DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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June 18, 1997

The Honorable Alvin L. Alm
Assistant Secretary for Environmental Management
Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585-0113

Dear Mr. Alm:

Members of the Defense Nuclear Facilities Safety Board (Board) were briefed on May 6, 1997, by personnel from the Department of Energy Richland Operations Office and Bechtel Hanford, Incorporated (BHI) regarding safety management of facility decommissioning work. As part of the briefing, BHI described its work flow process; identified several areas for continued improvement; and described selected recent events to highlight work planning and implementation deficiencies, their causes, and associated corrective actions. The Board's staff and outside experts have also been monitoring the work flow process, and have prepared reports documenting deficiencies in work planning and conduct of operations that may be helpful to the improvement effort. These reports are enclosed for your information. If you have any questions, please do not hesitate to contact me.

Sincerely,

John T. Conway
Chairman

c: The Honorable Tara O'Toole
Mr. Mark B. Whitaker, Jr.
Mr. John Wagoner

Enclosures

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 21, 1997

MEMORANDUM TO: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: D. G. Ogg

SUBJECT: Work Planning and Conduct of Operations at the Hanford N Basin

1. Purpose

This report documents observations of work activities at the N Basin, Hanford Site, Richland, Washington. The Environmental Restoration Contractor, Bechtel Hanford, Inc. (BHI), conducts deactivation activities at the N Basin for the Department of Energy, Richland Operations Office (DOE-RL). The Defense Nuclear Facilities Safety Board (Board) Hanford Site Representative, D. G. Ogg, assisted by outside expert D. S. Boyd, conducted reviews on three separate occasions during March 27–April 2, 1997.

2. Summary

On March 25, 1997, BHI workers removing electrical conduit in the Examination Pit of the N Basin cut through an energized 240-volt line. No one was injured. Causes for this event included poor procedural compliance, inadequate identification of workplace hazards, and inadequate control of those hazards in the work procedure. This event prompted the Hanford Site Representative to conduct a more detailed review of BHI activities at the N Basin.

Observations at the N Basin indicated several weaknesses in BHI work planning, conduct of operations, and radiological controls. Several of these poor practices were aggravated by procedures not being specifically written for the work at hand, and by the lack of adequate prejob planning and walkthroughs. Section 4 provides details of these observations. The Board's staff believes BHI could benefit from a more thorough and rigorous program to identify workplace hazards and controls for those hazards. A working integrated safety management system of the type suggested in Board Recommendation 95-2 would provide this sort of program.

3. Background

The deactivation work at the N Basin includes low-dose (< 1 roentgen [R]/hr on contact) hardware removal, water filtration, basin sediment relocation, and high-exposure-rate (> 1 R/hr on contact) hardware removal. While BHI continues to make progress in the deactivation work, the project has experienced delays due to revisions in the safety basis and a stand-down due to deficiencies in conduct of operations. Other occurrences included unexpected hydrogen gas

evolution from a grouted monolith, the drop of a 14-ton monolith from the overhead crane to the basin floor, and a crane operator moving off the crane without required fall protection.

4. Discussion

Electrical Conduit Cutting Near-Miss. During follow-up for the near-miss event of March 25, 1997, the Board's staff learned that causes for this event included both poor conduct of operations and inadequate procedures. The electrician who signed the procedural hold point confirming completion of zero energy checks did not complete the checks immediately prior to the work (he had completed the checks several months earlier).

A procedural inadequacy directly related to the near-miss event is the statement of isolation conditions in the work package that reads, "Lock and tag the system out-of-service with a Controlling Organization Lock and Tag, if the isolation breaker or disconnect switch can be traced." The workers skipped this hold point, because they believed they could not trace the power source. However, during the work, the workers cut through a conduit containing an energized 240-volt line they believed to be deenergized. More thorough prejob planning and walkthroughs could have caught and corrected these problems.

Airborne Radioactivity Postings. While touring the N Basin on March 27, 1997, the Board's staff observed airborne radioactivity area (ARA) postings on handrails that surrounded the Examination Pit (see Figure 1). No physical barriers separated the air space of the posted airborne area from the unposted areas. The prejob briefing for the tour did not include mention of an ARA, nor was one identified on the radiological survey map. Walkways allowed access to basin areas that surrounded the posted area.

Upon further investigation, the Board's staff learned that N Basin management had stopped the cutting work (the near-miss event) requiring the postings, but that the radiological controls (radcon) organization had not authorized downposting of the area. Air samples taken after the work, which indicated potentially high airborne contamination levels, had not had sufficient time for the radon contribution to decay. Later, the radcon organization confirmed the presence of radon and removed the ARA postings.

The radiological work permit (RWP) for the cutting work in the Examination Pit requires that workers engaged in the cutting activity wear respirators. The work package also requires that both alpha and beta continuous air monitors (CAMs) be operational during the work. However, the work planning documentation has several weaknesses:

- An air sampling plan for the work requires "periodic high-volume air sampling," but does not specify how often and where the air samples are to be taken.

- Although the radcon organization secured walkway access "downwind" of the west end of the Examination and Segregation Pits, neither the RWP nor the work package mentions or requires that access be limited.

- Neither the work package nor the RWP required workers in the general N Basin area but outside the Examination Pit to wear respirators.

