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**DEFENSE NUCLEAR FACILITIES
SAFETY BOARD**

Washington, DC 20004-2901



June 27, 2012

Mr. David Huizenga
Senior Advisor 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 Waste Isolation Pilot Plant (WIPP) and identified several issues of concern to the Board. The enclosed report documents deficiencies in the procedural quality and compliance of the maintenance program, as well as other maintenance-related issues. Given the uniqueness and importance of the WIPP mission, it is imperative that all structures, systems, and components serving a safety function be reliably maintained and monitored.

The enclosed report is being forwarded to assist the Department of Energy's (DOE) Carlsbad Field Office and WIPP contractor in strengthening the WIPP maintenance program. The Board understands that efforts are underway to improve and assess implementation of the contractor's corporate work planning and control standard. However, staff observations during this review indicate that significant progress is still necessary. Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report within 90 days of receipt of this letter identifying actions taken or planned by DOE to resolve these safety issues.

Sincerely,

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

Peter S. Winokur, Ph.D.
Chairman

Enclosure

c: Mr. José R. Franco
Mrs. Mari-Jo Campagnone

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

April 3, 2012

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: T. Hunt

SUBJECT: Maintenance Program, Waste isolation Pilot Plant

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the maintenance program at the Waste Isolation Pilot Plant (WIPP). The management and operating contractor at WIPP is URS Washington TRU Solutions, LLC (WTS); the Department of Energy's (DOE's) Carlsbad Field Office (CBFO) oversees this contract. Staff members T. Hunt, T. Cutler, and D. Winters, together with outside expert D. Boyd, performed the on-site portion of the review during the week of March 5, 2012.

Background. High quality work documents and workers' strict compliance with those documents are significant contributors to the safe implementation of any nuclear maintenance program. The Board's staff reviewed work planning and control processes in support of operations and maintenance at WIPP in July 2010. Among other findings, the staff identified work procedures that failed to contain necessary controls and could not be performed as written. A letter from the Board dated October 22, 2010, noted that "safe conduct of operations and maintenance is of particular importance at WIPP because of its unique position as the DOE's only operating facility for disposal of transuranic waste."

Subsequently, WTS developed two key maintenance program and process documents—the *WIPP Nuclear Maintenance Management Program* and the *Work Control Process* procedure. In a visit to WIPP in October 2011, the Board's staff observed a URS Global Management & Operations Services (URS) corporate assessment of these documents against the recently issued *URS Work Planning and Control Standard*. It was identified during this assessment that improvements had been made in the WTS directives governing work planning and control, but that improvements had not yet been made in maintenance work control documents and field implementation. Additionally, DOE's Office of Environmental Management (EM) issued an Activity Oversight Report, dated October 2011, on the same assessment that identified many deficiencies in WIPP's maintenance work control documents (WCDs)¹. The Activity Oversight

¹ WCDs are also known as technical procedures, work packages, or work instructions. All are referred to herein as WCDs, with the exception of quotes from a reference document. Administrative documents may also be referred to as procedures.

Report went on to say that a more thorough and rigorous review of additional WCDs was warranted to determine the status of the program.

Observations of Contractor Processes and Activities. The Board's staff reviewed the WIPP maintenance program and its conformity to the requirements and guidance in DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*; DOE Guide 433.1-1A, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1*; and facility- and company-specific documents. In addition, the staff observed plan-of-the-day meetings, pre-job reviews, post-job reviews, operational support activities, and maintenance operations. The following sections describe deficiencies identified by the staff with respect to the quality of and compliance with maintenance WCDs, post-maintenance testing, pre-job reviews, annual system walkdowns, maintenance resources, placekeeping, and DOE oversight.

Quality of Work Control Documents—Various assessments at WIPP during the past two years have identified the need to upgrade maintenance WCDs so they can be performed as written. The WTS maintenance organization identified opportunities to improve the format and clarity of preventive maintenance (PM) WCDs and initiated efforts to evaluate and revise each WCD by December 2010; however, this initiative was eventually suspended because of competing priorities. Since incorporating the *URS Work Planning and Control Standard* and developing the *Work Control Process* procedure, WTS has focused on upgrading waste handling WCDs; thus, little progress has been made on upgrading the maintenance WCDs. WTS has slowly begun to focus more on reviewing and potentially rewriting the more than 650 PM WCDs (only two of which had been approved at the time of the staff's visit) to be consistent with the new *Work Control Process* document. (The two revised PM WCDs showed no improvement—based on number of staff comments—when compared to five other maintenance WCDs that had not been upgraded.)

