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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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August 27, 2004

The Honorable David K. Garman
Under Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Mr. Garman:

The conceptual design of the Salt Waste Processing Facility (SWPF) at the Savannah River Site is complete. Recently, the staff of the Defense Nuclear Facilities Safety Board (Board) reviewed the safety aspects of SWPF's design and preliminary hazard analysis. In two meetings, the staff discussed its observations with representatives of the Department of Energy's (DOE) Savannah River Operations Office and its contractors. Of particular interest to the Board is the performance category (PC) designation of PC-2 proposed for this new facility. To protect workers and prevent an unfiltered release, this new facility should be designated as PC-3 to ensure that it will adequately confine hazardous material during natural phenomena events.

The requirements for natural phenomena hazards design and evaluation are articulated in a set of DOE directives: DOE Order 420.1A, *Facility Safety*; DOE Guide 420.1-2, *Guide for the Mitigation of Natural Phenomena Hazards for DOE Nuclear Facilities and Non-nuclear Facilities*; and a set of four natural phenomena standards. The concept of performance categorization for natural phenomena hazards is introduced in DOE Guide 420.1-2, with additional pertinent discussion provided in two of the natural phenomena hazard standards—*Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components* (DOE-STD-1021-93), and *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities* (DOE-STD-1020-2002).


As articulated in DOE Order 420.1A, all nuclear facilities with radioactive materials shall have means to confine those materials. Therefore, confinement will be a functional requirement for some safety structures, systems, and components (SSCs) at nuclear facilities. Thus, DOE's directives should provide clear direction regarding which performance category is necessary to achieve this safety function. Currently, this is not the case.

In May 2002, language was added to DOE Guide 420.1-2 to address this issue. This language states that when safety analyses determine that local confinement of high-hazard materials is required for worker safety, a PC-3 designation may be appropriate. Yet DOE-STD-1021-93 still designates such safety-significant SSCs as PC-2 with no regard for confinement requirements. As a result of this conflicting direction, DOE and its contractors have decided that it is only necessary to require a PC-2 designation for SWPF. SSCs designed to PC-2 requirements (standard building codes) are driven by the need to maintain operations primarily to support emergency response, and are likely to sustain significant deformation during a design basis earthquake. This is inconsistent with a requirement to maintain confinement, since quantified damage and leak path factors are difficult to calculate at such deformations. DOE needs to correct these conflicts in the directive system to prevent design inadequacies for this and future projects.

In addition to the question of performance categorization, the confinement concept proposed for SWPF is based on the isolation (holdup) of the process building and an assumed release of an analytically determined amount of unfiltered leakage to the environment during abnormal events. This concept is similar to that proposed in 2002 for the Highly Enriched Uranium Materials Facility (HEUMF) at the Y-12 National Security Complex. The Board communicated its safety concerns regarding the HEUMF proposal to the National Nuclear Security Administration in a letter dated December 27, 2002, namely that the isolation concept “depends on numerous analytical assumptions that may be impractical to implement. . .” and “. . . does not provide for post accident recovery activities.” The confinement concept at that facility has been modified to provide a safety-related active ventilation system. A similar approach may be appropriate for SWPF.

Therefore, in addition to designating the SWPF confinement structure as PC-3 and pursuant to 42 U.S.C. 2286b(d), the Board requests a report within 45 days of receipt of this letter that contains a plan and schedule for revising the affected DOE directives to provide consistent and adequate guidance for natural phenomena hazards, as well as implementing the revised directives in current design projects.

Sincerely,



John T. Conway
Chairman

c: Mr. Paul M. Golan
Mr. John S. Shaw
Mr. Jeffrey M. Allison
Mr. Mark B. Whitaker, Jr.