
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.: 530-8714
SRP Section: 10.3 – Main Steam Supply System
Application Section: 10.3
Date of RAI Issue: 11/21/2016

Question No. 10.03-7

GDC 2 requires that SSCs important to safety are designed to withstand the effects of natural phenomena, such as earthquakes, without loss of the capability to perform their safety function. In addition, SRP 10.3, Section III, item 3 specifies that essential portions of the main steam supply system are designed to Quality Group B and/or seismic Category I requirements.

On June 29, 2016, KHNP provided its response to RAI 8570, Question 10.03-4, related to the classification of the discharge piping of the main steam atmospheric dump valves (MSADVs) and the main steam safety valves (MSSVs). Specifically, the response states:

“... the discharge piping (vent stack) from the outlet of the MSSVs and MSADVs does not have a safety-related function... the discharge piping maintains its structural integrity in the event of an SSE.”

The staff disagrees with the above statement because one of the primary safety-related functions of the main steam system (MSS) is to dissipate heat from the reactor coolant system to the atmosphere when the condenser is not available. The MSS cannot perform the function to relieve steam to the atmosphere if the discharge piping (inside the main steam valve house) of the MSADVs and MSSVs are not appropriately designed and qualified. Designing the discharge piping inside the main steam valve house to seismic Category II ensures the piping will not break away from its restraints during an SSE and adversely interact with adjacent safety-related SSCs; however, it does not ensure the piping can perform a safety function or maintain functional capability (see NUREG-1367). Therefore, the staff requests the applicant to revise the classification of this section of piping located in the MSVHs to seismic Category I and/or to a suitable design standard to meet functional capability requirements (for example, ASME BPV Code, Section III as discussed in NUREG-1367).

The staff also notes that DCD Tier 2, Figure 10.3.2-1, “Main Steam System Flow Diagram (1 of 2),” identifies the MSADV on main steam line #1 from steam generator #1 as valve no. 012. The staff believes this MSADV should be identified as valve no. 102. The applicant is requested to

review Figure 10.3.2-1 and make any necessary corrections in order to ensure consistency with the DCD.

Response

The KHNP response to RAI 8570 indicated that the discharge piping of MSSVs and MSADVs could be classified as seismic category II. The NRC staff did not accept this response because designing the discharge piping to seismic category II does not ensure the piping can perform a safety function or maintain functional capability. Therefore, the NRC staff requested the applicant to revise the classification of this section of piping located in the MSVHs to seismic Category I and/or to a suitable design standard to meet functional capability requirements (for example, ASME BPV Code, Section III as discussed in NUREG-1367)

Accordingly, KHNP decided to perform a piping analysis on the functional capability of discharge piping to show that plastic deformation does not occur such that it challenges the safety function of the MSSV and MSADV. The following criteria specified in the General PSDS (Piping System Design Specification) for APR1400 and based on NUREG-1367 were applied in the F/C evaluation.

“Piping functional capability is assured by verifying that the maximum stress in Eq. (9) of ASME B&PV Code, Section III NC-3650, regardless of service level, does not exceed Service C limits.”

Thus, the MSSV and MSADV discharge piping will be maintained as seismic category II because functional capability of discharge piping has been assured by the piping analysis. The material in DCD Tier 2, Table 10.3.2-3 will be revised from A-106 Gr. B to A-106 Gr. C of equivalent material to increase stress allowable as indicated in the attached markup.

In Figure 10.3.2-1, valve No. 012 will be revised to No. 102 as indicated in the attached markup.

Impact on DCD

DCD Tier 2, Table 10.3.2-3 and Figure 10.3.2-1 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 Technical Specifications.

Impact on Technical/Topical/Environmental Reports

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

APR1400 DCD TIER 2

RAI 452-8545 Question 10.03.06-19

Replace with B

Table 10.3.2-3

Main Steam Branch Piping Design Data (2.5 Inches and Larger)

Segment	Material Specification	Nominal OD (mm (in))	ASME Class
Main steam piping to MSADV	SA106 Gr. C (seamless)	500 (20)	Section III, Class 2
MSADV discharge piping to silencer	A106 Gr. B (seamless)	400 (16)	B31.1
Main steam piping to MSSV	SA-105	200 (8)	Section III, Class 2
MSSV discharge piping to vent stack	A106 Gr. B (seamless)	250 (10), 650 (26)	B31.1
Main steam piping to pipe chase	SA-333 Gr. 6 (seamless)	200 (8)	Section III, Class 2
Pipe chase to AF pump turbine steam isolation valve	SA-106 Gr. B (seamless)	200 (8)	Section III, Class 3
Fittings	ASTM (S)A-234 WPB	65 (2.5) and larger	Section III, Class 2
Flanges	SA-350 LF2, ASTM A-105	65 (2.5) ~ 600 (24)	Section III, Class 2
Valves (globe, gate, check)	ASTM (S)A-216, WCB or WCC, A352 LCB	65 (2.5) and larger	Section III, Class 2
Main steam piping to moisture separator reheater	A106 Gr. B (seamless)	250 (10), 300 (12)	B31.1
Fittings	ASTM A-234, WPB	250 (10), 300 (12)	
Flanges	ASTM A-105	80 (3) and larger	
Valves (globe, gate, check)	ASTM A-216, WCB or WCC	65 (2.5) ~ 650 (26)	
HP turbine to moisture separator reheater	A588 Gr. C (welded)	1,050 (42)	B31.1
Moisture separator reheater to LP turbine	A588 Gr. C (welded)	1,050 (42)	B31.1
Fittings	ASTM A-234, WPB	1,050 (42)	

