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.:	**158-7997**
SRP Section:	**06.03 – Emergency Core Cooling System**
Application Section:	**06.03**
Date of RAI Issue:	**08/20/2015**

Question No. 06.03-7

During the staff's review of LCO 3.5.1 and LCO 3.5.4, the staff noted that the applicant proposed surveillance requirements to verify the boron concentration for the SIT injection water and the IRWST water, respectively. While the surveillance requirements for boron concentration of each tank reflect the design values of DCD Tier 2. Section 6.3 as well as the safety analysis values provided in DCD Tier 2 Section 15.6.5, the surveillance requirements do not specify the boron-10 atom percent of said boron concentrations. Because boron can be recycled in the APR1400 and eventually recombine with water in the IRWST, which can further be used to fill the SITs after an outage, the staff determined a need for surveillance requirements in regards to verifying whether the boron-10 atom percent in the water is sufficient. In accordance with SRP Section 6.3, the staff was unable to verify the adequacy of the existing scope of the surveillance requirements, per 10 CFR 50.36(c)(3), regarding boron-10 atom percent of the SIT injection water and the IRWST water.

The staff needs the applicant to justify how the current proposed surveillance requirements ensure a minimum Boron-10 atom percent, sufficient to meet the safe shutdown safety function, and consistent with the assumptions used in the safety analyses, or provide an additional surveillance requirement which ensures a minimum Boron-10 atom percent sufficient to meet the safe shutdown safety function and consistent with the assumptions used in the safety analyses. A new surveillance requirement would only need to be completed directly before starting up the reactor, after the reactor has come out of an outage and the IRWST and SIT water have been replenished as necessary by the outage.

Response

Boron recycling operations are not used for the APR1400. The natural B-10 atom percent used in the safety analyses is assumed to always be maintained during plant operations. The reduction of B-10 atom percent over the course of an operating cycle has been observed to be negligible. Because of this, the requirements for B-10 mass-spectroscopy are

administratively controlled by plant procedures, and confirmation of the B-10 atom percent is performed when necessary. Confirmation of the B-10 atom percent of the IRWST and the SIT inventory occurs at each refueling outage.

The core depletion design model is set-up based on measured B-10 abundance in every reload design process. Therefore, the most recent measured B-10 abundance in the IRWST is used to confirm that the concentration of the post-LOCA sump mixture (consisting of pre-LOCA RCS coolant, SIT inventory, and IRWST inventory) is sufficient to maintain long term post LOCA sub-criticality. Furthermore, an additional uncertainty of 1,000 pcm (~140 ppm) is applied to conservatively calculate the maximum boron concentration with a 0.99 k_{eff} core. The measured B-10 abundance of the IRWST in the OPR1000 (Optimized Power Reactor) core, having an operating experience of more than 15 years, is generally greater than 19.60 a/o indicating that the amount of B-10 depletion is very small and the impact is not significant compared to the calculational conservatism.

It is unnecessary to add the surveillance requirement to the TS for B-10 atom percent.

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 any Technical, Topical or Environmental Report.