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John T. Conway, Chairman
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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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December 16, 2002

The Honorable Jessie Hill Roberson
Assistant Secretary for Environmental Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0113

Dear Ms. Roberson:

The staff of the Defense Nuclear Facilities Safety Board (Board) recently conducted a review of the implementation of the Board's Recommendation 2000-2, *Configuration Management, Vital Safety Systems,* at the Hanford Site on October 29–31, 2002. During this review, the staff noted significant problems in the implementation of this recommendation on the part of the Department of Energy's (DOE) operations offices and their contractors. Specifically, the qualification and training programs for DOE subject matter experts on vital safety systems lacked the rigor required for these individuals to provide effective oversight of the contractors. The system engineering program at Fluor Hanford was weak, with few requirements for training and qualifying a system engineer. Additional efforts are also required by the DOE offices and their contractors to institutionalize the performance of the assessments identified in the DOE Implementation Plan for Recommendation 2000-2.

The site has informed the staff that corrective actions are being implemented to address most of these deficiencies. The Board believes the enclosed report, prepared by the Board's staff, may be of value in improving the implementation of Recommendation 2000-2 at the Hanford Site.

Sincerely,

John T. Conway
Chairman

c: Mr. Roy Schepens
Mr. Keith A. Klein
Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

November 27, 2002

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: D. Burnfield

SUBJECT: Status of Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, Hanford

This report presents observations resulting from a review of the progress made on implementing the Defense Nuclear Facilities Safety Board's (Board) Recommendation 2000-2, *Configuration Management, Vital Safety Systems*, at the Hanford Site. The review addressed the Department of Energy's (DOE) subject matter expert (SME)/system engineer program, the contractors' system engineer programs, and the status of Phase II assessments. The review was conducted October 29–31, 2002, by members of the Board's staff D. Burnfield, C. Shuffler, M. Sautman, and D. Grover, assisted by outside expert D. Volgenau.

Background. The Implementation Plan for Recommendation 2000-2 includes commitments to improve the competence of DOE and contractor engineering personnel, as well as to perform summary (Phase I) and detailed (Phase II) assessments of the material condition and operability of vital safety systems (VSS) and the programs that support them (e.g., maintenance and engineering). DOE's Richland Operations Office (DOE-RL) and Office of River Protection (ORP) and their respective contractors have been working to implement and improve programs designed to meet the requirements of the Recommendation 2000-2 Implementation Plan.

Discussion. The staff's observations are summarized below:

DOE's Subject Matter Expert Programs—DOE-RL and ORP have both established SME programs. However, neither program is fully developed. Differences between the programs exist, but DOE-RL and ORP share individual SMEs for some areas and disciplines. DOE-RL has assigned 10 people as SMEs by functional area, and considers them to be well qualified. Most of these individuals have strong technical backgrounds. However, site specific qualification requirements have not been established, although they are being considered. There is no succession plan for existing SMEs, and there is little SME presence in the field. How the SMEs will interact with the facility representatives and assist in contractor assessments remains to be defined.

The ORP SME program is especially immature. SMEs only recently have been assigned by safety system area (e.g., ventilation, electrical) and technical discipline (e.g., mechanical, radiological protection, nuclear safety). SME roles and responsibilities are being formalized, and site-specific qualification requirements are being considered. ORP management considers SME responsibilities to be a collateral duty, and as such has assigned two facility representatives as SMEs. Given the level of effort and responsibility that the Board believes will be required of SMEs, this action would detract from safety duties of the facility representatives.

Contractors' Systems Engineering Programs—Both Fluor Hanford and CH2M Hill Hanford Group, Incorporated (CHG), have established a system engineering program. However, the two programs vary significantly with regard to their apparent effectiveness and ability to meet DOE requirements. CHG has a robust system engineering program for the tank farms project, with many sound practices in place. This program was fully implemented as of August 2002. Although areas remain in which increased emphasis and further improvement are required, management appears cognizant of these areas and is working aggressively to improve the program. Examples of program strengths include: (1) clearly defined roles and responsibilities, (2) a comprehensive training and qualification program for system engineers and their backups, (3) inclusion of defense-in-depth systems in addition to VSSs, and (4) the conduct of quarterly system material assessments (system health reports).

