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.:	**211-8236**
SRP Section:	**09.02.01 - Station Service Water System**
Application Section:	**9.2.1**
Date of RAI Issue:	**09/14/2015**

Question No. 09.02.01-2

10 CFR 52.47(a)(2) requires that a 10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

Per SRP Section 9.2.1, Subsection III.1, the ESWS description and flow diagrams were reviewed by the staff for its design adequacy.

DCD Tier 2, Section 9.2.1.2.2.2 states that

> “the ESW piping to the CCW heat exchanger building is routed through a seismic Category I reinforced concrete pipe tunnels buried in the yard. The ESW piping to the UHS structures is routed through a seismic Category I reinforced concrete pipe tunnel.”

The staff finds these ESW piping sections are an essential part of the ESWS to carry the cooling water for its heat removal function. However, these piping sections are not shown in the classification table of DCD Tier 2, Table 3.2-1; or in the ESWS equipment and piping table of DCD Tier 1, Table 2.7.2.1-1; and are not considered in the failure modes and effects analysis of DCD Tier 2, Table 9.2.1-2.

The applicant is requested to include the piping information in the applicable tables, as identified above.

Response

The ESW piping sections are an essential part of the ESWS to carry the cooling water for its heat removal function. Therefore DCD Tier 1, Table 2.7.2.1-1, and Tier 2, Table 3.2-1 will be revised to show the ESW piping section.

The ESW piping is a passive component and designed with seismic category I; therefore, the ESW piping is not considered in the failure modes and effects analysis.

DCD Tier 2, Subsection 9.2.1.2.2.2 will be revised since the ESW is only utilized with the piping tunnel between the ESW building and the CCW heat exchanger building. Also the tunnel symbol on piping upstream of the UHS cooling tower will be deleted in Figure 9.2.1-1.

Impact on DCD

DCD Tier 1, Table 2.7.2.1-1, and Tier 2, Table 3.2-1, Subsection 9.2.1.2.2.2, and Figure 9.2.1-1 will be revised to show the ESW piping section as shown in 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

There is no impact on any Technical, Topical, or Environmental Report.

Table 2.7.2.1-1

Essential Service Water System Equipment and Piping Location/Characteristics

Equipment and Piping Name	Location	ASME Section III Class	Seismic Category
~~ESW pumps~~	~~ESW Building~~	~~3~~	~~I~~
~~ESW Debris Filters~~	~~CCW HX Building~~	~~3~~	~~I~~
~~Essential service water supply piping and valves to CCW heat exchangers~~	~~CCW HX Building /ESW Building~~	~~3~~	~~I~~
~~Essential service water return piping and valves from CCW heat exchangers~~	~~CCW HX Building /ESW Building~~	~~3~~	~~I~~

Replace with "A"

A

ESW pumps	ESW Building	3	I
ESW Debris Filters	CCW HX Building	3	I
ESW piping and valves excluding the following 1) through 3) below:	CCWHX Building/ ESW Building	3	I
1) ESW blowdown piping excluding the isolation valve SX-1063, SX1065 in the division I, and SX-1064, SX-1066 in the division II	ESW Building	-	II
2) Radiation monitoring piping excluding the isolation valve SX-2071, SX-2073 in the division I, and SX-2072, SX-2074 in the division II	CCWHX Building	-	II
3) Backwash discharge piping excluding the isolation valve SX-3102 and SX-3104	CCWHX Building	-	II

Table 3.2-1 (65 of 86)

