

June 20, 2000

The Honorable Richard A. Meserve  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Dear Chairman Meserve:

**SUBJECT: PROPOSED RESOLUTION OF GENERIC SAFETY ISSUE-173A, "SPENT FUEL STORAGE POOL FOR OPERATING FACILITIES"**

During the 473<sup>rd</sup> meeting of the Advisory Committee on Reactor Safeguards, June 7-9, 2000, we met with representatives of the NRC staff to discuss the proposed resolution of Generic Safety Issue (GSI)-173A, "Spent Fuel Storage Pool for Operating Facilities." We also had the benefit of the referenced documents.

Recommendations

1. The staff should defer closing out GSI-173A until the re-evaluation associated with spent fuel pool (SFP) accidents for decommissioning plants has been completed.
- ② The staff should develop screening criteria for regulatory analyses that are appropriate for SFP accidents at operating reactors.

Discussion

The principal concerns of GSI-173A involve the potential for a sustained loss of SFP cooling capability and a potential for a substantial loss of SFP coolant inventory.

The staff had previously developed and implemented a generic spent fuel storage pool action plan to resolve concerns related to GSI-173A. This plan included plant-specific evaluations and regulatory analyses for safety enhancement backfits for plants that are more vulnerable to the GSI-173A concerns.

The staff has completed the review and evaluation of design features related to the SFP associated with each operating reactor. It found that existing structures, systems, and components related to storage of irradiated fuel provide adequate protection of public health and safety. Consequently, the staff pursued regulatory analyses for safety enhancement backfits on a plant-specific basis. For these regulatory analyses, the staff used screening criteria for the frequency of "uncovery to within one foot of the top of fuel" or "loss of cooling for eight hours."

The screening criteria were:

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- 10<sup>-6</sup> /yr                      No action justified
- 10<sup>-6</sup> /yr to 10<sup>-5</sup> /yr      Further evaluation needed
- 10<sup>-5</sup> /yr                      Proceed to value-impact evaluation

With this choice of screening criteria, the staff determined that no further regulatory actions were warranted.

The screening criteria, which constituted the primary basis for the staff's findings, are essentially equivalent to the criteria in the Regulatory Analysis Guidelines. The criteria in the Regulatory Analysis Guidelines are derived from the prompt fatality quantitative health objective (QHO) of the Safety Goal Policy Statement. These are appropriate surrogates for this QHO for reactor accident source terms (fission product releases) driven by steam-zircaloy oxidation. As noted in our report of April 13, 2000, which is related to SFP accident risk at decommissioning nuclear power plants, it is very likely that the source terms for SFP accidents will be significantly different from those for operating reactor accidents. The fission product release from spent fuel accidents is most likely driven by air oxidation of the zircaloy clad. Under such circumstances, there is convincing evidence that there may be substantial release of the ruthenium inventory as the volatile oxide, as well as release of significant quantities of "fuel fines" through a decrepitation process.

Such differences in source terms have significant implications. Ruthenium has relatively long half-life isotopes, its inventory in spent fuel is substantial, and its biological consequences are severe. In connection with decommissioning plants, the staff estimated that prompt fatalities due to an SFP fire could increase by as much as two orders of magnitude if the source term is assumed to include 100-percent release of ruthenium compared to essentially zero release. In addition, the societal dose could double and the cancer fatalities could increase four-fold for this estimated source term. The consequences of actinide releases associated with either fuel decrepitation or matrix-stripping have not yet been evaluated. With emergency response measures, the limiting consideration might well no longer be prompt fatalities. The staff should assess the impact of the different source term on latent fatalities and land contamination. ]

Because of these differences in the source term, the screening criteria used in this application appear to be inappropriate as surrogates for the prompt fatality QHO related to SFP accidents at operating reactors. A proper surrogate could lead to changes in the conclusions that the staff has reached.

Before closing out GSI-173A and developing the Standard Review Plan and regulatory guidance, the staff should await the results of the proposed re-evaluation of SFP accidents for decommissioning plants and should re-evaluate the regulatory analysis screening criteria for application to SFP accidents at operating reactors. ]

Sincerely,

/RA/

Dana A. Powers  
Chairman

References: