
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.: 357-8344
SRP Section: 06.02.04 – Containment Isolation System
Application Section: 6.2.4
Date of RAI Issue: 01/05/2016

Question No. 06.02.04-11

Describe inspections, tests, analyses and acceptance criteria (ITAAC) for verification of containment isolation valve (CIV) placement

10 CFR 52.47(b)(1) requires that a DC application contain the proposed ITAAC that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the design certification is built and will operate in accordance with the design certification.

DCD Tier 1, Table 2.11.3-2 "Containment Isolation System ITAAC", provides the ITAAC for the CIVs. How will this ITAAC, as written, ensure that the supplied as-built piping distances from the outer CIV to the containment will be such that the valves are located as close to containment as practical? (i.e. describe any inspections, tests, or acceptance criteria which will confirm that the as built piping distances will not exceed those listed in DCD Tier 2, Table 6.2.4-1).

In addition, indicate the associated containment penetration numbers in DCD Tier 1, Table 2.11.3-1 "Containment Isolation System Component List."

Response – (Rev. 1)

GDCs 55, 56, and 57 require that isolation valves outside containment should be located as close to containment as practical. The APR1400 design has incorporated this design concept into the location of the containment isolation valves and has reflected the locations in the piping analyses performed. However, in applying the graded approach for piping design and analysis, only specific piping lines that penetrate containment are in the scope of the program and are required to be analyzed. Acceptable containment isolation valve location is assured through the overall design and piping analysis program. The length of pipe between containment and the outboard isolation valve indicated in DCD Tier 2, Table 6.2.4-1 does not necessarily represent a bounding condition for each piping line listed. Therefore, including verification of as-built piping distances as a prescriptive ITAAC item is not meaningful nor practical for a subjective criteria

such as locating isolation valves as close as practical to containment and the graded approach for piping analysis that has been implemented for the APR1400. However, as per the NRC's request, the pipe length from an operational plant will be provided in DCD Tier 2, Table 6.2.4-1 as a reference and is subject to change during the detailed design phase.

The changes to the DCD made in the response to the RAI 306-8240 Question 06.02.06-9 and RAI 357-8344 Question 06.02.04-9 have been addressed in DCD Tier 2, Revision 1, Table 6.2.4-1. However, incorrect information in item nos. 48, 49, 50, 55, 161, 162, 163 in DCD Tier 2, Table 6.2.4-1 were identified and will be corrected as indicated in attachment 1 associated with this response.

Containment penetration numbers have been added in DCD Tier 1, Revision 1, Table 2.11.3-1 according to the response to the RAI 357-8344 Question 06.02.04-11, Revision 0. However, some incorrect information regarding valves FW-V132, IA-V0020, PS-V0032, PS-V0258, and WI-V0015 were identified and will be corrected. Finally, the missing valves VQ-V2014, VQ-V2016, and VQ-V2024 will be added in DCD Tier 1, Table 2.11.3-1 as indicated in attachment 2 associated with this response.

Impact on DCD

DCD Tier 2, Table 6.2.4-1 and DCD Tier 1, Table 2.11.3-1 will be revised as shown in the attachment to this response.

- DCD Tier 2, Table 6.2.4-1 (Attachment 1)
- DCD Tier 1, Table 2.11.3-1 (Attachment 2)

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.

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Table 6.2.4-1 (1 of 10)

List of Containment Penetrations and System Isolation Positions

Item No.	Service	Penetration No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe (ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justification for Not Testing ⁽⁹⁾	Essential/Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut-down	Accident								
1	Main steam line #1 from SG #1 ⁽⁸⁾	PC0611	3	MS-091	15	10.3.2-1	Globe	Steam	82.2 ⁽⁺⁶⁾	Outside	Out	1 (57)	O	C	C	C	P	MSIS	A,R,M	A	No	⁽⁹⁾	Nonessential	
			30.9	MS-012	5		Gate		85.8 ⁽⁺⁶⁾	Outside			O	C	C	C	EH	MSIS	A,R,M				Nonessential	
			6	MS-1302	-		Safety		30.8 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1304	-		Safety		34.3 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1306	-		Safety		36.8 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1308	-		Safety		40.3 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1310	-		Safety		42.8 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			16	MS-102	-		Angle		65.1 ⁽⁺⁶⁾	Outside			C	C	C	C	EH	-	R,M				Nonessential	
			1	MS-1257	-		Globe		⁽⁺⁷⁾	Outside			LC	-	LC	-	HW	-	M				Nonessential	
			4	MS-016	10		Gate		91.8 ⁽⁺⁶⁾	Outside			C	C	C	C	EH	MSIS	A,R,M				Nonessential	
2	Main steam line #2 from SG #1 ⁽⁸⁾	PC0612	3	MS-090	15	10.3.2-1	Globe	Steam	79.3 ⁽⁺⁶⁾	Outside	Out	3 (57)	O	C	C	C	P	MSIS	A,R,M	A	No	⁽⁹⁾	Nonessential	
			30.9	MS-011	5		Gate		80.4 ⁽⁺⁶⁾	Outside			O	C	C	C	EH	MSIS	A,R,M				Nonessential	
			6	MS-1301	-		Safety		30.5 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1303	-		Safety		34.0 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1305	-		Safety		36.5 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1307	-		Safety		40.0 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1309	-		Safety		42.5 ⁽⁺⁶⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			16	MS-101	-		Angle		67.7 ⁽⁺⁶⁾	Outside			C	C	C	C	EH	-	R,M				Nonessential	
			8	MS-0110	5		Globe		53.4 ⁽⁺⁶⁾	Outside			C	O	C	O	P	AFAS	A,R,M				Essential	
			1	MS-1030	-		Globe		⁽⁺⁷⁾	Outside			LC	-	LC	LC	HW	-	M				Nonessential	
			4	MS-015	10		Gate		89.5 ⁽⁺⁶⁾	Outside			C	C	C	C	EH	MSIS	A,R,M				Nonessential	
			1	MS-0112	15		Globe		⁽⁺⁷⁾	Outside			O	O	O	O	P	-	A,R,M				Essential	
			3	Main steam line #1 from SG #2 ⁽⁸⁾	PC0622		3		MS-093	15			10.3.2-1	Globe	Steam	⁽⁺⁷⁾	Outside	Out	3 (57)				O	C
30.9	MS-014	5				Gate	⁽⁺⁷⁾	Outside	O	C	C	C		EH		MSIS	A,R,M			Nonessential				
6	MS-1312	-				Safety	⁽⁺⁷⁾	Outside	C	-	C	C		-		SV setpoint	-			Nonessential				
6	MS-1314	-				Safety	⁽⁺⁷⁾	Outside	C	-	C	C		-		SV setpoint	-			Nonessential				
6	MS-1316	-				Safety	⁽⁺⁷⁾	Outside	C	-	C	C		-		SV setpoint	-			Nonessential				
6	MS-1318	-				Safety	⁽⁺⁷⁾	Outside	C	-	C	C		-		SV setpoint	-			Nonessential				
6	MS-1320	-				Safety	⁽⁺⁷⁾	Outside	C	-	C	C		-		SV setpoint	-			Nonessential				
16	MS-104	-				Angle	⁽⁺⁷⁾	Outside	C	C	C	C		EH		-	R,M			Nonessential				
8	MS-109	5				Globe	⁽⁺⁷⁾	Outside	C	O	C	O		P		AFAS	A,R,M			Essential				
1	MS-111	15				Globe	⁽⁺⁷⁾	Outside	O	O	O	O		P		-	A,R,M			Essential				
4	Main steam line #2 from SG #2 ⁽⁸⁾	PC0621	30.9	MS-013	5	10.3.2-1	Gate	Steam	⁽⁺⁷⁾	Outside	Out	1 (57)	O	C	C	C	EH	MSIS	A,R,M	A	No	⁽⁹⁾	Nonessential	
			6	MS-1311	-		Safety		⁽⁺⁷⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1313	-		Safety		⁽⁺⁷⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1315	-		Safety		⁽⁺⁷⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1317	-		Safety		⁽⁺⁷⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			6	MS-1319	-		Safety		⁽⁺⁷⁾	Outside			C	-	C	C	-	SV setpoint	-				Nonessential	
			16	MS-103	-		Angle		⁽⁺⁷⁾	Outside			C	C	C	C	EH	-	R,M				Nonessential	
1	MS-1073	-	Globe	⁽⁺⁷⁾	Outside	LC	-	LC	LC	HW	-	M	Nonessential											
4	MS-017	10	Gate	⁽⁺⁷⁾	Outside	C	C	C	C	EH	MSIS	A,R,M	Nonessential											
3	MS-092	15	Globe	⁽⁺⁷⁾	Outside	O	C	C	C	P	MSIS	A,R,M	Nonessential											

