



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 25, 2000

MEMORANDUM TO: Ashok C. Thadani, Director
Office of Nuclear Reactor Research

FROM: William F. Kane, Director */RA by Martin J. Virgilio, Acting For/*
Office of Nuclear Material Safety
and Safeguards

SUBJECT: DRY CASK STORAGE PROBABILISTIC RISK ASSESSMENT;
DRAFT PROGRAM PLAN AND SCHEDULE

I am responding to your memorandum on, "Dry Cask Storage Probabilistic Risk Assessment; Draft Program Plan and Schedule," dated June 26, 2000. This memorandum describes your program plan, schedule and coordination for implementing our user need letter for a probabilistic risk assessment (PRA) on dry storage of spent nuclear fuel. Since your memorandum did not fully address the purpose for our user need, we would like to emphasize that this program is needed to comply with U.S. Nuclear Regulatory Commission (NRC) directives to develop safety goals and risk-inform 10 CFR Parts 71 and 72, as well as to gain public confidence on shipment and dry storage of spent nuclear fuel. As you are aware, these activities are highly contested and of high priority to the nuclear industry.

Before we comment on your program plan, we would like to acknowledge the significant contributions from your staff in developing realistic estimates of the probability (Edward Hackett and Cayetano Santos) and consequences (Charles Tinkler and Jason Schaperow) of the HI-STORM cask under normal and safety analysis report (SAR) accident conditions, and development of the program plan and schedule (Alan Rubin, Edward Rodrick and Christopher Ryder) to complete our user needs. Your staff's probabilistic and consequence analyses are being used in our licensing reviews and in developing generic guidance for confinement calculations. We request Office of Nuclear Reactor Research (RES) assistance, through Mr. Santos and Mr. Schaperow (the analysts who performed the referenced calculations), to assist the SFPO personnel perform similar analyses as part of their licensing activities. The transfer of analytic technology should be coordinated with Mr. Wayne Hodges, the SFPO Deputy Director for Technical Review.

With regard to your June 26, 2000, memorandum, we would like to express the following:

1. We would not characterize your PRA as a pilot, just as we would not characterize NUREG-1150 as a pilot. Our expectation is for a quality PRA of the HI-STORM dry storage cask from which the Spent Fuel Project Office (SFPO) can assess various options for developing Safety Goals and risk-informing Parts 71, 72, as well as risk-informing our prioritization and inspection programs.
2. We are concerned that your program plan places too great reliance on available data and/or models submitted by the licensee. While SAR analyses are available for your

use in the PRA, these analyses are considered, in many cases, bounding and should not be considered as encompassing the needs of a quality PRA. We support your plans to seek contractor assistance to bridge the gap between the SAR analyses and those required for the PRA. As we previously informed your staff, Pacific Northwest National Laboratory (PNNL) has a best-estimate thermal model of the HI-STORM Cask developed under one of our contracts. This should assist you in your thermal analyses that supports your PRA. Mr. Thomas Michener, of PNNL, developed the COBRA-SFS thermal model for the HI-STORM cask.

