REQUEST FOR ADDITIONAL INFORMATION 247-2179 REVISION 1

3/2/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 09.01.01 - Criticality Safety of Fresh and Spent Fuel Storage and Handling
Application Section: 9.1.1

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)

09.01.01-9

Requested Information

1. Which neutron absorber material has the applicant selected to use in the SFP for the standard reactor design? (If unable to identify a specific material, then state why no decision can be made at this time.)

2. Are there plans to anodize or otherwise treat the neutron absorber materials in the SFP to further protect them from corrosive reactions?

Background

GDC 62 requires SFP design to avoid criticality under all possible conditions. In support of this, SRP Section 9.1.1, Review Procedures 1.E (p. 9.1.1-6) states that " . . . compatibility and chemical stability in the components wetted by water . . . should be evaluated." The applicant mentions that neutron absorbing material containing boron will be used in the SFP. They mention as possible candidate materials the commercial products Boral and Metamic, as well as borated stainless steel. All of these materials generally behave quite well, although on occasion have exhibited deficiencies. For example, in 2003 a single Boral test coupon in the Seabrook plant was blistered, although not severely damaged.[1] An experimental evaluation of Metamic test coupons concluded with the recommendation that this material should be anodized or rigorously cleaned prior to use.[2] Experiments with borated stainless steel suggest that slight corrosion is possible,[3,4] although no more so than standard stainless steel.[4] Thus, the applicant is requested to provide greater explanation regarding use of these materials.

References

1. USNRC Morning Report for Nov. 6, 2003, Reviewer: Eric J. Benner. (http://www.nrc.gov/reading-rm/doc-collections/event-status/morning/2003/20031106mr.html)
2. *Qualification of Metamic for Spent Fuel Storage Application*, EPRI Report (EPRI Project Manager: A. Machiels), October, 2001.
3. T. Lister et al, *Electrochemical Corrosion Testing of Borated Stainless Steel Alloys*, INL/EXT-07-12633, Idaho National Laboratory, May 2007.

4. D.A. Moreno et al, *Corrosion* **60**(6), 573 (2004).

09.01.01-10

Requested Information

What recommendations does the applicant make regarding the testing program for neutron absorber materials? Include the specific evaluations to be made, the frequency, and acceptance criteria.

Background

GDC 62 requires SFP design to avoid criticality under all possible conditions. In support of this, ANSI/ANS-57.2 recommends periodic verification of properties and presence of fixed-neutron absorbers (Sect. 6.4.4.2). In addition, SRP Section 9.1.1, Review Procedures 1.E (p. 9.1.1-6) states that " . . . compatibility and chemical stability in the components wetted by water . . . should be evaluated." The applicant mentions that neutron absorbing material containing boron will be used in the SFP, and a testing program using sample coupons will be implemented. However, the DCD gives little detail on this test program, and has placed the burden of responsibility on the COL applicant through COL Action Item 9.1(1). The staff requests that the applicant supply recommendations for this testing program.