82.7
90.1
31.4
34.9
37.4
40.9
43.4
68.6
40.5⁽¹⁷⁾
92.1
79.8
84.7
31.1
34.6
37.1
40.6
43.1
71.2
55.1
40.0⁽¹⁷⁾
89.8
49.0⁽¹⁷⁾
78.8⁽¹⁷⁾
78.9⁽¹⁷⁾
27.8⁽¹⁷⁾
31.3⁽¹⁷⁾
33.8⁽¹⁷⁾
37.3⁽¹⁷⁾
39.8⁽¹⁷⁾
67.3⁽¹⁷⁾
49.6⁽¹⁷⁾
49.0⁽¹⁷⁾
83.4⁽¹⁷⁾
43.7⁽¹⁷⁾
84.3⁽¹⁷⁾
28.0⁽¹⁷⁾
31.5⁽¹⁷⁾
34.0⁽¹⁷⁾
37.5⁽¹⁷⁾
40.0⁽¹⁷⁾
63.0⁽¹⁷⁾
40.1⁽¹⁷⁾
85.2⁽¹⁷⁾
77.8⁽¹⁷⁾

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Table 6.2.4-1 (2 of 10)

Item No.	Service	Pene-traion No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe(ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justifi-cation for Not Testing	Essential/ Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut-down	Acci-dent								
5	Main feedwater to downcomer nozzle SG #1	PC0512	10 10	FW-131 FW-132	5 5	10.4.7-1	Gate Gate	Water	31.2 ⁽¹⁶⁾ 15.7 ⁽¹⁶⁾	Outside Outside	In	12 (57)	O O	C C	C C	O/C O/C	EH EH	MSIS MSIS	A,R,M A,R,M	A	No	⁽⁹⁾	Nonessential Nonessential	
6	Main feedwater to downcomer nozzle SG #2	PC0522	10 10	FW-133 FW-134	5 5	10.4.7-1	Gate Gate	Water	⁽¹⁷⁾ ⁽¹⁷⁾	Outside Outside	In	12 (57)	O O	C C	C C	O/C O/C	EH EH	MSIS MSIS	A,R,M A,R,M	A	No	⁽⁹⁾	Nonessential Nonessential	
7	Main feedwater to economizer nozzles for SG #1	PC0511	24 24	FW-121 FW-122	5 5	10.4.7-1	Gate Gate	Water	25.2 ⁽¹⁶⁾ 16.9 ⁽¹⁶⁾	Outside Outside	In	40 (57)	O O	C C	C C	O/C O/C	EH EH	MSIS MSIS	A,R,M A,R,M	A	No	⁽⁹⁾	Nonessential Nonessential	
8	Main feedwater to economizer nozzles for SG #2	PC0521	24 24	FW-123 FW-124	5 5	10.4.7-1	Gate Gate	Water	⁽¹⁷⁾ ⁽¹⁷⁾	Outside Outside	In	40 (57)	O O	C C	C C	O/C O/C	EH EH	MSIS MSIS	A,R,M A,R,M	A	No	⁽⁹⁾	Nonessential Nonessential	
9	Chemical injection	PC0512 PC0522	1 1	FW-138 FW-139	15 15	10.4.7-1	Globe Globe	Mixed chemical (15 wt% ethanlo amine and 2 wt% hydrazine)	⁽¹⁷⁾ ⁽¹⁷⁾	Outside Outside	In	12 (57)	C C	C C	C C	C C	P P	MSIS MSIS	A,R,M A,R,M	A	No	-	Nonessential Nonessential	
10	Motor-driven AFW pump PP02A discharge	PC0118	6 6	AF-0043 AF-1007A	14 -	10.4.9-1	Gate Check	Demi. Water	⁽¹⁷⁾ -	Outside Inside	In	4 (57)	O C	AI -	O C	O/C O/C	E -	ESF-AFAS/ DPS-AFAS/ DMA-AFAS	A,R,M -	A	No	⁽⁹⁾	Essential	
11	Motor-driven AFW pump PP02B discharge	PC0228	6 6	AF-0044 AF-1007B	14 -	10.4.9-1	Gate Check	Demi. Water	⁽¹⁷⁾ -	Outside Inside	In	4 (57)	O C	AI -	O C	O/C O/C	E -	ESF-AFAS/ DPS-AFAS/ DMA-AFAS	A,R,M -	A	No	⁽⁹⁾	Essential	
12	Turbine-driven AFW pump PP01A discharge	PC0129	6 6	AF-0045 AF-1008A	14 -	10.4.9-1	Gate Check	Demi. Water	⁽¹⁷⁾ -	Outside Inside	In	4 (57)	O C	AI -	O C	O/C O/C	E -	ESF-AFAS/ DPS-AFAS/ DMA-AFAS	A,R,M -	A	No	⁽⁹⁾	Essential	
13	Turbine-driven AFW pump PP01B discharge	PC0119	6 6	AF-0046 AF-1008B	14 -	10.4.9-1	Gate Check	Demi. Water	⁽¹⁷⁾ -	Outside Inside	In	4 (57)	O C	AI -	O C	O/C O/C	E -	ESF-AFAS/ DPS-AFAS/ DMA-AFAS	A,R,M -	A	No	⁽⁹⁾	Essential	
14	Safety injection pump #4 Discharge	PC0212	4 4	SI-616 SI-113	10 -	6.3.2-1	Globe Check	Borated Water	⁽¹⁷⁾ -	Outside Inside	In	22 (55)	C C	AI -	C C	O O	E -	SIAS -	A,R,M -	A	No	⁽¹⁸⁾	Essential	
15	Safety injection pump #2 discharge	PC0214	10 1 4 12	SI-600 SI-602 SI-626 SI-123	10 10 10 -	6.3.2-1	Globe Globe Globe Check	Borated Water	⁽¹⁷⁾ ⁽¹⁷⁾ ⁽¹⁷⁾ -	Outside Outside Outside Inside	In	10 (55)	C C C C	AI AI AI -	C C C O	O/C O O O	E E E -	- - SIAS -	R,M R,M A,R,M -	A	No	⁽¹⁸⁾	Essential	
16	Safety injection pump #3 discharge	PC0122	4 4	SI-636 SI-133	10 -	6.3.2-1	Globe Check	Borated Water	⁽¹⁷⁾ -	Outside Inside	In	22 (55)	C C	AI -	C C	O O	E -	SIAS -	A,R,M -	A	No	⁽¹⁸⁾	Essential	
17	Safety injection pump #1 discharge	PC0124	10 1 4 12	SI-601 SI-603 SI-646 SI-143	10 10 10 -	6.3.2-1	Globe Globe Globe Check	Borated Water	⁽¹⁷⁾ ⁽¹⁷⁾ ⁽¹⁷⁾ -	Outside Outside Outside Inside	In	10 (55)	C C C C	AI AI AI -	C C C O	O/C O O O	E E E -	- - SIAS -	R,M R,M A,R,M -	A	No	⁽¹⁸⁾	Essential	
18	SCS pump #2 suction	PC0215	16 8 16	SI-654 SI-189 SI-656	160- 80	6.3.2-1	Gate Relief Gate	Borated Water	- - ⁽¹⁷⁾	Inside Inside Outside	Out	9 (55)	LC C LC	AI - AI	O C O	O/C C O/C	E - E	- - RV setpoint	R,M - R,M	A	No	⁽¹⁰⁾	Essential	

