DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

October 6, 2011

Mr. David Huizenga
Acting Assistant Secretary for Environmental Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0113

Dear Mr. Huizenga:

The staff of the Defense Nuclear Facilities Safety Board (Board) recently reviewed the maintenance program at the Hanford Site's Waste Encapsulation and Storage Facility (WESF) and identified several issues of concern to the Board. For example, the enclosed report documents issues related to procedural quality and compliance as well as proper execution of work. Similar issues with the quality and implementation of technical procedures were noted in recent correspondence from the Board to the Department of Energy (DOE) related to operations at the Hanford Tank Farms.

The large quantity of radioactive material stored at WESF makes it imperative that all structures, systems, and components serving a safety function be rigorously maintained and monitored. The Board believes it is critical that DOE's defense nuclear facilities sustain a consistent, high degree of formality of operations while conducting maintenance activities and that management sets clear expectations to achieve these goals. In addition, the Board believes all maintenance personnel must receive facility-specific training on safety-related systems that reflect variations in facility type, purpose, and design. Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report and briefing within 60 days of receipt of this letter that details DOE's assessment of the effectiveness of the contractor's actions to address the issues identified in the enclosed report.

Sincerely,

Peter S. Winokur, Ph.D.
Chairman

Enclosure

c: Mr. Matthew S. McCormick
Ms. Mari-Jo Campagnone

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

August 12, 2011

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: T. Hunt

SUBJECT: Maintenance Program, Waste Encapsulation and Storage Facility, Hanford Site

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the maintenance program at the Waste Encapsulation and Storage Facility (WESF) at the Hanford Site. Staff members T. Hunt, Z. Beauvais, D. Chudnow, J. Troan, and R. Quirk performed the on-site portion of the review during the week of July 11, 2011.

Background. WESF is a Hazard Category 2 nuclear facility designed and constructed to process, encapsulate, and store strontium-90 and cesium-137 extracted from high-level wastes generated during plutonium production operations. WESF's current mission is to store the site's inventory of 1,936 cesium and strontium capsules until ultimate disposition. The capsules contain about one-third of the total radioactivity of Hanford waste and currently are stored under water in pool cells.

The Board's staff undertook this maintenance review based on the potential for significant consequences (e.g., increased dose rates, hydrogen buildup, release of radioactive material) should WESF's safety structures, systems, or components (SSCs) degrade to the point where they could not perform their designated functions in the event of certain upset conditions. The work activities at WESF are related principally to facility maintenance; the operational tempo is relatively slow, with the primary tasks being daily surveillances and periodic maintenance and inspections.

WESF—along with the Effluent Treatment Facility (ETF) and Canister Storage Building (CSB)—is part of the CH2M Hill Plateau Remediation Company's (CHPRC) Liquid Waste and Fuels Storage (LWFS) organization. Most WESF maintenance resources are shared with CSB and ETF, and thus the staff's observations regarding the program at WESF may well apply to these other LWFS facilities. It is noteworthy that CHPRC recently upgraded their proposed level of readiness review for upcoming operations at CSB based on the observations made by the Board's staff at WESF.

Observations of Contractor Processes and Activities. The Board's staff reviewed the maintenance program at WESF and its conformity to the requirements and guidance in Department of Energy (DOE) Order 433.1A, *Maintenance Management Program for DOE Nuclear Facilities*; DOE Guide 433.1-1, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1;* DOE O 5480.19, *Conduct of Operations Requirements for DOE Facilities*; and facility- and company-specific documents. In addition, the staff observed plan-of-the-day meetings, pre-shift meetings, pre-job briefings, surveillance walkdowns, and maintenance activities. The following sections describe shortcomings identified by the staff with respect to monitoring of design features, compliance with maintenance procedures, execution of work, the quality of procedures, facility-specific training, and the contractor oversight program.

Monitoring of Design Features—WESF personnel do not perform formal (i.e., documented and scheduled) periodic reviews or monitoring activities to confirm that all design features have not degraded and are still capable of performing their safety functions. One example is that WESF operators do not check or test the safety-significant pool fill piping that must be operable in an emergency situation to provide a means of getting water to the pools through a fire hose. After the staff raised this issue during its review, WESF management committed to evaluate the concern.

Compliance with Procedures—Technical procedures outline step-by-step actions necessary for maintaining facility SSCs. Following are examples of cases in which maintenance and surveillance personnel failed to adhere to the approved procedures. WESF management took initial steps to address the first two items during the staff's review.

- WESF surveillance personnel failed to properly identify readings out of normal range for Technical Safety Requirement (TSR) parameters on data sheets for pool cell water levels and hot cell ventilation.