Item No. / Principal SSCs	Location[2]	Safety Class	Quality Group	Codes and Standards	10 CFR 50, App. B[3]	Seismic Category	Remarks
88. SS – RCP Shaft Speed Sensing							
a. Safety-related components	RCB	SC-3	N/A	IEEE-323-2003 IEEE-344-2004 IEEE-383-2003	Yes	I	
b. Non-safety-related components	RCB	NNS	N/A	N/A	A	II	
89. SX – Essential Service Water							
~~a. Essential service water pumps~~	~~ESWB~~	~~SC-3~~	~~C~~	~~ASME Sec. III ND-2007 with 2008 addenda~~	~~Yes~~	~~I~~	
~~b. Essential service water debris filters~~	~~CCWHXB~~	~~SC-3~~	~~C~~	~~ASME Sec. III ND-2007 with 2008 addenda~~	~~Yes~~	~~I~~	
~~c. Essential service water supply piping and valves to CCW heat exchangers~~	~~CCWHXB~~ ~~ESWB~~	~~SC-3~~	~~C~~	~~ASME Sec. III ND-2007 with 2008 addenda~~	~~Yes~~	~~I~~	
~~d. Essential service water return piping and valves from CCW heat exchangers~~	~~CCWHXB,~~ ~~ESWB~~	~~SC-3~~	~~C~~	~~ASME Sec. III ND-2007 with 2008 addenda~~	~~Yes~~	~~I~~	

Replace with "B"

B

a. Essential service water pumps	ESWB	SC-3	C	ASME Sec. III ND-2007 with 2008 addenda	Yes	I	
b. Essential service water debris filters	CCWHXB	SC-3	C	ASME Sec. III ND-2007 with 2008 addenda	Yes	I	
c. ESW piping and valves excluding the following 1) through 3) below:	CCWHXB/ ESWB	SC-3	C	ASME Sec. III ND-2007 with 2008 addenda	Yes	I	
1) ESW blowdown piping excluding the isolation valve SX-1063, SX1065 in the division I, and SX-1064, SX-1066 in the division II	ESWB	NNS	D	ASME B31.1-2010	A	II	(3)(d)
2) Radiation monitoring piping excluding the isolation valve SX-2071, SX-2073 in the division I, and SX-2072, SX-2074 in the division II	CCWHXB	NNS	D	ASME B31.1-2010	A	II	(3)(d)
3) Backwash discharge piping excluding the isolation valve SX-3102 and SX-3104	CCWHXB	NNS	D	ASME B31.1-2010	A	II	(3)(d)

pressure drop from the certified design portion of the plant and adding site-specific head requirements, (2) determine the pump shutoff head to establish system design pressure, which does not exceed APR1400 system design pressure, and (3) evaluate the potential for vortex formation at the pump suction based on the most limiting applicable conditions in the ESWS (COL 9.2(3)).

9.2.1.2.2.2 Piping, Valves, and Fittings

[[Piping is carbon steel pipe or internally lined carbon steel pipe depending on the ESW chemistry. Cathodic protection is applied to the pipe depending on the ESW chemistry.]] Piping is designed, fabricated, installed, and tested in accordance with the ASME Section III, Class 3, requirements for the safety-related portion. Materials whose adequacy has been proven by a test at compatible operating temperatures with similar water chemistry are used for components and piping in this system.

The piping and components within a division are physically separated from those in the other division. The ESW piping to the CCW heat exchanger building is routed through a seismic Category I reinforced concrete pipe tunnels ~~buried in the yard. The ESW piping to the UHS structures is routed through a seismic Category I reinforced concrete pipe tunnel. Access manholes are provided for periodic inspection.~~

Vents are installed at high points, and drains are installed at low points in the ESWS to allow proper filling and venting.

An isolation valve is installed on each CCW heat exchanger and debris filter inlet and outlet line. The ESW pump discharge isolation valves are interlocked with the ESW pumps. The ESW pump discharge isolation valves are preset to a partially open position before the pump startup to minimize water hammer effects.

Butterfly valves in the ESWS piping are not used to throttle the water flow excessively to avoid potential downstream pipe wall thinning. The valves are sized to be fully open during the various modes of operation. The opening margins of valve are considered to provide reasonable assurance of the design flow during all mode of operation.