31.9
16.4
28.4 ⁽¹⁷⁾
12.9 ⁽¹⁷⁾
28.0
19.7
24.5 ⁽¹⁷⁾
16.2 ⁽¹⁷⁾
16.4 ⁽¹⁷⁾
10.0 ⁽¹⁷⁾
6.4 ⁽¹⁷⁾
-
6.0 ⁽¹⁷⁾
-
6.9 ⁽¹⁷⁾
-
6.9 ⁽¹⁷⁾
-
71.5 ⁽¹⁷⁾
-
25.8 ⁽¹⁷⁾
40.5 ⁽¹⁷⁾
36.3 ⁽¹⁷⁾
-
71.3 ⁽¹⁷⁾
-
23.3 ⁽¹⁷⁾
36.8 ⁽¹⁷⁾
37.5 ⁽¹⁷⁾
-
-
16.9 ⁽¹⁷⁾

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Table 6.2.4-1 (3 of 10)

Item No.	Service	Pene- traion No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe(ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justifi- cation for Not Testing	Essential/ Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut- down	Acci- dent								
19	SCS pump #1 suction	PC0125	16 8 16	SI-653 SI-179 SI-655	160 - 80	6.3.2-1	Gate Relief Gate	Borated Water	- - (+7)	Inside Inside Outside	Out	9 (55)	LC C LC	AI - AI	O C O	O/C C O/C	E - E	- RV setpoint -	R,M - R,M	A	No	⁽¹⁰⁾	Essential	
20	Hot leg injection loop #2	PC0213	4 4	SI-331 SI-533	10 -	6.3.2-1	Globe Check	Borated Water	(+7) -	Outside Inside	In	22 (55)	LC C	AI -	LC C	O/C O/C	E -	- -	R,M -	A	No	⁽¹⁸⁾	Essential	
21	Hot leg injection loop #1	PC0123	4 4	SI-321 SI-523	10 -	6.3.2-1	Globe Check	Borated Water	(+7) -	Outside Inside	In	22 (55)	LC C	AI -	LC C	O/C O/C	E -	- -	R,M -	A	No	⁽¹⁸⁾	Essential	
22	Containment spray pump #2 discharge	PC0226	14 14	CS-004 CS-1008	15 -	6.2.2-1	Gate Check	Borated Water	(+7) -	Outside Inside	In	5 (56)	LC C	AI -	LC C	O/C O/C	E -	CSAS -	A,R,M -	C	Yes	-	Essential	
23	Containment spray pump #1 discharge	PC0116	14 14	CS-003 CS-1007	15 -	6.2.2-1	Gate Check	Borated Water	(+7) -	Outside Inside	In	5 (56)	LC C	AI -	LC C	O/C O/C	E -	CSAS -	A,R,M -	C	Yes	-	Essential	
24	Safety injection pump #1 suction	-	20	SI-304	60	6.3.2-1	Gate	Borated Water	(+7)	Outside	Out	18 (56)	LO	AI	LO	LO	E	-	R,M	A	No	⁽¹¹⁾	Essential	
25	Safety injection pump #2 suction	-	20	SI-305	60	6.3.2-1	Gate	Borated Water	(+7)	Outside	Out	18 (56)	LO	AI	LO	LO	E	-	R,M	A	No	⁽¹¹⁾	Essential	
26	Safety injection pump #3 and containment spray pump #1 suction	-	20	SI-308	60	6.3.2-1	Gate	Borated Water	(+7)	Outside	Out	18 (56)	LO	AI	LO	LO	E	-	R,M	A	No	⁽¹¹⁾	Essential	
27	Safety injection pump #4 and containment spray pump #2 suction	-	20	SI-309	60	6.3.2-1	Gate	Borated Water	(+7)	Outside	Out	18 (56)	LO	AI	LO	LO	E	-	R,M	A	No	⁽¹¹⁾	Essential	
28	SIS division 1 miniflow return to IRWST	PC0111	10 10 4	SI-300 SI-100 SI-302	50 - 20	6.3.2-1	Gate Check Gate	Borated Water	(+7) - (+7)	Outside Inside Outside	In	14 (56)	C C LO	AI - AI	C C LO	C O LO	E - E	- - -	R,M - R,M	C	Yes	-	Essential	
29	SIS division 2 miniflow return to IRWST	PC0221	10 10 4	SI-301 SI-101 SI-303	50 - 20	6.3.2-1	Gate Check Globe	Borated Water	(+7) - (+7)	Outside Inside Outside	In	14 (56)	C C LO	AI - AI	C C LO	C O LO	E - E	- - -	R,M - R,M	C	Yes	-	Essential	
30	Return header from SI tanks	PC0301	2 2 3/4	SI-682 SI-293 SI-474	5 - -	6.3.2-1	Globe Globe Relief	Borated Water	- (+7) -	Inside Outside Inside	In	13 (55)	C LC C	C - -	O/C O/C C	C LC C	P HW -	SIAS - RV setpoint	A,R,M M -	C	Yes	-	Nonessential	
31	CCW supply to letdown heat exchanger	PC0162	8 8 3/4	CC-0296 CC-0297 CC-1685	40 40 -	9.2.2-1	Butterfly Butterfly Check	Deminer-alized water with corrosion inhibitors	(+7) - -	Outside Inside Inside	In	23 (56)	O O O	AI AI -	O O O	C C C	E E -	CIAS CIAS -	A,R,M A,R,M -	C	Yes	-	Nonessential	
32	CCW return from letdown heat exchanger	PC0163	8 8 3/4	CC-0301 CC-0302 CC-1686	40 40 -	9.2.2-1	Butterfly Butterfly Check	Deminer-alized water with corrosion inhibitors	- (+7) -	Inside Outside Inside	Out	19 (56)	O O C	AI AI -	O O C	C C C	E E -	CIAS CIAS -	A,R,M A,R,M -	C	Yes	-	Nonessential	
33	CCW supply to RCP coolers 1A, 1B, 2A, and 2B	PC0137	10 10	CC-231 CC-1099	50 -	9.2.2-1	Butterfly Check	Deminer-alized water with corrosion inhibitors	(+7) -	Outside Inside	In	6 (56)	O O	AI -	O O	C C	E -	CCWSTLLAS -	A,R,M -	C	Yes	-	Nonessential	

