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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

July 31, 1995

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: Ralph Arcaro

SUBJECT: Trip Report - Review of Hanford Systems Engineering and Implementation of Recommendation 92-4, June 27-29, 1995

1. **Purpose:** This memorandum documents observations made during a visit to the Hanford Site by Defense Nuclear Facilities Safety Board (Board) staff members Ralph Arcaro and Charles Keilers June 27-29, 1995. This trip was taken as a follow-up to a trip taken in May 1995.

2. **Summary:**

   a. Systems Engineering: It appears that the Systems Requirements Review (SRR) for the Tank Waste Remediation System (TWRS) is being addressed with the appropriate amount of rigor. Senior managers, including the Department of Energy-Richland Operations Office (DOE-RL) Assistant Manager for TWRS, described improving the systems engineering process as one of their top priorities. However, several Westinghouse Hanford Company (WHC) presentations were attempts to defend the current technical baseline rather than an unbiased look at the technical uncertainty identified in the SRR.

   b. C-106 Retrieval: Recent rescoping to reduce the C-106 Retrieval project cost has put the schedule at risk for resolving a significant safety issue. This will require close management attention. The new concept appears simpler and less costly, but it relies more on the operators and administrative controls. It is not evident that operator input has been obtained in the new concept.

      The critical design review for the project is proceeding; however, the quantity of detailed design information that needs to be reviewed will increase dramatically over the next two months, with construction to start soon thereafter.

      Therefore, the critical design review may become the controlling path and will need to be adequately staffed and supported to ensure a thorough, independent review.

3. **Background:** As part of the implementation of Board Recommendation 92-4, DOE-RL committed to instituting a systems engineering process for TWRS, as well as for the rest of the site. The fulfillment of these commitments has been delayed, partly due to a recent

headquarters SRR. The SRR (report issued in April 1995) found that the systems engineering process was seriously deficient; especially in the area of program baseline assumptions and in the management of risk and uncertainty associated with these assumptions.

One near-term project within TWRS is the retrieval of high heat waste from tank C-106. Tank C-106 has 2 M Ci of near-boiling waste in a World War II era single shell tank not designed for high heat waste. Currently, WHC is adding about 6 kgal per month of water to the tank to keep it from overheating.

4. Discussion/Observations:

a. Response to TWRS SRR: The action plan to address the SRR findings was reviewed with DOE-RL and WHC. This action plan was delivered in July 1995 to DOE-Headquarters (DOE-HQ). Both DOE-RL and WHC are committed to objectively addressing the review findings and comments as well as to improving the site-wide systems engineering process. Key to satisfactorily addressing the SRR is resolution of several policy issues that will require approval by DOE-HQ. For example, DOE-HQ will determine whether the Tri-Party Agreement should be an absolute constraint; will develop clean-up standards and; and will determine the maximum radionuclide content in low level waste.

Although senior management supports the systems engineering process, WHC presentations on specific SRR issues indicated a continued bias for the current technical baseline. While the staff recognizes that a vast amount of information has already been developed, the SRR found that much of this information is incomplete and many of the enabling assumptions of the program are not technically defensible. Therefore, an unbiased review of the information and additional study are necessary to place the TWRS program on a strong technical foundation.

The risk analysis and mitigation process is a critical issue since major findings of the SRR pointed to poor management of risk and uncertainty. WHC identified deficient risk management as a root cause of the primary findings of the SRR. WHC has embarked upon a program of emphasizing quantification of program cost, schedule, and performance risk associated with different systems architectural decisions. (For example, the impact on total glass volume by pretreatment methodologies.)

This risk management process is viewed by the Board's staff as a significant step toward addressing the findings of the SRR and will be reviewed in detail by the staff as more information becomes available.

b. Waste Storage Space Management: WHC has identified ten waste management actions necessary to support the decision to cancel the Multi-function Waste Tank Facility (MWTF). The actions include waste consolidation, continued active mitigation of Tank 101-SY, and resolution of waste incompatibility issues associated with Tank 102-SY. Progress to date on the ten actions has been slow and has mostly been limited to programmatic changes and problem evaluation. Should the above actions fail, the Tank Farms may be out of space as early as 1999. Given that it takes approximately five years to build additional tanks, more attention may be required to give these tasks the appropriate priority.

c. C-106 Retrieval: In April 1995, WHC determined that the C-106 Retrieval project was overrunning costs. DOE-RL asked WHC to rescope and focus on the safety issue. The result is a simpler sluice retrieval system, but rescoping has put the schedule at risk to resolve an immediate safety problem. The project is now 6 weeks behind the schedule advertised in March 1995, but WHC is trying to recover the schedule to be operational in October 1996.

Features that were omitted in the project rescoping include a simplified pipe flush capability, C Farm pit recirculation prior to inter-tank transfer, automatic sluicing control, automatic data acquisition, remote control station and trailer, a second sluicer, and a new heel pump. Additionally, existing failed pumps in C-106 and AY-102 will not be removed as originally intended. The new concept appears simpler and less costly, but it relies more on the operators and administrative controls. It is not evident that operator input has been obtained in the new concept.

The Critical Design Review (CDR) for the C-106 project is progressing. However, the quantity of information that needs to be reviewed will increase dramatically over the next two months. Therefore, the critical design review may become the controlling path and will need to be adequately staffed and supported to ensure a thorough, independent review. What has been reviewed so far is the inter-farm piping.

The AY Farm pit/pump package is expected imminently and is the first package to be reviewed since the rescoping. The C Farm ventilation package and the C Farm pit/pump/sluicer package are expected before August 9, 1995. Combined, these three packages represent a significant amount of design information which the CDR team will need to review in a short period.

To expedite the review, WHC has suggested that the CDR team review the 90% complete design packages, which are the same packages that WHC internally reviews. This would allow WHC to incorporate or resolve CDR and WHC internal review comments expediently and simultaneously, allowing some schedule recovery. The CDR team leader has not yet agreed to this.