

## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 167-8191  
SRP Section: 09.01.01 - Criticality Safety of Fresh and Spent Fuel Storage and Handling  
Application Section: Criticality analysis TeR Section 3.4  
Date of RAI Issue: 08/20/2015

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### **Question No. 09.01.01-6**

RAI 9.1.1-12: Modeling of region I fuel rack outer walls

#### REQUIREMENTS AND GUIDANCE

In 10 CFR Part 50 Appendix A, General Design Criterion (GDC) 62 requires the prevention of criticality in fuel storage and handling. 10 CFR 50.68(b) sets specific requirements for the demonstration of nuclear criticality prevention in wet fuel storage. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 9.1.1, guides the reviewer, in part, to verify that the materials of structures near racks that may provide neutron reflection, such as floors and walls, are provided and conservatively incorporated into the criticality analysis. Reviewers are further instructed to verify the conservatism of normal- and abnormal-conditions models and the appropriateness of assumptions and approximations made therein.

#### ISSUE

In Figure 3.4-3 of the criticality analysis report, it appears that not all cells along the outer walls of the racks in spent fuel pool region I have absorber plates facing the outer walls. It is therefore not clear that the infinite-array model shown in Figure 3.4-1 is conservative with regard to the finite-array effects of local moderation and reflection along the outer walls of the region I racks. In particular, the staff is concerned that the reactivity-increasing spectral effects of enhanced local neutron moderation and local thermalizing reflection in rack cells without absorber plates at their outer walls could in this case eventually prove to outweigh the reactivity-lowering leakage effects in the finite-array model such that the applicant's infinite array reference model can no longer be seen as conservative.

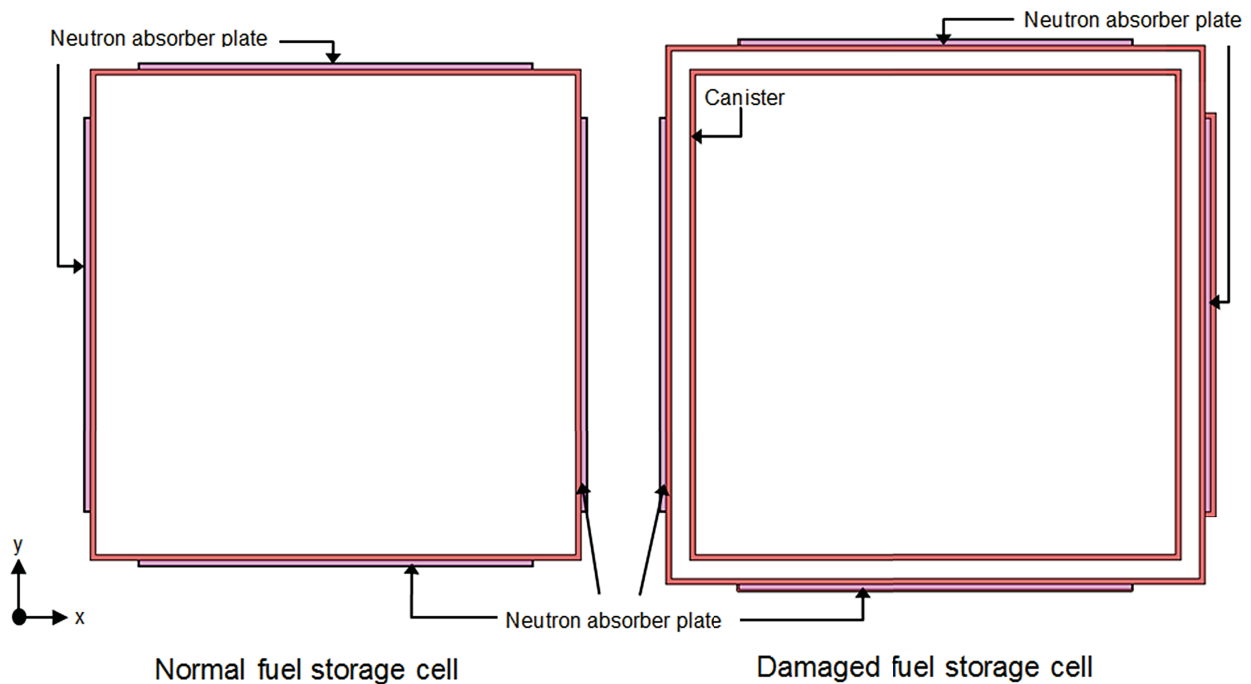
#### INFORMATION NEEDED

In its response and in the DCD or its incorporated references, the applicant should provide a finite-array analysis that evaluates the infinite-array model's potential for non-conservatism with regard to modeling the spectral effects of enhanced nearby moderation and reflection in rack wall cells without absorber plates on the outer rack walls.

## **Response**

Four neutron absorber plates are attached to the four faces of each fuel storage cell in the spent fuel pool (SFP) region I as shown in the picture below. So, all cells along the outer walls of the racks have neutron absorber plates facing the outer walls. To clarify the analysis models, Figures 3.4-2 and 3.4-3 of the criticality analysis technical report will be replaced with high resolution figures.

Because of the existence of neutron absorber plates facing the outer wall, the finite-array effects of local moderation and reflection along the outer walls of the region I racks are negligible. Therefore, the infinite-array model applied to the criticality analysis technical report is a conservative assumption.



## **Impact on DCD**

There is no impact on the DCD.

**Impact on PRA**

There is no impact on the PRA.

**Impact on Technical Specifications**

There is no impact on the Technical Specifications.

**Impact on Technical/Topical/Environmental Reports**

Figures 3.4-2 and 3.4-3 of the criticality analysis technical report will be replaced as indicated in Attachment.

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Figure 3.4-2 Model for Gap Effect of Spent Fuel Pool Region I

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Figure 3.4-2 Model for Gap Effect of Spent Fuel Pool Region I

Figure 3.4-3 Model for Damaged Fuel Storage Cells of Spent Fuel Pool Region I

Figure 3.4-3 Model for Damaged Fuel Storage Cells of Spent Fuel Pool Region I