REVISED 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.:	**417-8359**
SRP Section:	**SRP 19**
Application Section:	**19.1**
Date of RAI Issue:	**02/23/2016**

Question No. 19-42

Item 11 of Section II, “Acceptance Criteria,” of the (Draft) Revision 3 SRP, states, “The PRAs that meet the applicable supporting requirements for Capability Category I and meet the high-level requirements as defined in the ASME PRA Standard (ASME/ANS RA-S-2008 and addenda ASME/ANS RA-Sa–2009) should generally be acceptable for DC and COL applications. Alternatively, the applicant may identify, and justify the acceptability of, alternative measures for addressing PRA quality and technical adequacy. The staff should specifically review the acceptability of these alternative measures in the context of the specific uses and applications of the PRA.”

The staff reviewed the APR1400 design control document (DCD) Section 19.1.4.1.1, “Description of Level 1 Internal Events PRA for Operations at Power,” and found insufficient information describing the success criteria analysis performed. Specifically, the applicant did not describe the reasonableness and acceptability of success criteria developed which were different from design basis analysis and success criteria analysis notebook referenced in the PRA summary report, APR1400-E-P-NR-14001-P. As an example, the large loss of coolant accident (LLOCA) PRA success criteria for safety injection pumps requires more pumps than the design basis requirement (ASME PRA Standard – SC-B5). Therefore, in order for the staff to reach an assurance finding on the conformance to SRP Chapter 19.0 regarding PRA technical adequacy, please provide an explanation for the differences and revise the DCD accordingly.

Response – (Rev. 1)

The LLOCA success criterion is that “3 out of 4 Safety Injection Pumps (SIPs) inject borated water into the reactor vessel” based on the result of conservative thermal-hydraulic analysis. The PRA sensitivity analysis for changing the LLOCA success criterion from 3 out of 4 SIPs to 2 out of 4 SIPs shows that the core damage frequency is estimated to be 1.29E-06/yr (a decrease of 0.8%), thus the changed success criteria does not affect the results significantly. However the PRA success criterion is being considered for revision to reflect the additional thermal-hydraulic

analysis according to the PRA model update plan.

Impact on DCD

The DCD Tier 2, Table19.1-8 will be marked up as shown in the Attachment.

Impact on PRA

There is an impact on the PRA. But it is very small and will not impact risk insights. This response will be reflected in the next revision of 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.

Table 19.1-8 (4 of 6)

Top Event	Top Event Description	Success Criteria	Event Trees
RCS Heat Removal			
SIT	Safety Injection Tanks inject borated water	2 of 4 SITs inject borated water	LLOCA
SIS	SI pumps provides high pressure injection to make up lost RCS inventory	1 of 4 SI pumps provides DVI injection	FWLB, LSSB-D, LSSB-U, MLOCA, SGTR, SLOCA, PR-SL
		1 of 2 SI pumps provide DVI injection[1)]	PLOCCW, PLOESW
	Change to "2 of 4"	3 of 4 SI pumps provide DVI injection	LLOCA
SCSI	SC pump injection to RCS	1 of 2 SCS pumps provides injection from IRWST	SGTR, SLOCA
RF	IRWST refill during SGTR	Refill IRWST with borated water using CVCS	LSSB-D, SGTR
	SI pump injection for feed and feed decay heat removal	1 of 4 SI pumps provides DVI injection	FWLB, GRID-LOOP, GTRN, LOCV, LOFW, LOIA, LSSB-D, LSSB-U LOOP, SBO, PLOCCW, PLOESW
		1 of 3 SI pumps provides DVI injection[2)]	LODCA, LODCB
HIN	Hot leg injection to prevent boron precipitation	1 of 2 SI pumps provides hot leg injection[3)]	LLOCA
SDC	Shutdown cooling for long-term heat removal	1 of 2 SCS pumps provides injection from hot leg	LSSB-D, SGTR

Add

1) The division I of SI pumps are unavailable because PLOCCW or PLOESW causes the HVAC failure for division I of SI pumps.
   Therefore, the success criterion is 1 of 2 SI pumps on PLOCCW or PLOESW.
2) One train of SI pumps is unavailable because LODCA or LODCB causes the starting failure of one train of SI pump.
   Therefore, the success criterion is 1 of 3 SI pumps on LODCA or LODCB.
3) Two trains of SI pumps are used for Hot Leg Injection.
   Therefore, the success criterion is 1 of 2 SI pumps for Hot Leg Injection.