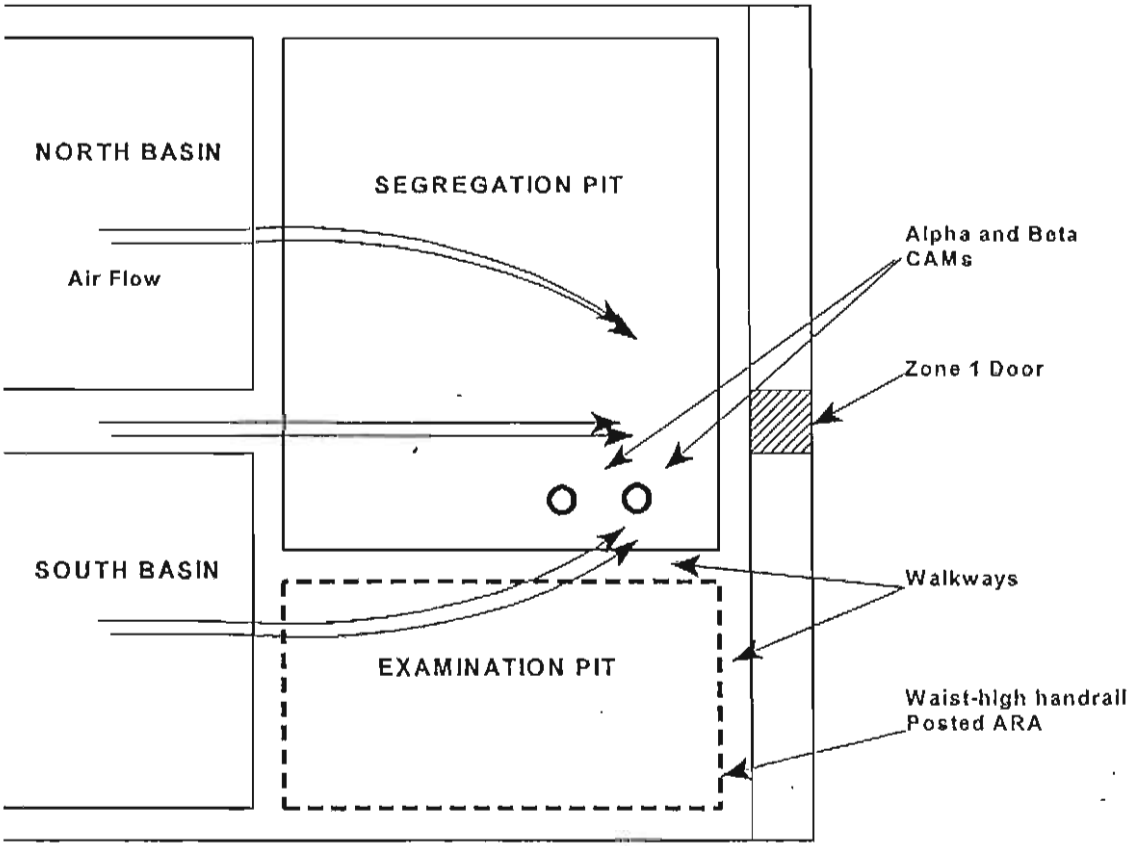

Figure 1. N Basins, East End

Pressure Gage Replacement Job. BHI workers replaced a discharge pressure gage on an Aquadyne hydro laser on April 1, 1997. The overall job required about 1 hour at the work site, including about 5 minutes for the actual gage replacement. Controlling organization lockouts/tagouts were placed on the pump motor electrical plug and the water supply valve. The equipment was located in a high-contamination area (HCA) in the transfer bay. The Board's staff made the following observations concerning the planning, documentation, and conduct of this job:

- Workers used a task instruction covering nonspecific Aquadyne troubleshooting, but did not adapt the instruction for the specific work to be accomplished. Many steps, such as those concerning the drip pan, were considered to be not applicable and were skipped by the craft supervisor. Also, the zero energy check for water pressure consisted of looking for water coming out of the hose, but the end of the hose was under the water's surface.

- As planned and written, the task instruction unnecessarily maintained an HCA around the Aquadyne. This was recognized during the job by the workers and the radiological control technician (RCT), who then surveyed the area and obtained authorization to post it temporarily as a CA.

- Workers who placed and independently verified the lockout/tagout on the electrical cord accepted that the craft supervisor had correctly identified the plug (which he had), but did not check for themselves. The electrical cord was intertwined with hoses and other electrical leads, and its identity was not self-evident.

- Planning for the job did not address how to lock the water supply valve shut, and a standard locking device was not available. Had the craft supervisor not improvised a locking device from a length of chain, a significant delay could have resulted.

- The BHI work control process allowed the discharge pressure gage to be replaced without the cause of the failure having been adequately determined. After hydro laser operation had resumed, the gage failed again the following day. BHI then learned, after contacting the manufacturer, that operating the nozzle too close to, or in contact with, the surface being cleaned can cause pressure pulses that can over-range the gage.

Chemical Additions to the Basin Water on April 2, 1997. Workers completed this work in accordance with a BHI demand work request. The following observations provide additional examples of poor prejob planning:

- Many pen-and-ink changes had been made in the working copy of the document, with no indication that a review and approval process had been followed. Some changes concerned technical content and work authorization.

- Workers began chemical additions without establishing an emergency shower/eyewash at the job site as required by the work document. Later, after an RCT recognized the problem, another worker corrected the deficiency.

5. Future Staff Action

The Board's staff continues to emphasize to DOE and its contractors the need for working programs that implement an integrated safety management system. The Hanford Site Representative Office will continue to prompt DOE-RL on this subject, and to provide oversight of BHI and other contractor activities.