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From: Eudy, Michael
Sent: Friday, June 13, 2014 2:45 PM
To: ArevaEPRDCDocsPEm Resource
Subject: FW: Ch 10 - Part 2
Attachments: Chapter 10 Changes for Rev 7 Part 2.pdf

From: HOTTLE Nathan (AREVA) [mailto:Nathan.Hottle@areva.com]
Sent: Friday, June 13, 2014 2:27 PM
To: Eudy, Michael
Cc: Wunder, George
Subject: Ch 10 - Part 2

Mike – We made a few editorial fixes summarized below. If the technical staff is reviewing the package we provided last night, that should be fine. We can discuss what was changed on Monday. I broke it up again to avoid any email restrictions.

- Added boxes to Figure 10.3-1, Sheet 2 of 2, to enclose area of change. No actual change to figure. (PDF Part 1 page 18 of 32)
- Removed page 10.4-18 (incorrect page). Replaced with page 10.4-19, showing change to Section 10.4.4.2.3. (PDF Part 1 page 32 of 32)
- Added new page 10.4-87 to package, showing change to Section 10.4.9.3. (PDF Part 2 page 24 of 34)
- Added boxes to Figure 10.4.9-1, Sheet 1 of 3, to enclose area of change. No actual change to figure. (PDF Part 2 page 27 of 34)

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Section 10.4.5, Circulating Water System

- Figure 10.4.5-1, Circulating Water System Flow Diagram
  - Removed incorrect nomenclature of system identifier on index

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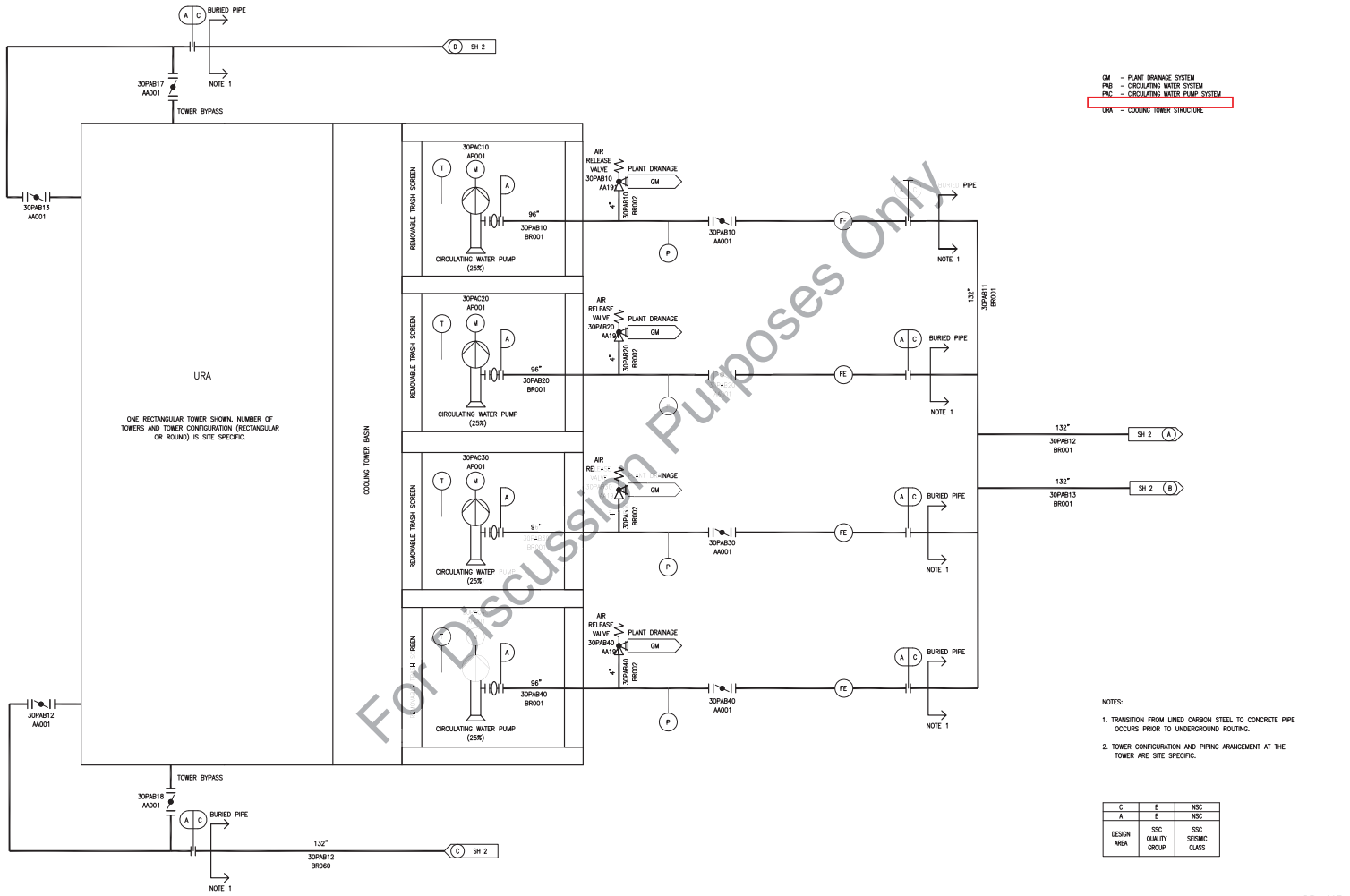
Figure 10.4.5-1—Circulating Water System Flow Diagram
Sheet 1 of 2



