading dock rather than facilitating their reporting to the assembly stations.

Collectively, these deficiencies constitute a Severity Level II violation.
Proposed Civil Penalty – $41,250

B. Work Processes

Section 830.122(e)(1) states that DOE contractors are to "Perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means."

Contrary to this requirement approved work control procedures were inadequate to control and limit pyrophoric hazards associated with specific material disassembly and handling operations at Y-12. Examples include the following:

1. No approved procedure was in place to effectively control the transfer, handling, and disposition of uranium chips generated during GB02 disassembly operations in building 9204-2E. These material disposition activities included the transfer of dry, potentially hydrated uranium chips in ambient air. Consequently, formal and effective evaluations of the hazards posed by the material disposition activities were not performed, and effective controls (such as the use of respiratory protection and walk-in hoods) that were used in other work areas to perform dry chip transfers were neither required nor employed during these transfer operations.

   Procedures were in place in building 9204-2E to control operations inside GB02 and to provide general criticality safety controls for material operations. However, these procedures did not discuss material handling and disposition activities taking place outside the glovebox, nor did they explicitly discuss pyrophoric concerns related to uranium chips or precautions to be taken in the presence of uranium hydride.

2. Review of selected operation and disassembly procedures determined that they lacked adequate detail related to pyrophoric concerns and appropriate controls for chip handling operations. The DOE Office of Enforcement reviewed procedures associated with linear glovebox disassembly operations (Y50-01-QE-013, Rev. 4.3, *Disassembly Glovebox Operation (U)*) and material disposition (Y50-01-QE-024, Rev. 3.15, *Dispositioning of Weapons Components by Quality Evaluation (U)*) during prior operations in building 9204-4, as well as the GB02 operations procedure (Y50-01-B2-151, Rev. 0.6, *Quality Evaluation Glovebox Operations (U)*) used in building 9204-2E at the time of the chip fire. This review identified that the procedures and their accompanying hazard analyses did not explicitly discuss either pyrophoric concerns specifically related to uranium chips, or additional hazards or precautions regarding uranium hydride.

   Similarly, the B&W Y-12 team investigating the chip fire reviewed the above procedures and additional disassembly procedures (Y51-01-B2-GX-162, *Disassembly (U)* and Y58-01-B2-022, *Containerizing Parts – Glovebox (U)*) and their associated job hazard analyses. This team noted that the disassembly procedures did not include specific instructions or locations for dry chip transfers and did not recognize the pyrophoric nature of the chips. The B&W Y-12 investigation also noted that the associated job hazard analyses did not specifically evaluate chip transfers for their fire potential or identify any specific controls beyond the initial containerization of the chips in the glovebox.

Collectively, these deficiencies constitute a Severity Level II violation.
Proposed Civil Penalty – $41,250

C. Written Procedures (Worker Radiological Protection)

Section 835.104 states that "Written procedures shall be developed and implemented as necessary to ensure compliance with this part, commensurate with the radiological hazards created by the activity and consistent with the education, training, and skills of the individuals exposed to those hazards."

Contrary to this requirement, written procedures were not implemented commensurate with the radiological hazards created by the uranium chip transfer activities. Specific examples include the following:

1. B&W Y-12 procedure Y75-56-FO-117, *Radiological Posting and Entry Control*, dated September 28, 2006, section F.4, requires that Airborne Radioactivity Areas be posted when specified criteria are met. Appendix A of this procedure defines an Airborne Radioactivity Area as any area where the concentration of airborne radioactivity exceeds or is likely to exceed the DAC values in 10 C.F.R. Part 835.

   During the transfer of uranium chips from the hospital can to the chip dolly on March 15, 2007, the work area used for this transfer was not posted as an Airborne Radioactivity Area. Air-sampling measurements performed during a prior occurrence of this evolution (on February 21, 2007) measured uranium airborne radioactivity concentrations of 1.8 DAC, thereby demonstrating that subsequent evolutions would likely generate similar airborne radionuclide concentrations. No additional controls were put in place during the March 15, 2007, evolution to limit the airborne activity. B&W Y-12 estimates that uranium airborne radioactivity concentrations exceeded 10,000 DAC as a result of the chip fire.