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-
16.9 ⁽¹⁷⁾
32.8 ⁽¹⁷⁾
-
23.1 ⁽¹⁷⁾
-
15.7 ⁽¹⁷⁾
-
15.7 ⁽¹⁷⁾
-
42.1 ⁽¹⁷⁾
41.8 ⁽¹⁷⁾
29.6 ⁽¹⁷⁾
30.2 ⁽¹⁷⁾
23.5 ⁽¹⁷⁾
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20.2 ⁽¹⁷⁾
24.7 ⁽¹⁷⁾
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21.5 ⁽¹⁷⁾
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4.9 ⁽¹⁷⁾
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13.3 ⁽¹⁷⁾
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14.3 ⁽¹⁷⁾
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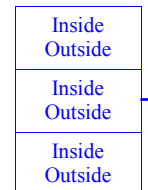
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Table 6.2.4-1 (4 of 10)

Item No.	Service	Pene-traion No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe(ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justifi-cation for Not Testing	Essential/ Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut-down	Acci-dent								
34	CCW return from RCP coolers 1A, 1B, 2A, and 2B	PC0138	10 10 3/4	CC-0250 CC-0249 CC-1100	50 50 -	9.2.2-1	Butterfly Butterfly Check	Demineralized water with corrosion inhibitors	(+?) - -	Outside Inside Inside	Out	19 (56) C	O O C	AI AI -	O O C	C C C	E E -	CCWSTLLAS CCWSTLLAS -	A,R,M A,R,M -	C	Yes	-	Nonessential	
35	CVCS IRWST boron recovery return	PC0131	3 3	CV-509 CV-189	5 -	9.3.4-1	Gate Check	Borated Water	(+?) -	Outside Inside	In	5 (56) O/C	O/C O/C	AI -	O/C O/C	C C	E -	CIAS -	A,R,M -	C	Yes	-	Nonessential	
36	Shutdown purification line to letdown heat exchanger	PC0403	2 2	CV-362 CV-363	- -	9.3.4-1	Gate Check	Primary Coolant	(+?) -	Outside Inside	In	11 (55) LC	LC C	- -	O/C O/C	LC C	HW -	- -	M -	C	Yes	-	Nonessential	
37	Letdown to purification system	PC0402	2 2	CV-523 CV-522	5 5	9.3.4-1	Globe ⁽¹⁾ Globe ⁽¹⁾	Primary Coolant	(+?) -	Outside Inside	Out	17 (55) O	O O	C C	C C	C C	P P	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Essential	
38	CVCS charging line	PC0230	3 3	CV-524 CV-747	5 -	9.3.4-1	Globe Check	Primary Coolant	(+?) -	Outside Inside	In	6 (55) O	O O	AI -	C C	O O	E -	- -	R,M -	C	Yes	-	Essential	
39	RCP seal injection	PC0255	2 2	CV-255 CV-835	5 -	9.3.4-1	Globe Check	Primary Coolant	(+?) -	Outside Inside	In	6 (55) O	O O	AI -	O O	O O	E -	- -	R,M -	C	Yes	-	Essential	
40	RCP seal return flow	PC0305	1 1	CV-505 CV-506	5 5	9.3.4-1	Globe Globe	Primary Coolant	(+?) -	Outside Inside	Out	17 (55) O	O O	C C	C C	C C	P P	CSAS CSAS	A,R,M A,R,M	C	Yes	-	Nonessential	
41	RDT flow to RDPs	PC0232	3 3	CV-561 CV-560	5 5	9.3.4-1	Globe ⁽¹⁾ Globe ⁽¹⁾	Primary Coolant	(+?) -	Outside Inside	Out	20 (56) O/C	O/C O/C	C C	O/C O/C	C C	P P	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
42	Resin sluice supply to reactor Drain Tank	PC0306	1½ 1½	CV-580 CV-494	5 -	9.3.4-1	Gate ⁽¹⁾ Check	Demi. Water	(+?) -	Outside Inside	In	8 (56) C	C C	C -	C C	C C	P -	CIAS -	A,R,M -	C	Yes	-	Nonessential	
43	Service air supply	PC0144	3 3	SA-001 SA-1401	15 -	9.3.1-2	Globe Check	Compressed Air	(+?) -	Outside Inside	In	8 (56) C	C C	C -	O O	C C	P -	CIAS -	A,R,M -	C	Yes	-	Nonessential	
44	Instrument air supply	PC0145	2 2½	IA-020 IA-1601	15 -	9.3.1-1	Globe Check	Compressed Air	(+?) -	Outside Inside	In	34 (56) O	O O/C	C -	O O/C	C C	P -	CSAS -	A,R,M -	C	Yes	-	Nonessential	
45	Refueling pool cleanup suction line	PC0239	6 6	FC-1143 FC-1142	- -	9.1.3-1	Gate Gate	Borated Water	(+?) -	Outside Inside	Out	26 (56) LC	LC LC	- -	O/C O/C	LC LC	HW HW	- -	M M	C	Yes	-	Nonessential	
46	Refueling pool cleanup return header	PC0240	10 10	FC-1144 FC-1145	- -	9.1.3-1	Gate Check	Borated Water	(+?) -	Outside Inside	In	11 (56) LC	- -	- -	O/C -	LC -	HW -	- -	M -	C	Yes	-	Nonessential	
47	SIT sample line	PC0311	3/4 3/4	PX-020 PX-021	15 15	9.3.2-1	Globe Globe	Borated Water	(+?) -	Outside Inside	Out	24 (55) C	C C	C C	C C	C C	S S	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
48	Pressurizer liquid sample line	PC0408	3/4 3/4	PX-0003 PX-0004	15 15	9.3.2-1	Globe Globe	Primary coolant	(+?) -	Outside Inside	Out	24 (55) O/C	O/C O/C	C C	C C	C C	S S	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
49	Pressurizer steam space sample line	PC0409	3/4 3/4	PX-0005 PX-0006	15 15	9.3.2-1	Globe Globe	Primary coolant	(+?) -	Outside Inside	Out	24 (55) O/C	O/C O/C	C C	C C	C C	S S	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
50	Hot leg sample line	PC0310	3/4 3/4	PX-0001 PX-0002	15 15	9.3.2-1	Globe Globe	Primary coolant	(+?) -	Outside Inside	Out	24 (55) O/C	O/C O/C	C C	C C	O/C O/C	S S	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
51	SG #1 blowdown cold leg sample	PC0332	3/4	PS-0035	15	-	Gate ⁽¹²⁾	Secondary Coolant	(+?)	Outside	Out	38 (57) O/C	O/C	C	C	C	P	CIAS/MSIS AFAS/HRAS	A,R,M	A	No	⁽⁹⁾	Nonessential	

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12.6 ⁽¹⁷⁾
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6.3 ⁽¹⁷⁾
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12.4 ⁽¹⁷⁾



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Table 6.2.4-1 (5 of 10)