Based on a review of seven WCDs, the staff concluded that the preventive and corrective maintenance WCDs need to be enhanced to be more clear and concise and to reflect actual conditions and practices in the field. The staff informally forwarded a detailed list of comments on the seven WCDs to WTS/CBFO for their consideration. Selected WCD deficiencies noted by the staff during tabletop reviews and observations of maintenance activities are listed below. (Most of the conditions identified are inconsistent with the WCD requirements and expectations delineated in the *Work Control Process* procedure; the *WIPP Writer's Guide*; the *Maintenance PM/MWO [Model Work Order] Controlled Document Processing* procedure; and/or DOE Standard 1029, *Writer's Guide for Technical Procedures*.)

- The use of formatting (e.g., warnings, cautions, and notes) and terminology was inconsistent
- The WCDs were not always technically accurate (e.g., warnings erroneously indicated that radiological hazards existed) or administratively accurate (e.g., action steps not beginning with a singular, present-tense action verb)

- Some WCDs lacked the clarity necessary to be followed without confusion (e.g., not specifying the person responsible for sign-offs)
- The detail and language of some steps did not support error-free performance of work (e.g., equipment/tooling tolerances and ranges not included where necessary)
- WCDs did not consistently reflect human factors considerations (e.g., WCD callouts not matching equipment labels)

Guidance for the Development of Work Control Documents—The WIPP Procedure Writer's Guide states that a technical procedure is required for maintenance and testing of equipment and articulates expectations for procedure development. The scope of the *Work Control Process* procedure includes the development of preventive, predictive, and corrective maintenance WCDs. WIPP's *Maintenance PM/MWO Controlled Document Processing* procedure provides a protocol for processing PM procedures. All three of these documents provide guidance on the development of maintenance work documents but are not always consistent. For example, each describes a different format for the required sections of a WCD. This inconsistency could create confusion among procedure writers and workers as to the necessary format and content of maintenance work documents. Reconciling these three work document guides would increase the likelihood of WCDs being developed consistently and meeting workers' expectations.

Compliance with Work Control Documents—Three of the seven WCDs the staff reviewed in the field were suspended either during the pre-job briefing (task preview) or during execution of the first performance step. These suspensions, due to the inability to perform steps as written, were initiated after the Board's staff or DOE facility representative brought the issues to the attention of the field work manager. During the performance of three other maintenance activities, steps in the WCD having no direct safety impact could not be executed as written, so workers—instead of suspending the job—used skill-of-the-craft to augment the WCD and accomplish the work. Although the staff observed a few cases in which maintenance technicians worked around steps, there was also evidence that WTS management was actively counseling the workers on compliance with WCDs and the need to stop work if the WCDs could not be executed as written. The following are examples of where maintenance personnel did not stop work when WCD issues arose:

- A technician worked around the step to connect two serial cables together by instead connecting one serial cable directly to a control box because the procedure could not be performed as written. The technician stated that a serial cable was sometimes left in the control box so the connection could be made.
- The step to check a trip coil and mechanical linkage could not be performed as written, so the electricians used skill-of-the-craft to first remove a plate covering the components. It would have been advisable to suspend work until the task had been analyzed and the WCD revised to specify removing the cover plate, if appropriate.

- Operators moved/rolled a large circuit breaker about 25 feet without WCD authorization. Providing a WCD action step to move the breaker before performing the subsequent step would help avert a potential interference.
- Maintenance personnel executed a lockout by placing a breaker in the “OFF” position instead of the procedurally required “OPEN” position. This inconsistency in nomenclature requires maintenance technicians to deduce that “OPEN” and “OFF” are synonymous.

Placekeeping—As noted in the DOE Standard 1029, a best practice to help workers track their progress in a WCD and reduce the likelihood of omitting or duplicating action steps is the use of placekeeping. WIPP process documents, including the *Conduct of Operations Manual*, are silent on the operators employing the placekeeping protocol (although some WCDs note that placekeeping is optional and provide brackets at the beginning of steps for that purpose). The majority of operators that the staff observed implementing WCDs *did* mark each step as being completed before proceeding to the next step, and in one case, this prevented a WCD violation. Proceduralizing expectations for placekeeping and making it a firm requirement during the performance of complex or high-hazard procedures would enhance control over maintenance activities.

Post Maintenance Testing—WTS has not established a rigorous and well-documented process for post maintenance testing (PMT). WTS has no document clearly defining the PMT process and the required PMT for each type of equipment in the PM program. As a result, the test requirements and acceptance criteria for PMT activities are subjective—i.e., at the discretion of the individual writing the work package—and are more likely to be developed and applied inconsistently. DOE Guide 433.1-1A notes that “maintenance [personnel] should include predefined [emphasis added] PMTs in job instructions.” WTS management indicated that they plan to develop a PMT procedure similar to an effective procedure that is used at another DOE site.

