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.:	**63-7983**
SRP Section:	**06.02.02 - Containment Heat Removal Systems**
Application Section:	**6.2.2**
Date of RAI Issue:	**07/07/2015**

Question No. 06.02.02-13

Technical Report APR1400-E-N-NR-14001-P, Section 4.2.2.3, “Components of Interest,” states that Table 4.2-1, “Components in the Flow Path during an LBLOCA,” of Technical Report APR1400-E-N-NR-14001-P lists the ECCS/shutdown cooling system (SCS)/in-containment refueling water storage tank (IRWST) components in the downstream effects evaluation. The components in the ECCS flow path during small break LOCA (SBLOCA) and large break LOCA (LBLOCA) operations include pumps, heat exchangers, valves, orifices, containment spray nozzles, and piping. The NRC staff reviewed the components of interest and identified the following inconsistencies:

The applicant states that Table 4.2-1 lists ECCS/SCS/IRWST components in the downstream effects evaluation. However, Table 4.2-1 lists only components in the safety injection system (SIS) and CSS. The applicant is requested to clarify ECCS/SCS/IRWST components in the downstream effects evaluation in the technical report.

Table 4.2-1 lists valves in the CSS miniflow line but does not include the CSS miniflow heat exchangers or the 4-inch miniflow recirculation piping. The applicant is requested to clarify in the technical report whether these components are required to be included in the downstream effects evaluation. Also, the applicant is requested to review and confirm that all applicable SI and CS components required to be included in the downstream effects evaluation are included in Table 4.2-1 with any changes to the table as appropriate.

Response – (Rev. 2)

Components in the flow path during an LBLOCA include the ECCS and CSS components. Section 4.2.2.3 of the Technical Report will be revised to be consistent with Table 4.2-1.The CS pump miniflow heat exchangers and the 4-inch miniflow recirculation piping are included in the

downstream effects evaluation. KHNP has reviewed the SI and CS components required to be included in the downstream effects evaluation and has either added, changed, or deleted them from Table 4.2-1.

Impact on DCD

DCD Tier 2, Table 6.8-4 will be revised, as indicated in the Attachment.

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

The changes that were proposed in the original response and initial revised response (Rev.1) to this RAI have been incorporated into Revision 3 of the Technical Report APR1400-E-N-NR-14001-P/NP. There are no impacts on any Technical, Topical and/or Environmental Reports.

Table 6.8-4 (1 of 4)

Components in the Flow Path during a LBLOCA

Component	Description
Pumps	
SI pump (SI-PP02A/02B/02C/02D)	Type: Multi-Stage Centrifugal Pump Arrangement: Horizontal Flow rate: ~4,675 L/min (1,235 gpm) (maximum)(1)
CS Pump (CS-PP01A/01B)	Type: Centrifugal Arrangement: Vertical Flow rate: ~24,605 L/min (6,500 gpm) (maximum)(1)
Heat Exchangers	
CS Heat Exchanger (CS-HX01A/01B)	Type: Shell and Tue, U-Tube, Horizontally Mounted Number of Shell in Series:1 Number of Tube Passes: 2 Tube Material; Austenitic Steel Flow rate: ~18,927 L/min (5,000 gpm) (During LBLOCA Containment Spray)
Valves	
CS-V1001/1002	Swing check, ~~18 in~~ 14 in
CS-V1003/1004	Gate (Manual), ~~18 in~~ 14 in
CS-V1007/1008	Swing check, 14 in
CS-V1015/1016/1017/1018	Globe (Manual), 4 in
CS-V001/002/003/004	Gate (MOV), 14 in
SI-V304/305	Gate (MOV), 20 in
SI-V470/402/130/131	Gate (Manual), 10 in
SI-V404/405/434/446	Swing check, 4 in
SI-V435/447/476/478	Gate (Manual), 4 in
SI-V308/309	Gate (MOV), 20 in
SI-V347/348	Gate (MOV), 18 in
SI-V157/158	Swing check, 18 in
~~SI-V340/342~~	~~Gate (MOV), 18 in~~ Delete
CS Pump Miniflow Heat Exchanger (CS-HX02A/02B)	Type: Shell and Tube, U-tube, Horizontally Mounted Number of Shell in Series: 1 Number of Tube Passes: 2 Tube Material: Austenitic Steel Flow rate: ~ 1,817 L/min (480 gpm)