Item No.	Service	Penetration No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe (ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justification for Not Testing	Essential/Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut-down	Accident								
52	SG#1 blowdown hot leg sample	PC0331	3/4 3/4	PS-0031 PS-0257	15 15	- -	Gate ⁽¹²⁾ Gate ⁽¹²⁾	Secondary Coolant	(+?) (+?)	Outside Outside	Out	42 (57)	O O/C	C C	C C	C C	P P	CIAS/MSIS AFAS/HRAS CIAS/MSIS AFAS	A,R,M	A	No	⁽⁹⁾	Nonessential	
53	SG #1 downcomer Sample	PC0333	3/4	PS-0033	15	-	Gate ⁽¹²⁾	Secondary Coolant	(+?)	Outside	Out	32 (57)	O	C	C	C	P	CIAS/MSIS AFAS/HRAS	A,R,M	A	No	⁽⁹⁾	Nonessential	
54	SG #2 blowdown cold leg sample	PC0437	3/4	PS-0036	15	-	Gate ⁽¹²⁾	Secondary Coolant	(+?)	Outside	Out	38 (57)	O/C	C	C	C	P	CIAS/MSIS AFAS/HRAS	A,R,M	A	No	⁽⁹⁾	Nonessential	
55	SG #2 blowdown hot leg sample	PC0314	3/4 3/4	PS-0032 PS-0258	15 15	-	Gate ⁽¹²⁾ Gate ⁽¹²⁾	Secondary Coolant	(+?) (+?)	Outside Outside	Out	42 (57)	O/C	C	C	C	P	CIAS/MSIS AFAS/HRAS CIAS/MSIS AFAS	A,R,M	A	No	⁽⁹⁾	Nonessential	
56	SG #2 downcomer sample	PC0436	3/4	PS-0034	15	-	Gate ⁽¹²⁾	Secondary Coolant	(+?) -	Outside	Out	32 (57)	O	C	C	C	P	CIAS/MSIS AFAS/HRAS	A,R,M	A	No	⁽⁹⁾	Nonessential	
57	Containment high volume purge supply system	PC0250	48 48	VQ-0011 VQ-0012	5 5	9.4.6-2	Butterfly ⁽¹²⁾ Butterfly ⁽¹²⁾	Outside Air	(+?) -	Outside Inside	In	28 (56)	C C	C C	C C	C C	EH E	CIAS/CPIAS CIAS/CPIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
58	Containment high volume purge exhaust system	PC0249	48 48	VQ-0013 VQ-0014	5 5	9.4.6-2	Butterfly ⁽¹²⁾ Butterfly ⁽¹²⁾	Containment Atmosphere	- (+?)	Inside Outside	Out	28 (56)	C C	C C	C C	C C	E EH	CIAS/CPIAS CIAS/CPIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
59	Containment low volume purge supply system	PC0247	8 8	VQ-0031 VQ-0032	5 5	9.4.6-2	Butterfly ⁽¹³⁾ Butterfly ⁽¹³⁾	Outside Air / Containment Atmosphere	(+?) -	Outside Inside	In	2 (56)	C C	C C	C C	C C	P P	CIAS/CPIAS CIAS/CPIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
60	Containment low volume purge supply system	PC0246	8 8	VQ-0033 VQ-0034	5 5	9.4.6-2	Butterfly ⁽¹³⁾ Butterfly ⁽¹³⁾	Containment Atmosphere	- (+?)	Inside Outside	out	21 (56)	C C	C C	C C	C C	P P	CIAS/CPIAS CIAS/CPIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
61	SG #1 blowdown to blowdown flash tank	PC0911	8 8	SD-0005 SD-0007	40 40	10.4.8-1	Gate Gate	Secondary Coolant	(+?) (+?)	Outside Outside	Out	35 (57)	O O	C C	O O	C C	P E	MSIS/CIAS/ DPS-AFAS/ AFAS MSIS/CIAS/ DPS-AFAS/ /AFAS/ HRAS/ BFTHHLAS	A,R,M A,R,M	A	No	⁽⁹⁾	Nonessential	
62	SG #2 blowdown to blowdown flash Tank	PC0912	8 8	SD-0006 SD-0008	40 40	10.4.8-1	Gate Gate	Secondary Coolant	(+?) (+?)	Outside Outside	Out	35 (57)	O O	C C	O O	C C	P E	MSIS/CIAS/ DPS- AFAS /AFAS MSIS/CIAS/ DPS-AFAS/ AFAS/ HRAS/ BFTHHLAS	A,R,M A,R,M	A	No	⁽⁹⁾	Nonessential	
63	SG wet layup recirculation return to SG #1	PC0134	4 4	SD-1113 SD-1115	- -	10.4.8-1	Gate Check	Secondary Coolant	(+?) -	Outside Inside	In	11 (56)	LC C	- -	O/C O/C	LC C	HW -	- -	M -	C	Yes		Nonessential	
64	SG wet layup recirculation return to SG #2	PC0233	4 4	SD-1114 SD-1116	- -	10.4.8-1	Gate Check	Secondary Coolant	(+?) -	Outside Inside	In	11 (56)	L/C O	- -	O/C O/C	LC C	HW -	- -	M -	C	Yes		Nonessential	

12.8⁽¹⁷⁾
27.9⁽¹⁷⁾
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12.5⁽¹⁷⁾
15.1⁽¹⁷⁾
17.6⁽¹⁷⁾
12.4⁽¹⁷⁾
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3.4⁽¹⁷⁾
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3.4⁽¹⁷⁾
2.6⁽¹⁷⁾
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2.6⁽¹⁷⁾
8.7⁽¹⁷⁾
22.9⁽¹⁷⁾
10.2⁽¹⁷⁾
40.7⁽¹⁷⁾
14.4⁽¹⁷⁾
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8.2⁽¹⁷⁾
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Table 6.2.4-1 (6 of 10)

