



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001

ACRSR-2212

September 21, 2006

Luis E. Reyes  
Executive Director of Operations  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

SUBJECT: PROPOSED DIRECT FINAL RULE TO AMEND 10 CFR 50.68,  
"CRITICALITY ACCIDENT REQUIREMENTS"

Dear Mr. Reyes:

During the 535<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards, September 7-8, 2006, we reviewed the proposed direct final rule to amend 10 CFR 50.68, "Criticality Accident Requirements." During our review, we had the benefit of discussions with representatives of the NRC staff and the Nuclear Energy Institute, and the documents referenced.

### RECOMMENDATION

1. The proposed direct final rule to amend 10 CFR 50.68 should be issued for public comment.
2. The NRC staff should complete the research to quantify the reactivity effects of fission products in the fuel. The results of this research may enable additional burnup credit to be allowed in the guidance for 10 CFR Part 71 and 72.

### BACKGROUND AND DISCUSSION

The staff has proposed to amend 10 CFR 50.68, so that the requirements governing criticality control for spent fuel pool storage racks do not apply to the fuel within a spent fuel transportation package or storage cask when a package or cask is in a spent fuel pool. 10 CFR 50.68 currently requires that spent fuel pools remain subcritical in an unborated, maximum moderation condition. The implementation of this regulation also allows credit for the operating history of the fuel (burnup credit) when analyzing the storage configuration of the spent fuel.

10 CFR Parts 71 and 72 govern the use of spent fuel storage casks and transportation packages. 10 CFR Part 71 requires that transportation packages be designed assuming they can be flooded with fresh water (unborated), and thus, are already analyzed in a manner that complies with 10 CFR 50.68. 10 CFR Part 72 requires that dry storage casks be designed to be subcritical when stored dry, but may rely on soluble boron to avoid criticality when filled with water when the cask is in a spent fuel pool.

On March 23, 2005, the NRC issued Regulatory Issue Summary (RIS) 2005-05 addressing spent fuel criticality analyses for spent fuel pools under 10 CFR 50.68 and independent spent fuel storage installations under 10 CFR Part 72. In the Statement of Considerations for the proposed direct final rule the staff stated that, "The intent of the RIS was to advise reactor licensees that they must meet both the requirements of 10 CFR 50.68 and 10 CFR Part 72 with respect to subcriticality during storage cask loading in spent fuel pools. In order to satisfy both requirements, an additional site-specific analysis according to 10 CFR 50.68 is required. In this analysis, the licensee can take credit for fuel burnup to determine the margin to criticality for the specific cask loading.

The NRC staff has determined that the requirement to perform multiple analyses is an unnecessary burden for both industry and the agency. As a result, the staff proposes to modify 10 CFR 50.68 to eliminate the requirement for redundant criticality analyses of fuel in a cask in a spent fuel pool. Under the proposed rule, the criticality requirements of 10 CFR Parts 71 and 72 would apply to fuel in these casks in a spent fuel pool. For fuel in the pool but outside the cask, the criticality analyses requirements of 10 CFR 50.68 would apply.

We agree with the staff's proposed revision to 10 CFR 50.68. The proposed direct final rule should be issued for public comment.

The staff's justification for their position is a qualitative analysis that scenarios that could result in criticality are very unlikely. The arguments regarding the likelihood of these scenarios discussed in Appendix A to the rule package are persuasive but the presentation is confusing. The use of simple event trees to display the scenarios would have been very helpful and could be beneficial if included in the final rule package.

The NRC staff should also consider revising the guidance associated with 10 CFR Parts 71 and 72 to allow for fuel burnup credit, as is now permitted in the guidance for 10 CFR Part 50. The staff stated that this has not been done because the uncertainty in fission product reactivity effects is large, and has not been quantified. Industry and the Office of Nuclear Regulatory Research are cooperating on a program to obtain the data needed to reduce uncertainties. The results of this research may enable additional burnup credit to be allowed for dry cask storage.

Sincerely,

/RA/

Graham B. Wallis  
Chairman

References:  
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References

1. Memorandum from Ho K. Nieh to John Larkins, Revised Draft Final Rule Package to Amend 10 CFR 50.68, "Criticality Accident Requirements," August 22, 2006, ML062330162.
2. Memorandum from Ho K. Nieh to John Larkins, Draft Final Rule Package to Amend 10 CFR 50.68, "Criticality Accident Requirements," July 12, 2006, ML061790301 (Predecisional).
3. Memorandum from John Larkins to Luis Reyes, Draft Final Rule Package to Amend 10 CFR 50.68, "Criticality Accident Requirements", July 14, 2006
4. Spent Fuel Project Office, Interim Staff Guidance - 8, Revision 2, "Burnup Credit in the Criticality Safety Analyses of PWR Spent Fuel in Transport and Storage Casks", ML022700416
5. Memorandum from C. Withee to M. Hodges, "ISG-8, REV. 2 Supporting Document", September 27, 2002, ML022700393
6. "Technical Recommendations for the Criticality Safety Review of PWR Storage and Transportation Casks That Use Burnup Credit", C. Withee and C. Parks, September 4, 2002, ML022700412