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Table 10.3.2-3

B

Main Steam Branch Piping Design Data (2.5 Inches and Larger)

Segment	Material Specification	NPS	DN	Outside Diameter (in)	Remark	ASME Class
Main steam piping to MSADV	SA-106 Gr.C (seamless)	20	500	20.000	-	Section III, Class 2
MSADV discharge piping to silencer	A-106 Gr.B (seamless)	16	400	16.000	-	B31.1
Main steam piping to MSSV	SA-105	6	150	6.625	-	Section III, Class 2
MSSV discharge piping to vent stack	A-106 Gr.B (seamless)	10 26	250 650	10.750 26.000	-	B31.1
Main steam piping to pipe chase	SA-333 Gr.6 (seamless)	8	200	8.625	-	Section III, Class2
Pipe chase to AF pump turbine steam isolation valve	SA-106 Gr.B (seamless)	8	200	8.625	-	Section III, Class 3
Fittings	ASTM(S)A-234 WPB	2.5 and larger	65 and larger	2.875 and larger	-	Section III, Class 3

APR1400 DCD TIER 2

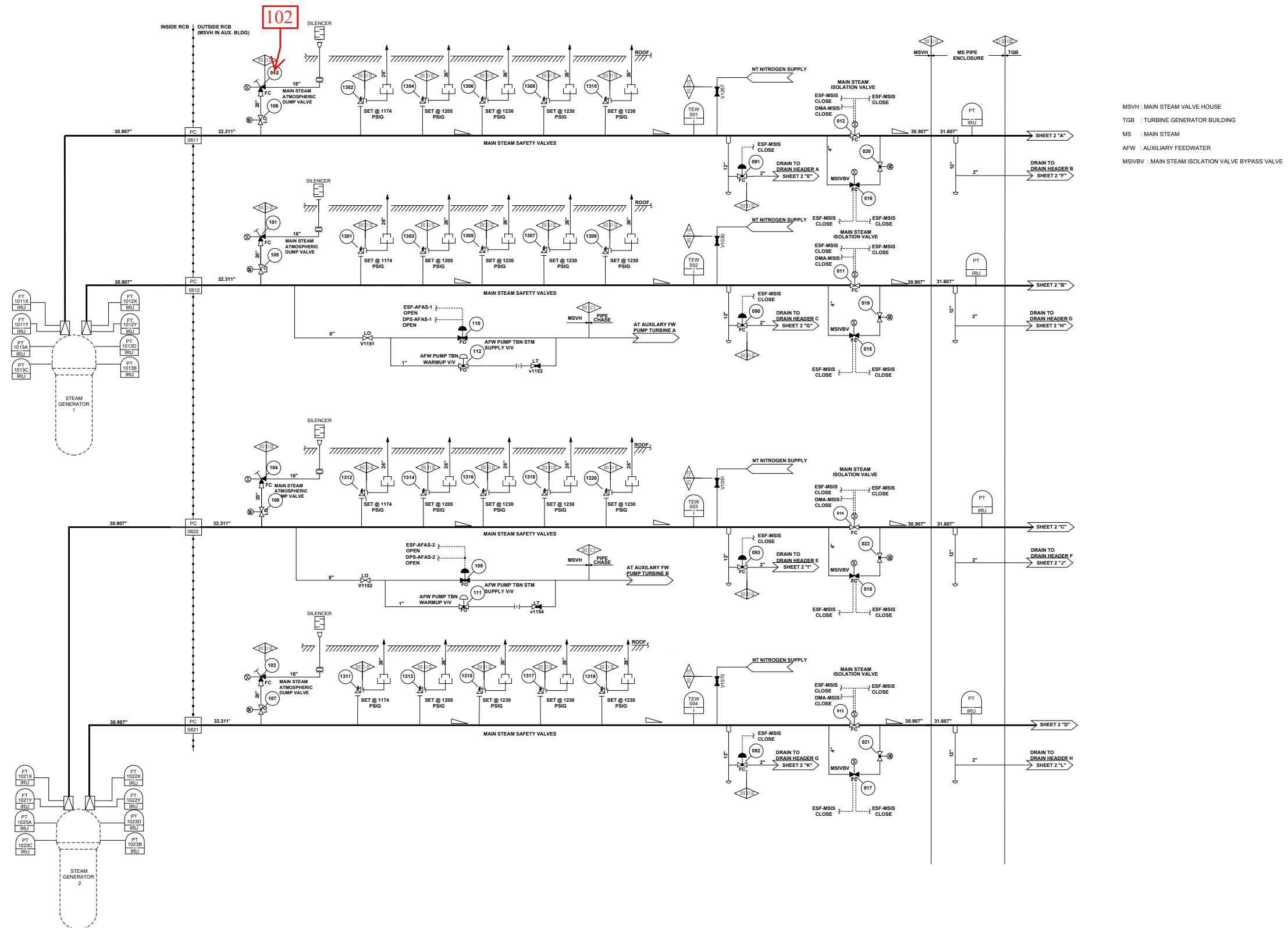


Figure 10.3.2-1 Main Steam System Flow Diagram (1 of 2)