Item No.	Service	Pene-traion No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe(ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justifi-cation for Not Testing	Essential/ Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut-down	Acci-dent								
65	Fire Protection water supply to containment Line #2	PC0253	6 6	FP-0030 FP-1440	30 -	9.5.1-1	Globe ⁽¹²⁾ Check	Fresh water	(+?) -	Outside Inside	In	8 (56)	C O	C -	C C	C C	P -	CIAS -	A,R,M -	C	Yes		Nonessential	⁽¹⁴⁾
67	PCW supply to containment ventilation units	PC0152	12 12	WI-0013 WI-1043	50 -	9.2.7-2	Gate ⁽¹²⁾ Check	Chilled water	(+?) -	Outside Inside	In	34 (56)	O O	C -	O O	C C	P -	CIAS -	A,R,M -	C	Yes		Nonessential	⁽¹⁴⁾
68	PCW return from containment ventilation units	PC0151	12 12 3/4	WI-0012 WI-0015 WI-0014	50 50 -	9.2.7-2	Gate ⁽¹²⁾ Gate ⁽¹²⁾ Relief	Chilled water	(+?) - -	Outside Inside Inside	Out	39 (56)	O O C	C AI -	O O C	C C C	P E -	CIAS CIAS RV setpoint	A,R,M A,R,M -	C	Yes		Nonessential	⁽¹⁴⁾
69	Containment radiation monitor (inlet)	PC0319	3/4 3/4	PR-432 PR-431	15 15	-	Gate ⁽¹²⁾ Gate ⁽¹²⁾	Containment Atmosphere	(+?) -	Outside Inside	Out	29 (56)	O O	AI AI	O O	C C	E E	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
70	Containment radiation monitor (outlet)	PC0319	3/4 3/4	PR-434 PR-1433	15 -	-	Gate ⁽¹²⁾ Check	Containment Atmosphere	(+?) -	Outside Inside	In	7 (56)	O O	AI -	O O	C C	E -	CIAS -	A,R,M -	C	Yes	-	Nonessential	
71	Containment pressure sensing line	PC0330 PC0260 PC0308 PC0404 PC0330 PC0260	3/4 3/4 3/4 3/4 3/4 3/4	CM-17 CM-18 CM-19 CM-20 CM-21 CM-22	OPEN OPEN OPEN OPEN OPEN OPEN	-	Globe Globe Globe Globe Globe Globe	Containment Atmosphere	(+?) (+?) (+?) (+?) (+?) (+?)	Outside Outside Outside Outside Outside Outside	Out Out Out Out Out Out	15 (56)	O O O O O O	O O O O O O	O O O O O O	S S S S S S	- - - - - -	R,M R,M R,M R,M R,M R,M	C	Yes	-	Essential		
72	Nitrogen supply to safety injection tanks and RDT	PC0318	1 1	NT-0004 NT-1016	15 -	-	Globe ⁽¹²⁾ Check	Nitrogen Gas	(+?) -	Outside Inside	In	34 (55)	O O/C	C -	O O/C	C C	P -	CIAS -	A,R,M -	C	Yes	-	Nonessential	
73	Containment air sample	PC0312	1/2 1/2	PX-0041 PX-0042	15 15	9.3.2-1	Gate Gate	Containment Atmosphere	- (+?)	Inside Outside	Out	27 (56)	C C	AI AI	C C	O/C O/C	E E	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
74	Containment drain sump pump discharge line	PC0141	4 4	DE-0006 DE-0005	20 20	9.3.3-1	Globe Globe	Primary Coolant	(+?) -	Outside Inside	Out	33 (56)	O O	C AI	O O	C C	P E	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
75	Containment air sample	PC0312	1/2 1/2	PX-0043 PX-1020	15 -	9.3.2-1	Gate Check	Containment Atmosphere	(+?) -	Outside Inside	In	5 (56)	C C	AI -	C C	O/C O/C	E -	CIAS -	A,R,M -	C	Yes	-	Nonessential	
76	Reactor drain tank gas space to GWMS	PC0307	1 1	GW-0002 GW-0001	15 15	11.3-1	Globe Globe	Gas	(+?) -	Outside Inside	In/Out	36 (56)	O O	C AI	O O	C C	S E	CIAS CIAS	A,R,M A,R,M	C	Yes	-	Nonessential	
77	Sample return to containment	PC0313	3/4 3/4	PX-0053 PX-1005	15 -	9.3.2-1	Globe Check	Borated Water	(+?) -	Outside Inside	In	30 (56)	C C	C -	C -	O/C O/C	S -	CIAS -	A,R,M -	C	Yes	-	Nonessential	
78	Non-condensable gas exhaust to containment	PC0242	6 6	CA-0013 CA-1023	30 -	10.4.2-1	Gate Check	Inleakage Air	(+?) -	Outside Inside	In	5 (56)	C C	AI -	C C	O/C O/C	E -	CIAS -	A,R,M	C	Yes	-	Nonessential	
79	Channel A containment monitor suction from Containment	PC0330	1/2 1/2 1/2	CM-001 CM-003 CM-023	15 15 15	-	Globe Globe Globe	Containment Atmosphere (Combustible Gas)	- (+?) -	Inside Outside Inside	Out	41 (56)	C C C	C C C	C C C	O/C O/C O/C	S S S	CIAS CIAS CIAS	A,R,M A,R,M A,R,M	C C C	Yes Yes Yes	-	Essential	
80	Channel A containment monitor discharge to containment	PC0308	1/2 1/2	CM-009 CM-1013	15 -	-	Globe Check	Containment Atmosphere (Combustible Gas)	(+?) -	Outside Inside	In	31 (56)	C C	C -	C C	O/C O/C	S -	CIAS -	A,R,M -	C	Yes	-	Essential	

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11.2 ⁽¹⁷⁾
5.5 ⁽¹⁷⁾
5.9 ⁽¹⁷⁾
18.8 ⁽¹⁷⁾
10.8 ⁽¹⁷⁾
6.3 ⁽¹⁷⁾
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22.5 ⁽¹⁷⁾
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3.9 ⁽¹⁷⁾
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6.3 ⁽¹⁷⁾
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8.3 ⁽¹⁷⁾
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5.2 ⁽¹⁷⁾
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21.5 ⁽¹⁷⁾
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Table 6.2.4-1 (7 of 10)

Item No.	Service	Penetration No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe(ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justification for Not Testing	Essential/Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut-down	Accident								
81	Channel B containment monitor suction from containment	PC0260	1/2	CM-002	15	-	Globe	Containment Atmosphere (Combustible Gas)	-	Inside	Out	41 (56)	C	C	C	O/C	S	CIAS CIAS CIAS	A,R,M	C	Yes	-	Essential	
			1/2	CM-004	15		(+?)		Outside				C	C	C	O/C	S		A,R,M	C	Yes			
			1/2	CM-024	15		-		Inside				C	C	C	O/C	S		A,R,M	C	Yes			
82	Channel B containment monitor discharge to containment	PC0404	1/2	CM-010	15	-	Globe	Containment Atmosphere (Combustible Gas)	(+?)	Outside	In	31 (56)	C	C	C	O/C	S	CIAS	A,R,M	C	Yes	-	Essential	
			1/2	CM-1014	-		-		Inside				C	-	C	O/C	-		-	-				
83	Channel A IRWST monitor Suction from IRWST	PC0308	1/2	CM-011	15	-	Globe	Containment Atmosphere (Combustible Gas)	-	Inside	Out	25 (56)	C	C	C	O/C	S	CIAS CIAS	A,R,M	C	Yes	-	Essential	
			1/2	CM-013	15		(+?)		Outside				C	C	C	O/C	S		A,R,M	C	Yes			
84	Channel B IRWST monitor suction IRWST	PC0404	1/2	CM-012	15	-	Globe	Containment Atmosphere (Combustible Gas)	-	Inside	Out	25 (56)	C	C	C	O/C	S	CIAS CIAS	A,R,M	C	Yes	-	Essential	
			1/2	CM-014	15		(+?)		Outside				C	C	C	O/C	S		A,R,M	C	Yes			
85	IRWST to boric acid makeup pump	-	4 4	IW-005 IW-006	20 20	6.8-3	Gate Gate	Borated Water	(+?) (+?)	Outside Outside	Out	37 (56)	O/C	A1	O/C	O/C	E	CIAS CIAS	A,R,M A,R,M	A	No	(11)	Nonessential	
86	Auxiliary steam supply	PC0143	2 1/2 2 1/2	AS-1016 AS-1017	N/A N/A	10.4.10-1	Globe Globe	Steam	(+?) -	Outside Inside	In	26 (56)	LC LC		LC LC	LC LC	HW HW	-	M M	C	Yes	-	Nonessential	
87	EC SBS supply line	PC0135	6 6	CS-1013 CS-1014	- -	6.2.2-1	Gate Check	Air	(+?) -	Outside Inside	In	11 (56)	LC C	- -	LC C	O/C O/C	- -	- -	M -	C	Yes	-	Nonessential	
88	IRWST level instrument upper tap isolation	PC0350 PC0349 PC0351 PC0352	1	IW-010	15	6.8-3	Globe	Borated Water	(+?)	Outside	Out	16 (56)	O	O	O	O	S	-	R,M	C	Yes	-	Essential	
			1	IW-022	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-024	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-026	15		(+?)		Outside				O	O	O	O	S		R,M					
89	IRWST level instrument lower tap isolation	-	1	IW-011	15	6.8-3	Globe	Borated Water	(+?)	Outside	Out	16 (56)	O	O	O	O	S	-	R,M	A	No	Note 11	Essential	
			1	IW-023	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-025	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-027	15		(+?)		Outside				O	O	O	O	S		R,M					
90	HVT Level Instrument isolation	PC0344 - PC0345 - PC0346 - PC0347 - PC0348 -	1	IW-012	15	6.8-3	Globe	Borated Water	(+?)	Outside	Out	16 (56)	O	O	O	O	S	-	R,M	C	Yes	-	Essential	
			1	IW-013	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-014	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-015	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-016	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-017	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-018	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-019	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-020	15		(+?)		Outside				O	O	O	O	S		R,M					
91	Reactor cavity instrument isolation	PC0340 - PC0341 - PC0342 - PC0343 -	1	IW-018	15	6.8-3	Globe	Borated Water	(+?)	Outside	Out	16 (56)	O	O	O	O	S	-	R,M	C	Yes	-	Essential	
			1	IW-019	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-020	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-021	15		(+?)		Outside				O	O	O	O	S		R,M					
			1	IW-032	15		(+?)		Outside				O	O	O	O	S		R,M					