(1) Including minimum bypass flow

SI-V302 | Gate (Manual) 4 in

Table 6.8-4 (2 of 4)

Component	Description
Valves (Cont.)	
SI-V424/426/448/451	Swing check, 4 in
SI-V410/411/412/413	Globe (Manual), 4 in
~~SI-V302~~/303	Globe (MOV), 4 in
SI-V100/101	Swing check, 10 in
SI-V395	Gate (MOV), 10 in
SI-V959	Gate (Manual), 10 in
~~SI-V106/107~~	~~Gate (Manual), 18 in~~
~~SI-V568/569~~	~~Swing check, 14 in~~
~~SI-V578/579~~	~~Gate (Manual), 14 in~~
~~SI-V341/343~~	~~Gate (MOV), 14 in~~
~~SI-V265/269~~	~~Globe (Manual), 4 in~~
SI-V604/609	Gate (MOV), 4 in
~~SI-V344/346~~	~~Gate (MOV), 18 in~~
~~SI-V159/160~~	~~Swing check, 18 in~~
SI-V616/626/636/646	Globe (MOV), 4 in
SI-V11~~3/123~~/133~~/143~~	Swing check, 4 in
SI-V540~~/541~~/542~~/543~~	Swing check, 4 in
SI-V614/624/634/644	Gate (MOV), 12 in
SI-V217/227/237/247	Swing check, 12 in
~~SI-V217/227/237/247~~	~~Swing check, 12 in~~
SI-V321/331	Globe (MOV~~, throttling~~), 4 in
SI-V523/533	Swing check, 4 in
SI-V957/V958	Gate (Manual), 4 in
SI-V522/532	Swing check, 4 in

delete

delete

delete

delete

SI-V123/143 | Swing check 12 in

SI-V541/543 | Swing check 12 in

Table 6.8-4 (3 of 4)

Component	Description
Orifice	
CS-OR01A/B	CS pump miniflow orifice, 4 in
CS-FE338/348	CS pump outlet flow instrument orifice, 14 in
CS-02A/B, 03A/B	CS main spring ring header orifice, 8 in
CS-OR04A/B	CS main spring ring header orifice, 4 in
CS-OR05A/B, 06A/B	CS auxiliary spring ring header orifice, 4 in
SI-OR01A/B/C/D, 08A/B/C/D, 20A/B/C/D	SI pump miniflow orifice, 4 in
~~SI-OR02A/B~~ (delete)	~~SC pump miniflow orifice, 4 in~~
SI-OR06A/B/C/D	SI pump outlet flow orifice, ~~12 in~~ 4 in
SI-OR07A/B	Hotleg injection flow orifice, 4 in
SI-FE311D/321B/331C/341A	SI pump outlet flow instrument orifice, 4 in
SI-FE390C/~~390D~~ 391D	Hotleg injection flow instrument orifice, 4 in
Containment Spray Nozzle	
Main spray nozzle	Orifice size 0.516 in
Auxiliary spray nozzle	Orifice size 0.22 in

Table 6.8-4 (4 of 4)

Component	Description
Piping	
16" CS Pump Suction Line (SS Sch. 80)	18" CS Pump Suction Line (SS Sch.80)
14" CS Pump Discharge Line (SS Sch. 80)	
12" CS Pump Discharge Line (SS Sch. 80S)	
14" CS Spray Header Line (SS Sch. STD)	
12" CS Spray Header Line (SS Sch. 40S)	
8" CS Spray Header Line (SS Sch 40S)	
6" CS Spray Ring Line (SS Sch 40S)	
4" CS Spray Ring Line (SS Sch 40S)	4" CS Pump Miniflow Line (SS Sch.40)
24" SI Pump Suction Line (SS Sch. 80)	10" SI IRWST Return Line (SS Sch.120)
20" SI pump Suction Line (SS Sch. 80)	
10" SI Pump Suction Line (SS Sch. 80S)	
4" SI Pump Discharge Line (SS Sch. 120)	
4" SI Pump Miniflow Line (SS Sch. 120)	
4" SI Pump Hotleg Injection (SS Sch. 120)	
4" SI Pump Discharge Line (SS Sch. 160)	
12" SI Pump Discharge Line (SS Sch. 160)	