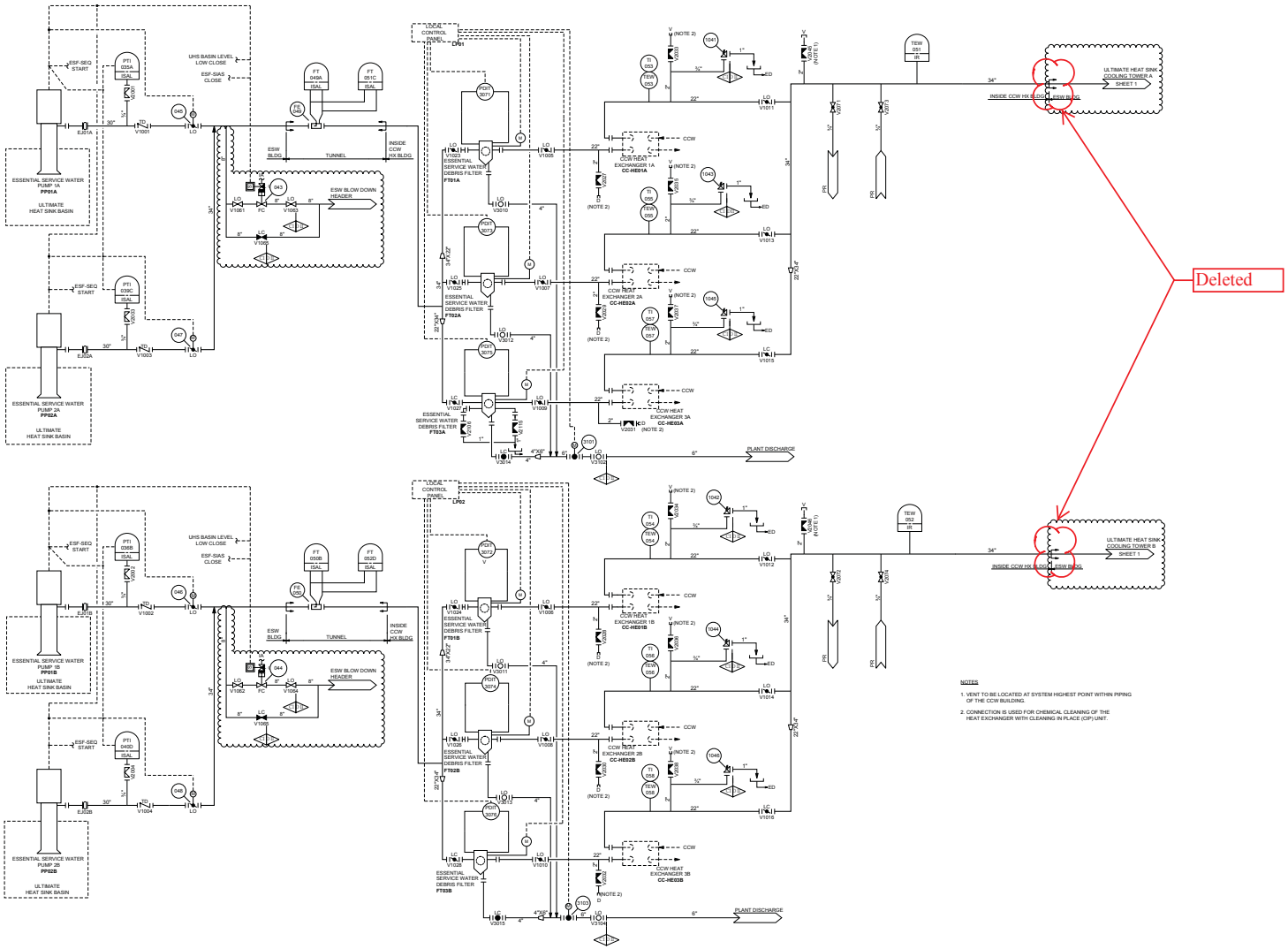

Figure 9.2.1-1 Essential Service Water System Flow Diagram