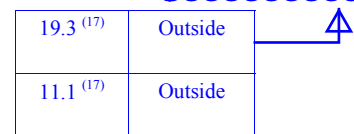
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5.4 ⁽¹⁷⁾
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17.4 ⁽¹⁷⁾
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6.0 ⁽¹⁷⁾
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19.7 ⁽¹⁷⁾
19.4 ⁽¹⁷⁾
22.9 ⁽¹⁷⁾
4.9 ⁽¹⁷⁾
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15.9 ⁽¹⁷⁾
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22.6 ⁽¹⁷⁾
21.8 ⁽¹⁷⁾
23.1 ⁽¹⁶⁾
23.1 ⁽¹⁶⁾
22.2 ⁽¹⁷⁾
21.0 ⁽¹⁷⁾
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22.2 ⁽¹⁷⁾
22.6 ⁽¹⁷⁾
22.8 ⁽¹⁷⁾
20.8 ⁽¹⁷⁾
23.1 ⁽¹⁶⁾
23.1 ⁽¹⁶⁾
23.1 ⁽¹⁶⁾

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Table 6.2.4-1 (9 of 10)

Item No.	Service	Pene- traion No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe(ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justifi- cation for Not Testing	Essential/ Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut- down	Acci- dent								
130	(Electric)	EC4-014	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
131	(Electric)	EC4-015	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
132	(Electric)	EC4-016	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
133	(Electric)	EC4-017	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
134	(Electric)	EC4-018	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
135	(Electric)	EC4-019	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
136	(Electric)	EC4-020	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
137	(Electric)	EC4-021	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
138	(Electric)	EC4-022	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
139	(Electric)	EC4-023	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
140	(Electric)	EC4-024	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
141	(Electric)	EC4-025	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
142	(Electric)	EC4-026	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
143	(Electric)	EC4-027	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
144	(Electric)	EC4-028	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
145	(Electric)	EC4-029	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
146	(Electric)	EC4-030	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
147	(Electric)	EC4-031	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
148	(Electric)	EC4-032	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
149	(Electric)	EC4-033	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
150	(Electric)	EC4-034	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
151	(Electric)	EC4-035	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
152	(Electric)	EC4-036	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
153	(Electric)	EC4-037	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
154	(Electric)	EC4-038	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
155	(Electric)	EC4-039	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
156	(Electric)	EC4-040	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
157	(Electric)	EC4-041	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
158	(Electric)	EC4-042	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
159	(Electric)	EC4-043	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
160	(Electric)	EC4-044	-	-	-	-	-	-	-	-	-	47(-)	-	-	-	-	-	-	B	No	-	-		
161	Containment low volume purge supply system	PC166	10	VQ-2024	-	9.4.6-2	Gate	Containment Atmosphere	⁽¹⁷⁾	Inside Outside	Out	43(56)	C	C	C	C	-	-	M	C	Yes	-	Nonessential	for ILRT/SIT air supply & exhaust connection
162	Containment low volume purge supply system	PC417	1	VQ-2014	-	9.4.6-2	Globe	Containment Atmosphere	⁽¹⁷⁾	Inside Outside	Out	43(56)	C	C	C	C	-	-	M	C	Yes	-	Nonessential	for ILRT/SIT pressure gauge connection



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12.0⁽¹⁷⁾ Outside

Table 6.2.4-1 (10 of 10)

Item No.	Service	Penetration No	Line Size (in)	Valve No.	Closure Time (sec)	Figure No.	Valve Type	Fluid	Length of Pipe(ft) ⁽¹⁵⁾	Location Relative to Containment	Flow Direction Relative to Containment	Valve Arrangement (GDC) ⁽²⁾	Valve Position ⁽³⁾				Actuator Type ⁽⁴⁾	Actuation Signal ⁽⁵⁾	Type ⁽⁶⁾	Type Test	Type-C Test	Justification for Not Testing	Essential/Nonessential Line ⁽⁷⁾	Remark
													Normal	Fail Safe	Shut-down	Accident								
163	Containment low volume purge supply system	PC316	1	VQ-2016	-	9.4.6-2	Globe	Containment Atmosphere	12.0 ⁽¹⁷⁾	Inside Outside	Out	43(56)	C	C	C	C	-	-	M	C	Yes	-	Nonessential	for ILRT verification test connection
164	(Spare)	PC0154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
165	(Spare)	PC0156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
166	(Spare)	PC0164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
167	(Spare)	PC0165	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
168	(Spare)	PC0168	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
169	(Spare)	PC0169	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
170	(Spare)	PC0235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
171	(Spare)	PC0235	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
172	(Spare)	PC0248	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
173	(Spare)	PC0257	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
174	(Spare)	PC0258	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
175	(Spare)	PC0261	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-
176	(Spare)	PC0263	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No	No	-	-	-	-

(1) Valve closure time is established based on system considerations, but all valves stroke to their designated position upon actuation as soon as practicable. An upper limit of 60 seconds as shown in the table is used in stroke time determination except for the low volume purge system supply and exhaust valves, which are required to close in 30 seconds per Subsection 15.6.5.2. Valve closure time is shown for these valves, which receive a CIAS. CIAS signal generation time is not included in the valve closure times shown in this table.

(2) Valve arrangements are shown in Figure 6.2.4-1.

(3) Valve position abbreviations
 O – Open C - Closed
 O/C – Open or Closed LO - Locked Open#
 LC – Locked Closed# AI - Fails-As-Is
 # If other than handwheel-operated manual valve, valve actuator operability is controlled by administrative means(e.g., removing actuator power, air supply, using key-controlled switch).