Fluor Hanford's system engineering program, on the other hand, suffers because of inadequate guidance and definition of requirements at the corporate level. In effect, the site engineering discipline appears to be decentralized, and Fluor Hanford was unable to demonstrate that this does not weaken its effectiveness across the Hanford Site. The six individual Fluor Hanford projects are essentially left to formulate their own system engineering programs and establish associated standards. The result is a large variation in the quality of system engineering programs across the projects. Some examples of the shortcomings of the system engineering programs of individual projects include the following: (1) qualification programs for system engineers lack key elements or adequate requirements in such areas as system knowledge, training in the Unreviewed Safety Question (USQ) process, authorization basis documentation, and requalification specifics; (2) component and system performance, reliability, and availability trending is not formally accomplished, although the data are available; (3) two VSSs in one project were found not to have a responsible system engineer assigned; and (4) system engineers are not required to conduct periodic material assessments or system walkdowns.

System Engineering Program of Pacific Northwest National Laboratory (PNNL)—PNNL has one facility of interest with regard to Recommendation 2000-2—the Radiochemical Processing Laboratory, Building 325. This facility is a Category 2 nuclear facility that contains several systems designated as safety-significant. Most of these systems have received recent upgrades to improve reliability and operability, and there are plans to complete similar improvements for the remaining systems. A qualified building engineer serves full time as the system enginner for these systems, and a qualified individual is available to serve as a backup in case of the building engineer's absence. Certification for the building engineer requires systems

and procedural knowledge, including certification in subordinate building qualifications. However, an understanding of safety basis documentation, the processing of USQs, and configuration management is not required by the PNNL process, even though the current building engineer is well qualified in these areas. There is no formal requirement for the building engineer to periodically assess the operability, reliability, and material condition of the safety systems. However, the building engineer indicated that he spent about 4–6 hours each week walking down his systems.

Phase II Assessments at the Hanford Site—CHG and Fluor Hanford appear to be working to implement the principles of Recommendation 2000-2. However, neither DOE nor its contractors have institutionalized a process for conducting Phase II-like system assessments, although PNNL and Fluor Hanford are examining how to incorporate such assessments into their existing assessment processes. DOE-RL conducted five Phase II assessments. The contractor subsequently developed corrective actions for all findings, and DOE is tracking the actions taken. Future assessment plans are being discussed with Fluor Hanford. ORP conducted Phase II assessments of three VSSs. Although several programmatic opportunities for improvement were found, no significant findings associated with the material condition of systems or components were made. This lack of findings is a concern, since the system health reports recently instituted by the contractor have noted a number of material deficiencies. ORP had not compared the results of its assessments to the results of the system health reports to determine how best to improve its assessment process. CHG has taken aggressive action to resolve the assessment findings, and has committed to improving technical rigor and to completing four additional assessments of VSSs in 2003.

During a walkdown of the ventilation system of the AY Tank Farm with DOE and contractor representatives, the Board's staff noted some areas for improvement. The system engineer had been assigned for about 3 years. The system became operational in 1998. The Board's staff saw only minor degradation in the material condition of the system, but noted that several differential pressure gauges either were missing calibration stickers or had stickers that indicated a past-due calibration date. Two motor control valves, used to control pressure and flow rate, also had expired calibration dates. Neither the system engineer nor the facility manager was familiar with the policy and procedures for gauge and valve calibration. The system engineer appeared to be generally knowledgeable about the system, but demonstrated some weaknesses in knowledge of the particulars of system components and of the cause for a recent component failure. Procedurally, a system engineer is expected to conduct and document a routine walkdown of assigned systems each week. A review of the system engineer's records revealed that weekly walkdowns had not always been documented.

Criticality Safety Training for Fissile Material Handlers (FMH)—The staff reviewed the criticality safety training for FMHs at the Plutonium Finishing Plant (PFP). The training program appeared to be well organized and encompassed the features necessary to ensure solid training in criticality safety, not only for FMHs, but also for managers, team leaders, and those whose work places them in proximity to fissile material. Included in the training are formal classroom sessions with written exams, self-study, and an on-the-job checklist that includes

practical factors, an oral examination, and an operational evaluation. In addition to initial training and qualification, there are formal requirements for continuing training and recertification. The roles and responsibilities are clearly articulated for all involved in the training and qualification program. In addition to the governing PFP directive, however, Fluor Hanford has established detailed site-wide requirements for this training, and it is not clear that the PFP directives have been reviewed for compliance with the latest edition of the site directive.