3. With respect to beyond the design basis events, your memorandum stated that data in support of your PRA may be limited. We recommend that such data be identified as soon as practicable to enable us to assess the need and means for obtaining such information. Cooperative programs with the industry should be pursued, where appropriate.
4. SFPO appreciates the fact that the PRA, in certain areas, will precede RES ongoing activities to obtain data that can be used for beyond the design basis events, such as seismic and evaluation of higher burnup fuel and cladding integrity. We continue to support such activities and encourage the continued excellent interactions between our respective staff to establish informed engineering decisions prior to obtaining the required data.
5. With respect to seismic research, your memorandum states that the results may not need to be considered in the PRA depending on the results of the screening analysis. We request that your PRA include seismic events, irrespective of the screening analysis. Our needs for such assessments stems from licensees located on the West Coast need to incorporate such activities in the event and fault trees (thereby enabling us to perform site-specific analyses). The industry has already approached the staff to incorporate PRA insights for storage of spent nuclear fuel.
6. With respect to human performance, we request that your assessment of exposure risk to personnel be provided to us as soon as practicable, in order for our inspectors to apply that data in their activities. We are coordinating with your staff to arrange for a site visit to observe the process of cask loading, welding the cask shut, vacuum drying, helium testing, and transporting/placement of the cask on the site.
7. In regard to the proposed schedule, SFPO is well aware and pleased with the contributions made by RES in developing a PRA for dry storage of spent nuclear fuel. Your schedule appears reasonable, given the available resources. We need to stress our need for the continued activities and maintaining the proposed schedule. SFPO and the industry place high priority on this activity. Delays in your schedule will have a detrimental impact on our commitment to the NRC to risk-inform 10 CFR Parts 71 and 72, to develop Safety Goals, to develop quantitative risk-informed activities, to support licensing of ISFSIs that require special considerations (i.e., high seismic areas) and to improve as low as reasonably achievable activities. The analyses provided by RES in response to our March 10, 2000, memorandum incorporates valuable insights that enabled the staff to incorporate risk insights into its licensing decisions and staff guidance documents.

With respect to the action plan attached to your memorandum, we provide the following comments.

- Schedule: The schedule identifies that preliminary results from the PRA will be completed in July 2001, followed by detailed ACNW and peer review and comment resolution. If we are misinterpreting your schedule, please let us know as soon as possible. As previously underscored, It is imperative that RES maintain to the proposed schedule; otherwise we will be unable to meet our NRC and licensing commitments, as stated above.
- Fuel integrity from preferential loading of the canister should be addressed in the PRA. For example, consequences (fuel behavior) of mis-loading a canister should be addressed.
- The staff agrees that the following events are part of an operating plant PRA and not within the scope of this Part 71/72 PRA:
 - Operator errors leading to the dropping of the MPC on and damaging the spent fuel pool.
 - Accidents involving the MPC/Overpack leading to a trip of an operating reactor or a trip and concurrent compromise of plant mitigating systems.
- In recognition that data from high-burnup nuclear fuel will not be available for two or more years, the primary focus of the PRA should be on storage of spent nuclear fuel with burnup of approximately 45 GWd/MTU. However, SFPO urges RES to consider high burnup fuel when developing the PRA. This conscious awareness will help guide the ongoing RES high-burnup experiments during the limited window of experimental opportunity.

SFPO is pleased with the RES efforts to date and the close interaction between our respective staff. We encourage monthly technical meetings to ensure completeness of the PRA and agreement on the proposed technical issues and resolutions.

As your memorandum referenced, several related activities are being pursued in parallel, such as the high burnup fuel and cask demonstration program. Given the limited resources, we believe that the programs should be integrated to ensure overall consistency and resolve as many issues as possible.

As you are aware, NUREG/CR-6672 addresses the risk of transporting spent fuel. However, that PRA was performed on a generic cask (MODAL Study) and is not directly applicable to current generation of casks. This and the various demonstration projects should be integrated into one program. My staff is ready to coordinate these efforts, at your earliest convenience.

cc: See list

cc: M. Federline
A. Murphy
C. Lui
E. Rodrick
M. Cunningham
E. Hackett
C. Tinkler
J. Flack
M. Mayfield
F. Eltawila
T. King

A.C. Thadani

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 - Operator errors leading to the dropping of the MPC on and damaging the spent fuel pool.
 - Accidents involving the MPC/Overpack leading to a trip of an operating reactor or a trip and concurrent compromise of plant mitigating systems.
- In recognition that data from high-burnup nuclear fuel will not be available for two or more years, the primary focus of the PRA should be on storage of spent nuclear fuel with burnup of approximately 45 GWd/MTU. However, SFPO urges RES to consider high burnup fuel when developing the PRA. This conscious awareness will help guide the ongoing RES high-burnup experiments during the limited window of experimental opportunity.

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