Section 10.4.7, Condensate and Feedwater System

- Table 10.4.7-1, Main Feedwater Safety-Related Piping and Valves
  - Conforming change for Main Feedwater Piping so that the design flow rate is consistent with heat balance flow rate
- Table 10.4.7-2, Condensate and Feedwater System Single Failure Active Failure Analysis
  - Item 5: Corrected typo on naming of MFWIV
- Figure 10.4.7-1, Condensate and Feedwater System (Sht 1 of 2)
  - Conforming change for design pressure boundaries
  - Added quality group, design pressure and temperature, and seismic classification as Group R

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Section 10.4.7 (cont'd)

- 10.4.7.3, Safety Evaluation
  - Conforming change for Condensate and Feedwater System so that the quality group and seismic category is consistent with design requirements
- Table 3.2.2-1, Classification Summary
  - Conforming changes for various systems so that the classifications listed on this table are consistent with design requirements
- Table 3.10-1, List of Seismic and Dynamically Qualified Mechanical and Electrical Equipment
  - Conforming changes for various systems/equipment so that the EQ Designated Function and Safety Class is consistent

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Table 10.4.7-1—Main Feedwater Safety-Related Piping and Valves
Sheet 1 of 3

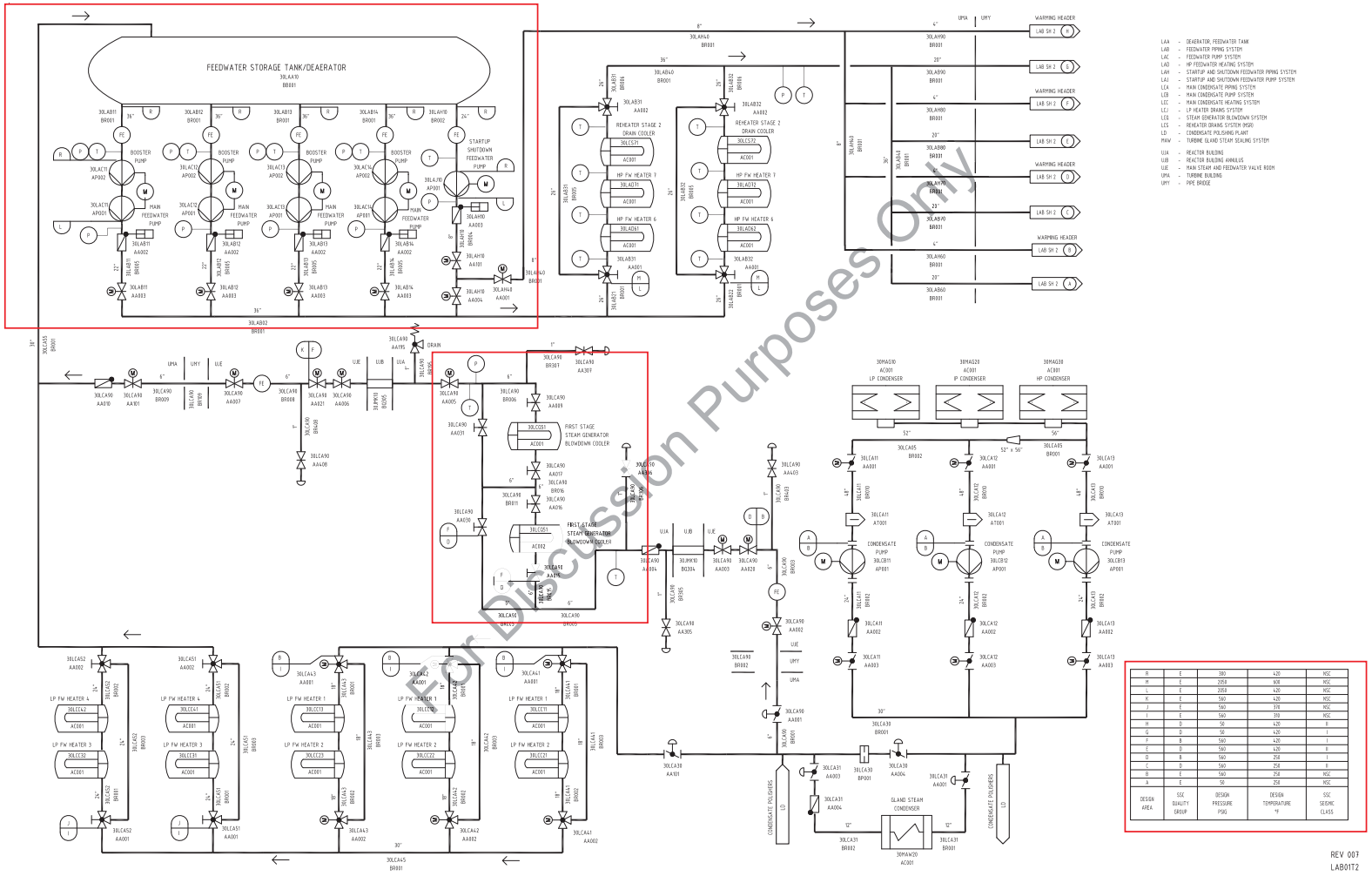
Main Feedwater Piping (Safety-Related Portion)	
Design (VWO) flow rate	21,479,950 lb/hr ~~21,492,900 lb/hr~~
Number of lines	4
Main line nominal size	20 in.
Piping MFWCKV Outlet to SG	
Schedule	120
Design pressure	1435 psig
Design temperature	600°F
Design code	ASME Section III, Class 2
Seismic design	Category I
Piping MFWIV to MFWCKV	
Schedule	160
Design pressure	2050 psig
Design temperature	600°F
Design code	ASME Section III, Class 2
Seismic design	Category I
Piping Main 20 Inch Line Fixed Point Restraint to MFWIV	
Schedule	140
Design pressure	2050 psig
Design temperature	600°F
Design code	ASME Section III, Class 3
Seismic design	Category I
Piping 10 Inch Line Low Load	
Schedule	140
Design pressure	2050 psig
Design temperature	600°F
Design code	ASME Section III, Class 3
Seismic design	Category I

