
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.: 404-8488

SRP Section: 15.06.05 – Loss of Coolant Accidents Resulting From Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary

Application Section: 15.6.5

Date of RAI Issue: 02/10/2016

Question No. 15.06.05-10

According to CENPD-137P Report, "Calculative Methods for the C-E Small Break LOCA

Title 10 of the Code of Federal Regulations, Part 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," requires that Emergency Core Cooling System cooling performance must be calculated in accordance with an acceptable evaluation model and must be calculated for a number of postulated loss-of-coolant accidents of different sizes, locations, and other properties sufficient to provide assurance that the most severe postulated loss-of-coolant accidents are calculated. Section 2.1 of Technical Report APR1400-F-A-NR-14001-P, Revision 0, "Small Break LOCA Evaluation Model," refers to a break size sensitivity study in CENP SBLOCA methodology to justify not considering break sizes between 0.5 ft² and 1.0 ft². The C-E SBLOCA methodology report documented in CENPD-137P, "Calculative Methods for the C-E Small Break LOCA Evaluation Model," was issued in 1974. The sensitivity study did not consider the phenomenon of steam generator reflux cooling and loopseal liquid formation. Therefore, considering this and the APR1400 design differences from the C-E System 80 model used for the sensitivity study, please demonstrate that the 0.5 ft² break size remains the largest SBLOCA which must be considered, or provide discussion of limiting break sizes between 0.5 ft² and 1.0 ft².

Response

The modeling aspects are discussed in the responses to Response to RAI SRSB 8503, 15.06.05-13 and RAI SRSB 8503, 15.06.05-19.

As explained in the response to RAI 431-8504, 15.00.02-11, the S1M has been licensed to continue to be used for SBLOCA analyses for CE-designed PWR's after the NRC reviewed

CE responses to the II.K.3.30 issues after the TMI-2 accident. The basis of approving continued usage of S1M is its built-in conservatism. It was recognized that it had some limitations in predicting more realistic transient behaviors. This is the reason why CE developed a more realistic model to demonstrate the conservatism of S1M. Since S1M-K is basically the same as S1M from the view-point of its thermal hydraulic modeling, the same rationale should be apply for S1M-K also.

The second aspect of limiting break size is discussed in the break spectrum suggestions made in the Response to RAI 318-8337, 15.06.05-2. And also, according to the CENPD-137(page 129), the sensitivity analysis results show that the 1.0, 0.8 and 0.65 ft² breaks produced total core uncover. The phenomenon of total core uncover is a representative phenomenon of the LBLOCA. So, it is inappropriate for SBLOCA methodology to deal with such phenomena. Therefore, CENPD-137 methodology defines that the range of SBLOCA break spectrum is equal or less than 0.5 ft².

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 Environment Report.