(4) Actuator type abbreviations
 E – motor operated (electric powered)
 P – pneumatically operated (compressed air powered), except as qualified by Note 13
 HW – manual handwheel operated
 S – solenoid operator
 EH – electro hydraulic operated

(5) Definition of actuation signals
 CIAS – containment isolation actuation signal
 AFAS – auxiliary feedwater actuation signal
 DPS AFAS – diverse protection system auxiliary feedwater actuation signal
 HRAS – high radiation actuation signal
 HHAS – high humidity actuation signal
 SIAS – safety injection actuation signal
 CSAS – containment spray actuation signal
 MSIS – main steam isolation signal
 BFTHHLAS – blowdown flash tank high-high level actuation signal
 CCWSTLLAS – component cooling water surge tank low low level actuation signal
 CPIAS – containment purge isolation actuation signal
 All of above signals are engineered safety feature (ESF) signals and classified as ESF valves except HRAS, HHAS, CCWLLSTAS, BFTHHLAS, and DPS AFAS.

(6) Abbreviations for actuation signal types
 A – automatically initiated
 R – remotely initiated
 M – manually initiated

(7) Essential lines are lines that are required for safe shut down of the reactor or to mitigate the consequences of an accident. Nonessential lines are either be locked closed through manual valves or automatically isolated upon a CIAS or approved automatic signal unless the line is provided with a regulatory exemption.

(8) Main steam isolation valves are piston-operated, using process fluid.

(9) The main steam, main feedwater, auxiliary feedwater, sample and blowdown lines are all connected to the secondary side of the steam generator, which is kept at a higher pressure than the primary side soon after a LOCA occurs. Any leakage between the primary and secondary sides of the steam generators is directed inward to the containment. Refer to Table 3.9-15 for qualitative in-service leakage testing to periodically access valve degradation.

(10) The shutdown cooling system (SCS), which functions to remove reactor decay heat during shutdown, are operated during Type-A tests to maintain the unit in a safe condition.

(11) An effective fluid seal on these penetrations is provided by the IRWST (in-containment refueling water storage tank).

(12) Maximum valve closure time on CIAS is 60 sec.

(13) Maximum valve closure time on CIAS is 30 sec.

(14) During Type-A test, the fire protection system (FP) is operated to supply fire water for fire protection and plant chilled water system (WI) is operated to supply chilled water for containment fan cooler (RCFC), when required.

(15) The value is the length of pipe from containment penetration anchor to outermost isolation valve (or the maximum length that is not exceeded in further design) conservatively estimated since an operational plant does not have the valve. The value in the length of pipe is subject to change during the detailed design phase.

(16) The value in the length of pipe is the scope of DCD in accordance with the graded approach.

(17) The value in the length of pipe is out of scope of DCD in accordance with the graded approach. from an operational plant and subject to change during the detailed design phase.

(18) An effective fluid seal is maintained on these penetrations by safety injection pump (SIP) or shutdown cooling pump (SCP) during post-accident conditions. During normal operation, an effective fluid seal is maintained by the static head of the IRWST acting through the safety injection piping, safety injection filling tanks (SIFTs) that are to fill SIS piping in accordance with Technical Specification surveillance requirements, and check valves located at downstream of safety injection and shutdown cooling pumps. The fluid seal within the pipe would preclude release of containment atmosphere to the environs.

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Table 2.11.3-1 (6 of 19)

Item No.	Valve Type	Penetration No	Arrangement No. ⁽²⁾	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal ⁽³⁾	Active Safety Function	Loss of Motive Power Position
Feedwater System													
FW-V121	E/H	PC0511	40	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V122	E/H	PC0511	40	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V123	E/H	PC0521	40	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V124	E/H	PC0521	40	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V131	E/H	PC0512	12	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V132	E/H	PC0512	120	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V133	E/H	PC0522	12	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V134	E/H	PC0522	12	5	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V138	SOV	PC0512	12	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
FW-V139	SOV	PC0522	12	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	MSIS	Close	Close
Gaseous Radwaste System													
GW-V0001	MOV	PC0307	36	15	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
GW-V0002	SOV	PC0307	36	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
Instrument Air System													
IA-V0020	AOV	PC0145	34	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
IA-V1601	Check	PC0145	34	-	Inside	2	I	No/Yes	No/No	No/No	-	Close	-

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CSAS

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Table 2.11.3-1 (12 of 19)

Item No.	Valve Type	Penetration No	Arrangement No. ⁽²⁾	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal ⁽³⁾	Active Safety Function	Loss of Motive Power Position
Radiation Monitoring System													
PS-V0031	SOV	PC0331	42	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PC0438	SOV	PC0311	42	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0033	SOV	PC0333	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0034	SOV	PC0436	32	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0035	SOV	PC0332	38	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0036	SOV	PC0437	38	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PS-V0257	SOV	PC0331	42	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close
PC0438	SOV	PC0311	42	15	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS, AFAS, MSIS	Close	Close

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Table 2.11.3-1 (18 of 19)

Item No.	Valve Type	Penetration No	Arrangement No. ⁽²⁾	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal ⁽³⁾	Active Safety Function	Loss of Motive Power Position
Reactor Containment Building Purge System													
VQ-V0011	E/H	PC0250	28	5	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0012	MOV	PC0250	28	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	As-is
VQ-V0013	MOV	PC0249	28	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	As-is
VQ-V0014	E/H	PC0249	28	5	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0031	AOV	PC0247	2	5	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0032	AOV	PC0247	2	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0033	AOV	PC0246	21	5	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close
VQ-V0034	AOV	PC0246	21	5	Outside	2	I	Yes/No	Yes/Yes	Yes/Yes	CIAS ESF-CPIAS	Close	Close

VQ-V2014	Manual	PC0417	43	-	Outside	2	I	No/No	No/No	No/No	-	Close	-
VQ-V2016	Manual	PC0316	43	-	Outside	2	I	No/No	No/No	No/No	-	Close	-
VQ-V2024	Manual	PC0166	43	-	Outside	2	I	No/No	No/No	No/No	-	Close	-

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Table 2.11.3-1 (19 of 19)

Item No. ⁽¹⁾	Valve Type	Penetration No	Arrangement No. ⁽²⁾	Closure Time (sec)	Location Relative to Containment	ASME Section III Class	Seismic Category	Class 1E/ Harsh Envir.	Control/ Display at MCR	Control/ Display at RCR	Control Signal ⁽³⁾	Active Safety Function	Loss of Motive Power Position
Plant Chilled Water System													
WI-V0012	AOV	PC0151	39	50	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
WI-V0013	AOV	PC0152	34	50	Outside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	Close
WI-V0014	Relief	PC0151	39	-	Inside	2	I	-/Yes	No/No	No/No	-	-	-
WI-V0015	MOV	PC0151	3339	50	Inside	2	I	Yes/Yes	Yes/Yes	Yes/Yes	CIAS	Close	As-is
WI-V1043	Check	PC0152	34	-	Inside	2	I	-/Yes	No/No	No/No	-	Close	-

- (1) Dash(-) indicates not applicable.
- (2) Valve arrangements are shown in Figure 2.11.3-1.
- (3) Definition of actuation signals.

AFAS - Auxiliary Feedwater Actuation Signal
 CIAS - Containment Isolation Actuation Signal
 CPIAS - Containment Purge Isolation Actuation Signal
 CSAS - Containment Spray Actuation Signal
 SIAS - Safety Injection Actuation Signal
 MSIS - Main Steam Isolation Signal

All above signals are engineered safety feature (ESF) signal and classified as ESF valves.