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A.J. Eggenberger, Vice Chairman
John W. Crawford, Jr.
Joseph J. DiNunno
Herbert John Cecil Kouts

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700, Washington, D.C. 20004
(202) 208-6400

95-0005863



December 15, 1995

The Honorable Thomas P. Grumbly
Assistant Secretary for Environmental Management
Department of Energy
Washington, D.C. 20585-0113

Dear Mr. Grumbly:

Members of the Defense Nuclear Facilities Safety Board's (Board) staff and outside experts recently performed a review of the design criteria for the Spent Nuclear Fuel Project's Canister Storage Building (CSB) at Hanford. The CSB is to be used in the stabilization and interim dry storage of spent nuclear fuel from the Hanford K Basins. It is important to note that, although final design of the CSB is in progress, the design criteria are not completely in place. This evolutionary process of defining design criteria could contribute to an inadvertent compromise on safety requirements. Therefore, it is particularly important that these design criteria issues be resolved early in the design process.

The enclosed report summarizes the staff's observations from this review of CSB design criteria. Please contact me if you need any further information regarding this matter.

Sincerely,

A handwritten signature in cursive script, appearing to read "John T. Conway".

John T. Conway
Chairman

c: Mr. Mark Whitaker

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

November 20, 1995

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: A. H. Hadjian

SUBJECT: Structural Review of the Proposed Canister Storage Building (CSB) at the Hanford Site

1. **Purpose:** This report documents Defense Nuclear Facilities Safety Board's (Board) staff and outside experts' review of the conceptual design of the CSB at the Hanford Site. The review was conducted at the site on October 19, 1995, by staff member Asa Hadjian and outside experts Paul Rizzo, John Haltiwanger, and John Stevenson.
2. **Summary:** It is important to note that, although final design of the CSB is in progress, the design criteria are not completely in place. Efforts to establish U.S. Nuclear Regulatory Commission (NRC) "equivalency," combined with portions of the CSB having already been constructed, have resulted in unsettling debate on which design criteria to meet. In any event, it is important that the project demonstrate that the basic Department of Energy (DOE) applicable Orders and standards will be satisfied as a minimum and in a timely fashion (i.e., before the design is finalized and construction begins).
3. **Background:** The CSB is one of the five sub-projects comprising the Spent Nuclear Fuel Project (SNFP). The objective of the SNFP is the expedited removal of spent fuel and sludge from the K Basins to a safer location away from the Columbia River. The original CSB of the Hanford Waste Vitrification Plant (HWVP) has been selected to serve as the staging and storage facility for the spent fuel from the K Basins. The spent fuel will be stored in Multi-Canister Overpacks (MCOs) until a stabilization facility is available to stabilize the fuel. After the stabilization of the fuel, the MCOs will be returned to the CSB for interim storage until a geologic repository is available or a different method is chosen for final disposal. The site excavation, the foundation, and part of the structure are already in place from the earlier HWVP project. It is the intent of the SNFP to salvage the old CSB design to accommodate its new mission.
4. **Discussion/Observations:** DOE decided to design and construct the CSB to a level of nuclear safety comparable to the NRC licensed nuclear spent fuel storage facilities (10CFR72). This commitment, however, is partial and arbitrary. It has been difficult to understand how this NRC "equivalency" is to be achieved. In order not to get into endless discussions on compliance with NRC requirements, the staff has concentrated on the basic safety issues of the interim and intermediate storage functions of the CSB according to present DOE applicable Orders and standards.

Because of the fast tracking of the CSB, construction is expected to begin March 1996. However, design criteria issues are not yet resolved. Clearly, a firm design basis must be in place to accommodate the construction schedule. Examples of design criteria issues are provided below.

- a. The seismic design criteria currently reference the Hanford Site Architectural/Civil Design Criteria (HPS-SDC-4.1. Rev 12, 1993), but several issues are unresolved.
 - 1) Confusion exists relative to the performance categorization and hence the seismic design level (e.g., even though it is claimed that the facility is designed to 0.35g [which might be associated with PC4] with NUREG-0098 spectra, handouts during the meeting indicate a 0.23g spectrum associated with PC3).
 - 2) The site seismic hazard report (probabilistic) and the recently developed letter report (deterministic), both by Geomatrix, have not been reviewed and evaluated by the Board's staff and outside experts.
 - 3) A longer design life is being considered than the currently specified design criteria of a 75-year life for the structure and a 40-year life for systems and components.
 - 4) The Yakima Ridge has not been considered in evaluating the seismic hazard even though it is parallel with and between Gable Mountain and Rattlesnake Mountain folds and plunges beneath the site.
- b. Tornado design criteria, as defined in site Criteria 4-1, are not consistent with the most recent probabilistic tornado hazard defined for the site area. It also is not clear how the precipitation requirements of DOE Standard 1020 are being addressed, or how volcanic effects are being considered in design.
- c. Although the principles of defense-in-depth are specified, the current design criteria are not clear on the requirement for double confinement of the fuel (i.e., primary and secondary confinement are not specified). Facility configurations, and hence design, cannot be finalized without this issue being resolved.
- d. It is not clear to what extent security and safeguards requirements as they affect design have been considered to date (e.g., explosion, malevolent vehicle or small aircraft crash). The current design criteria simply require that security and safeguards measures be incorporated. However, these measures have not yet been defined and could severely impact both the configuration and the design of the building.

In addition, the CSB is a design-to-cost project. Because design-to-cost could inadvertently contribute to compromise on intrinsic safety requirements, it is important that these issues related to design criteria be resolved early in the design process.

5. **Future Staff Actions:** At least one meeting will be held in Washington, D.C., to bring to closure the confusing seismic requirements, which have been aggravated by the NRC "equivalency" thrust, and the requirement to consider additional natural and man-induced external hazards. Documents other than those considered to date will be reviewed to assess the completeness and the adequacy of the design criteria, as soon as those documents are finalized.