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.:	**483-8602**
SRP Section:	**09.01.01 - Criticality Safety of Fresh and Spent Fuel Storage and Handling**
Application Section:	**DCD Tier 2, Section 9.1.1**
Date of RAI Issue:	**05/16/2016**

Question No. 09.01.01-41

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, directs the reviewer to verify that appropriate assumptions are used in the criticality analysis. In addition, NRC Interim Staff Guidance DSS-ISG-2010-01 states that rodded operation may affect the discharge reactivity of fuel assemblies and should be considered in spent fuel pool criticality analyses. DSS-ISG-2010-01 further states that bounding reactor parameters should be used in the fuel depletion analysis.

RAI 167-8191, Question 09.01.01-7 noted that the applicant did not appear to consider rodded fuel depletion history and asked the applicant to revise or justify the assumption of rodded operation and provide revised depletion and criticality analyses as necessary. The applicant's December 10, 2015, response clarified that it assumed all rods out in its depletion calculations because it expected the effects of rodded operation to be small and covered by the bounding reactor parameters assumed in the depletion calculation.

However, the staff does not have a sense for whether the effects would truly be small enough to be captured in the bounding reactor parameters. In a teleconference held on March 14, 2016, the applicant committed to perform a sensitivity study based on control rod operational data from an OPR1000, and should control rod history significantly affect the reactivity of the depleted fuel, the applicant agreed to revise the criticality analysis to consider rodded operation.

Therefore, please provide the sensitivity study results and, if the results show significant effects, revise the depletion and criticality assumptions and calculations in DCD Section 9.1.1 and technical report APR1400-Z-A-NR-14011-P.

Response

The depletion calculations were performed under the assumption of all rods out (ARO). To verify the appropriateness of this assumption, a case study for the control rod operation was performed. The assumptions applied to the case study are as follows:

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The case study simulated worst-case and unrealistic conditions (i.e. all control rods are fully inserted for longer periods than that of HANBIT Unit 3) due to conservative assumptions discussed above.

The results of the case study are provided in Table 1 below. The results show that even for highly conservative assumptions applied to the case study, the control rod insertions have an insignificant effect on the reactivity of the spent fuel assemblies. Therefore, the assumption of ARO applied to the criticality analysis is an appropriate assumption.

Table 1 Results of case study for control rod operation

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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

There is no impact on the Technical/Topical/Environmental Report.