Annual System Walkdowns—The annual walkdowns are a critical activity performed to ascertain the operability, availability, reliability, and overall health of site systems. The resultant report also serves as documentation of the cognizant manager’s (CM) assessment of the cognizant engineer’s (CE) and alternate CE’s requalification and system knowledge. The expectation, as expressed by WTS management and outlined in the *Annual System Health/Walkdown/Requalification* procedure, is that the CM, CE, alternate CE, and CBFO representative participate in the system walkdown. The staff’s review of numerous records indicated that this expectation is not consistently being met by the CM, alternate CE, and CBFO representative. Limited resources were cited to explain why CMs and alternate CEs do not always participate in walkdowns. Three CMs support about 100 systems, and there are several CE position vacancies and eight CEs in qualification (a 2–3 year process). In addition, no alternate CE is assigned to 9 of 14 vital safety systems and about 60 systems overall. These strained resources may result in a lack of attention to system maintenance that is necessary to ensure that all safety systems will meet facility needs.

Pre-Job Reviews—Pre-job reviews (or briefings) are important to support the safe and compliant accomplishment of work. As described in the WIPP procedure for pre- and post-job reviews, the type of pre-job review to be conducted depends on the frequency, complexity, and risk associated with the work. The pre-job review may be a task preview, tailored pre-job briefing, standard pre-job briefing, electrical pre-job briefing, or walkdown/dry run/mockup training. This approach to pre-job reviews is overly complex, and the use of multiple similar terms for different levels of review is confusing. The staff observed several task previews/pre-job briefings and, although these are two different activities performed prior to commencement of work, they appeared to be interchangeable in practice. Discussions with two field work managers revealed that there was some confusion as to when each applied. Although not stated in the pre-job review procedure, it is appropriate for the individual who conducts the review to be the first-level supervisor who will actually be overseeing the work in the field (usually the field work manager or work group manager at WIPP). Additionally, WIPP procedures require documenting the printed name, badge number, and initials of all briefing attendees, but this was not done in three instances.

Maintenance Resources—WTS faces obstacles to maintaining an experienced and skilled workforce. Attrition, a reduction in force, and retirement pose substantial concerns for a workforce in which the average age is about 50 years. WTS currently has several openings for electrical and instrumentation and control personnel; these positions are difficult to fill because of competing industries (e.g., oil, gas, potash) in southeastern New Mexico. One of the impacts of a shortage of maintenance personnel is an increase in backlogged work. The backlog of preventive and corrective maintenance work has increased in the past few months as a result of workforce restructuring, a revised work control process, and increased rigor in complying with WCDs. WTS will need to manage its personnel resources prudently to reduce the effects on safety-related equipment and systems.

The WIPP physical plant is now showing considerable signs of aging, and resources are not being applied to address these issues in a timely manner. Noncritical maintenance items—some of which are potentially (and eventually) safety-related—are being deferred. For example, work on stripping deteriorated paint and rust scale from the steel surface of the salt hoist frame (tower) and repainting it to inhibit further corrosion has been deferred for several years beyond when it would ordinarily be performed. In addition, much of the equipment has single-point failure modes, and procurement of replacement parts will require significant lead time, on the order of months.

DOE Oversight—The individual responsible for overseeing the WIPP maintenance program for CBFO recently departed, and the vacancy has not yet been filled. Current plans are to have an electrical safety individual qualify as the replacement maintenance oversight person. This is an 18-month process after the qualification card has been developed. Also, at the time of the staff's visit, a field office oversight person was not assigned to all vital safety systems (e.g., underground ventilation) to track and verify acceptable performance in meeting established safety requirements. Cognizant individuals were subsequently assigned to those vital safety systems, and the paperwork to reflect the coverage is in process. The workforce staffing analysis

indicates that three full-time equivalent personnel are needed to fulfill safety system oversight responsibilities, but only two are presently functioning in that capacity.

Conclusions. During this review, the Board's staff identified flaws in several elements of the WTS maintenance program at WIPP. Chief among these was the quality and usability of maintenance WCDs. WTS management estimated that the upgrading of maintenance WCDs to meet local requirements lags behind the upgrading of waste handling WCDs by about 18 months. Management also realizes that a culture change is necessary with respect to workers recognizing deficient WCDs and stopping work accordingly. Even though the staff observed a few cases in which technicians worked around steps in WCDs that they could not comply with as written, the staff also saw evidence that WTS management is actively counseling maintenance workers on WCD compliance and the need to stop work if WCDs cannot be executed as written. Continued diligence to resolve these issues and the others documented in this report should make the maintenance program at WIPP safer and more efficient.