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# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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June 2, 1994

The Honorable Hazel R. O'Leary  
Secretary of Energy  
Washington, D.C. 20585

Dear Secretary O'Leary:

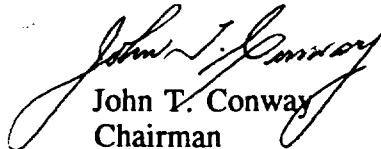
The Defense Nuclear Facilities Safety Board (Board) has reviewed the Department of Energy's (DOE) revised Implementation Plan, dated March 18, 1994, in response to Recommendation 92-4. We find that this revision to the plan represents a step forward and a basis for proceeding with the Tank Waste Remediation System (TWRS) program at Hanford. However, the Implementation Plan does not specify the necessary commitment to effectively implement systems engineering methods at the project level.

Recommendation 92-4 was originally directed at the Multi-Function Waste Tank Facility (MWTF). Yet, the current Hanford Site systems engineering effort does not appear to have had any impact on the MWTF project. The Board believes that the MWTF design should be subjected to an in-depth, independent review, in accordance with good systems engineering practice, before the Department authorizes MWTF construction.

The review of the draft Implementation Plan by the Board's staff is enclosed for the Department's use in amending the Plan. The Board considers the Implementation Plan to be acceptable, subject to incorporation or resolution of the comments noted above and in the enclosure. The Department is requested to provide an amended Implementation Plan to the Board within 60 days of the date of this letter.

The Board looks forward to DOE's successful implementation of this important recommendation.

Sincerely,

  
John T. Conway  
Chairman

c: The Honorable Thomas Grumbly, EM-1  
The Honorable Tara O'Toole, EH-1  
Mark Whitaker, Acting EH-6

Enclosure

## **DNFSB Staff Comments on 92-4 Implementation Plan**

The Defense Nuclear Facilities Safety Board (Board) staff and outside experts have closely followed the Department of Energy's (DOE) and Westinghouse Hanford Company's (WHC) efforts toward developing this Implementation Plan and implementing systems engineering as part of the Tank Waste Remediation System (TWRS) Program. Based on their review, the Board has been advised as follows:

1. Systems engineering is progressing at the TWRS Program level but has not yet been applied at the project level. As a consequence, systems engineering has had little effect so far on individual projects and, in particular, has had no discernible impact on the Multi-Function Waste Tank Facility (MWTF) project.

WHC anticipates that systems engineering will not begin to affect project-level decisions until September 1994. Systems engineering expenditures are expected to dramatically increase in September 1994, when construction is scheduled to begin on two of the six new tanks for MWTF. This schedule makes systems engineering virtually incapable of influencing the MWTF project since, once construction begins, design changes mandated by systems engineering will be much more costly and difficult to implement. In addition, major milestones for implementing systems engineering are slipping. This exacerbates the situation and makes achieving project-level implementation by September 1994, increasingly unlikely.

2. DOE Order 4700.1, *Project Management System*, which includes systems engineering requirements, is not as effective as needed to ensure adequate consideration of technical issues that affect public health and safety. This lack of effectiveness is evident from the process that DOE used to control the MWTF design. As an example, the DOE Headquarters' reviews that were done at each "gate" in the design appear to have consisted of brief presentations by the contractors that focused mostly on budget and schedule. Little attention was given to technical design issues or whether lower-tier design reviews were adequate.
3. The Board's staff is reviewing and will separately comment on reports already submitted by DOE in response to commitments in earlier drafts of the Implementation Plan. However, several of these documents do not meet the Board's expectations. For example:
  - a. The "standdown reviews" did not assess in-depth the hazards, the safety implications, or the use of codes and standards in support of project-level design decisions as originally intended in the Implementation Plan (Commitment 2.4.a). These standdown reviews were to be performed for the purpose of quickly validating or modifying the design bases of several TWRS projects. The scope of these reviews was to include

status, quality assurance, safety analyses, adequacy of design interfaces, and application of codes and standards.

However, the standdown reviews that were performed seemed more focused on determining whether each of the topics considered (e.g., application of codes and standards) had been reviewed at some time in the past, and less focused on whether these earlier reviews were adequate or whether new requirements or conditions existed that could alter the conclusions of earlier reviews. Typically, these reviews were done hastily by people involved with the project and were neither thorough nor independent. The Board believes that both DOE and WHC reviews should be thorough, independent, and well-documented. This allows the reviews to be used to validate the design bases consistent with best practices for design reviews of major projects (e.g., MIL-STD-1521).

- b. The comparison between DOE and Department of Defense requirements for systems engineering and technical reviews did not identify detailed conclusions or how results were incorporated into WHC's systems engineering efforts (Commitment 2.1.c). On a broader scale, this review may indicate where DOE directives need to be revised to strengthen the systems engineering process requirements, since these are inadequately defined now in DOE Order 4700.1, *Project Management System*.
  - c. The "external review" report of the MWTF project (Commitment 2.4.c) does not qualify as a "thorough, independent design review." The outside contractor who performed this review *assumed* that the MWTF functional design criteria were correct. Since basic underlying assumptions of the project were not questioned, this review became just a literature survey that compiled a list of the requirements invoked on the project.
4. The staff believes that to resolve these issues, DOE needs to:
- a. Provide in the Implementation Plan separate commitments for systems engineering implementation for the projects.
  - b. Perform an in-depth independent design review of the MWTF project prior to Title III authorization to proceed with construction.
  - c. Brief the Board, as part of the MWTF independent design review, on the MWTF design bases and project-level assumptions and on how their compatibility has been confirmed with program-level functional requirements defined by the systems engineering effort.

- d. Ensure that future design reviews are consistent with best practices for design reviews of major projects (e.g., MIL-STD-1521).
- e. Clarify in the Implementation Plan what was actually done by way of the standdown reviews and the MWTF external review.
- f. Provide a report on the review of the Department of Defense's systems engineering and design review standards, and how the lessons learned are being incorporated into both WHC's systems engineering and into higher-level DOE directives, such as DOE Order 4700.1. This will foster the systems engineering approach at other DOE sites in the future as discussed in Section 2.1 of the Implementation Plan.
- g. Ensure future reports submitted in response to Implementation Plan commitments adequately address the issue and requirements in the plan.
- h. Provide quarterly updates of the *TWRS Program Functions and Requirements* document to allow the Board to track its development. This document was reviewed by the Board's staff in March 1994, and appears to be much improved compared to the January 1994 version (Commitment 2.3.a).
- i. Link the issue date for the last quarterly status report to a milestone, such as six months after the Operational Readiness Review for the new MWTF tanks, rather than June 1995, as indicated in the Implementation Plan.
- j. Clarify the Implementation Plan regarding exactly *what* will be in place when the Department's staffing analyses are completed, as part of Commitments 3.4.a and 3.4.b.
- k. Provide the Board with an update of the Site Management Plan, last promulgated in August 1992, when submitting the site management system directives (Commitment 3.6.a). Alternatively, establish a separate commitment for the Site Management Plan update so that periodic updates are provided along with the systems engineering and other program management plans.
- l. Review the commitment list and provide the Board with realistic, mutually acceptable due dates. This is needed since several of the listed commitments to the Board have already slipped. All changes to commitments and due dates should be formally submitted to the Board, not just "substantive" changes as stated in Section 5 of the Implementation Plan.