- A TSR surveillance requires pool cell water levels to be verified and documented weekly, along with the date and method of verification. WESF personnel are not recording the method of verification as there is no place to record it on the data sheet.

- The data sheet for automated personnel monitor inspections requires the radiological control technician to verify, through a meter on the automated personnel monitor, that there is evidence of an outlet flow. Some automated personnel monitors indicate no flow, but the radiological control technicians accept and work around this known abnormal condition by instead verifying the presence of an outlet flow using the inlet flow gauge and the gas bottle regulator.

- Workers skipped steps that could not be performed as written and performed actions that were not documented in the continuous-use procedure to function test the WESF stack radiation monitor system.

Execution of Work—In some cases, workers were found to exhibit poor performance or judgment during maintenance and surveillance activities. In the following examples, the workers did not perform as expected based on training, procedures, or skill of the craft.

- Workers recently found wet detector wires in the K3 exhaust ventilation system. The wires dried when the workers opened the system to perform repairs. The operators returned the instrument to service without determining the source of the moisture.

- During a TSR surveillance, the operator failed to recognize out-of-range readings on pressure gauges until the Board's staff pointed them out. The operator also failed to note as a concern on the data sheet that a gauge reading was off-scale.

- During a surveillance round, an operator indicated that he did not understand how to read a complex gauge (with three different scales) on the M-2 pool cell beta monitor, as required by the data sheet. Therefore, he entered a reading from a remote computer monitor (see the section below on facility-specific training).

Quality of Procedures—The Board's staff identified issues associated with the quality and usability of technical procedures during tabletop reviews, observations of work, and discussions with CHPRC personnel. For example:

- Post-maintenance testing may be performed by operators or crafts personnel using maintenance procedures, but the maintenance procedures do not designate the responsible position/individual if not a craftsperson. This situation is contrary to a contractor standard that "the single user format should be used when the majority of the steps in a procedure are performed by one discipline or craft. Those steps performed by other disciplines are identified at the beginning of the affected step."

- The staff noted numerous cases in which equipment identifiers in a procedure (surveillance forms, data sheets, checklists) were missing or did not match physical labels or touchscreen readouts.

- The daily Radiological Control Data Sheet for remote surveillance of area radiation monitors does not highlight the TSR-related equipment (3 of 13 area radiation monitors). A CHPRC procedure requires that "critical steps [e.g., TSR level surveillance steps] are adequately emphasized."

Facility-Specific Training—No formal facility-specific system/equipment training is offered or required for crafts personnel because, as stated by CHPRC management, the contractor hires only journeymen who undergo general site training through the apprenticeship program. DOE Guide 433.1-1 states that the "training organization should maintain maintenance training programs that address specific facility needs." In addition, DOE Order 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*, requires that "personnel who perform work on engineered safety features as identified in the facility Documented Safety Analysis must be trained on those systems/components, including

systems having a direct impact on the safe operation of the facility." The Board's staff believes all maintenance personnel need to receive facility-specific training on facility systems that reflect variations in facility type, purpose, and design.

The aging workforce at WESF creates a compelling need for specific training on facility SSCs. In the near future, the LWFS/WESF maintenance organization expects to lose four crafts personnel, four work planners, and two qualified supervisors (about 25 percent of the LWFS maintenance workforce) through retirement or reassignment, and many others at WESF will be eligible for retirement in the near term. The staff believes workforce turnover at WESF will need to be managed prudently to ensure that knowledgeable and experienced personnel are available to maintain the WESF safety systems.

Contractor Oversight Program—The contractor has performed 18 formal assessments during the past 2 years that encompassed elements of the WESF maintenance program. CHPRC personnel noted that no findings from their management assessments or independent assessment were related to WESF maintenance activities, and that only one minor opportunity for improvement (a procedure change) was identified during 11 management observations of maintenance activities at WESF. These results indicate to the staff that the contractor's oversight program may not be optimally effective or critical. Given the significant issues identified by the staff during this 3-day review, it may be advisable for DOE to evaluate the rigor with which the contractor performs its program assessments.

Conclusions. During this review, the Board's staff found several elements of the LWFS maintenance program at WESF to be deficient. Chief among these deficiencies was the quality and use of technical procedures. The staff also identified shortcomings with respect to the monitoring of design features, facility-specific training, contractor oversight, and execution of work. During the review, CHPRC management showed a willingness to accept feedback by promptly addressing several issues raised by the staff (e.g., by evaluating the possibility of periodically monitoring some design features). Continued diligence to resolve the issues documented in this report should strengthen the maintenance program at WESF.