2. B&W Y-12 procedure Y75-56-122, *Radiological Work Permit*, March 28, 2006, section B.6.c, requires that if a work area or component is accessible for survey, then the radiological work permit (RWP) shall include a statement that the user is to be familiar with the radiological conditions and/or review available or attached surveys, or similar language.

   Contrary to this requirement, the RWP controlling GB02 operations in building 9204-2E (RWP 2007-E1-722-0-Y) did not list specific work area radiological conditions, and did not include any statements directing the user to be familiar with radiological conditions and/or to review radiological surveys prior to conducting work.

Collectively, these deficiencies constitute a Severity Level III violation.
No civil penalty.

D. Management and Independent Assessment

Section 830.122(i) requires contractors to "Ensure managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives."

Section 830.122(j) (1) requires contractors to "Plan and conduct independent assessments to measure item and service quality, to measure the adequacy of work performance, and to promote improvement."

Contrary to these requirements, assessments performed by B&W Y-12 (including a formal readiness review and follow-up management oversight activities) were not effective in identifying and correcting significant problems, or in measuring the adequacy of work performance. Specifically, these assessments failed to identify that dry chip transfer operations were being conducted without a controlling procedure and without controls consistent with the hazard. Specific examples include the following:

1. The scope of the formal readiness review of GB02 glovebox operations did not include material handling or disposition activities outside the glovebox. Consequently, these activities were not evaluated, and the readiness review did not identify the absence of a procedure to control such activities.

2. Subsequent to the readiness review, quality evaluations of initial GB02 operational evolutions were performed by management oversight personnel (MOP). These quality evaluations failed to identify the lack of a disposition procedure, despite specific opportunities to make such identification. The specific opportunities included the following:

    a. During the second evaluated GB02 evolution, the question of where the dry chip transfer should be made was raised and informally resolved by representatives from production and safety functional groups. There was no recognition that the activity was not covered by procedure.

    b. During the third evaluated evolution, the MOP representative observed that the chips were being handled without specific procedural coverage, and a procedure modification request was subsequently initiated on February 19, 2007. However, no action was taken to stop the work pending establishment of procedural controls.

Collectively, these deficiencies constitute a Severity Level II violation.
Proposed Civil Penalty – $41,250

REPLY

Pursuant to the provisions of 10 C.F.R. § 820.24, B&W Y-12 is hereby required, within 30 days after the date of filing this Preliminary Notice of Violation (PNOV), to submit a written reply by overnight carrier to the following address:

Director, Office of Enforcement
Attention: Office of the Docketing Clerk
270 Corporate Square Building
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

Copies should also be sent to the Y-12 Site Office Manager as well as to my office. This reply should be clearly marked as a "Reply to a Preliminary Notice of Violation" and should include the following for each violation: (1) any facts, explanations, and arguments which support a denial that a violation has occurred as alleged; (2) facts that demonstrate any extenuating circumstances or other reasons why the proposed remedy should not be imposed or should be mitigated; and (3) full and complete answers to any questions set forth in the Notice. Copies of all relevant documents shall be submitted with the reply. The reply shall include a discussion of the relevant authorities which support the position asserted, including rulings, regulations, interpretations, and previous decisions issued by DOE. Corrective actions that have been or will be taken to avoid further violations should be delineated with target and completion dates in DOE's Noncompliance Tracking System. If B&W Y-12 agrees to comply with the proposed remedy and waives any right to contest the Notice or the remedy, this PNOV will constitute a Final Order upon the filing of the reply.

If B&W Y-12 agrees to comply with the proposed remedy in its reply, the penalty of $123,750 must be paid within 60 days after the reply is filed by check, draft, or money order payable to the Treasurer of the United States (Account 891099) and mailed to the Director, Office of Enforcement, Attention: Office of the Docketing Clerk, at the above address. If B&W Y-12 should fail to reply within the time specified, the Director will request that a default order be issued against B&W Y-12. If additional mitigation of the proposed civil penalty is requested, B&W Y-12 should address the adjustment factors described in 10 C.F.R. Part 820, appendix A, section IX.3.

Thomas P. D'Agostino
Administrator
National Nuclear Security Administration

Washington, DC
this 13th day of JUNE 2008