Table 10.4.7-2—Condensate and Feedwater System Single Active Failure Analysis

	Component	Failure	Comments
1	Main feedwater full load isolation valves (MFWFLIV)	Loss of power from one power supply	Loss of one power supply has no effect on ability of valve to close. Valve actuator has 2 redundant closure systems. Valve closure is controlled by 2 cross-division power supplies provided to the actuator closing systems.
		Valve fails to close upon receipt of automatic signal	Redundant isolation valves MFWFLCV and MFWIV provided in each main feedwater line.
2	Main feedwater low load isolation valves (MFWLLIV)	Loss of power from one power supply	Redundant, cross-division power supply provided.
		Valve fails to close upon receipt of automatic signal	Redundant isolation valve MFWLLCV and MFWIV provided.
3	Main feedwater full load control valves (MFWFLCV)	Loss of power from one power supply	Redundant, cross-division power supply provided.
		Valve fails to close upon receipt of automatic signal	Redundant isolation valves MFWFLIV and MFWIV provided in each main feedwater line.
4	Main feedwater low load control valves (MFWLLCV)	Loss of power from one power supply	Redundant, cross-division power supply provided.
		Valve fails to close upon receipt of automatic signal	Redundant isolation valves MFWLLIV and MFWIV are provided.
5	Main feedwater very low load control valves (MFWVLLCV)	Loss of power from one power supply	Redundant, cross-division power supply provided.
		Valve fails to close upon receipt of automatic signal	Redundant isolation valves MFW~~FL~~IV and MFWLLIV are provided.
6	Main feedwater isolation valves (MFWIV)	Loss of power from one power supply	Redundant, cross-division power supply provided.
		Valve fails to close upon receipt of automatic signal	Redundant isolation valves MFWFLIV and MFWLLIV are provided.

Next File

Figure 10.4.7-1—Condensate and Feedwater System
Sheet 1 of 2



ATWS – Loss of Normal Feedwater

The secondary side response is the same as for ATWS – Loss of Offsite Power.

Refer to Chapter 15 for a description of accident analyses.

10.4.7.3 Safety Evaluation

The design of the safety-related portions of the CFS satisfies GDC 2 regarding the effects of natural phenomena.

- Safety-related portions of the CFS are located inside containment and valve rooms, which are part of the SBs. Safeguard Buildings 1 and 4 each contain two valve rooms. These buildings are designed to withstand the effects of natural phenomena, such as earthquakes, tornadoes, hurricanes, floods, tsunami and seiches. Section 3.3, Section 3.4, Section 3.5, Section 3.7 and Section 3.8 provide the bases for the adequacy of the structural design of these buildings.

- Safety-related portions of the CFS are designed to remain functional during and after a safe shutdown earthquake (SSE). Section 3.7 provides the design loading conditions that are considered.

- Consistent with the guidance in RG 1.29, the condensate system piping penetrating the containment and the associated CIVs are designed to Seismic Category I requirements. The condensate system piping inside containment or valve rooms that is not Seismic Category I, is designed to Seismic Category II requirements. Also consistent with the guidance in RG 1.29, feedwater system piping that is part of the primary and secondary reactor containment, is designed to Seismic Category I requirements; these design requirements extend to the first seismic restraint beyond the defined boundary.

- Portions of the condensate system penetrating the containment and the associated CIVs are designated Quality Group B and designed as ASME Boiler and Pressure Vessel Code, Section III, Class 2 (Reference 2) components. The cooling water supply and return piping inside containment is designated Quality Group ~~D~~B and Seismic Category ~~II~~I.

- Feedwater system CIVs and adjacent piping up to the SGs are designated Quality Group B and designed as ASME Code, Section III, Class 2 components subject to the requirements of Subsection NC. Feedwater system piping upstream of the CIVs up to the fixed restraint, is designated Quality Group C and designed as ASME Boiler and Pressure Vessel Code, Section III, Class 3 (Reference 4) components subject to the requirements of Subsection ND.

- Inside the four valve rooms, the feedwater piping is routed in four individual and separate trains so that internal flooding does not prevent the main feedwater system (MFWS) from performing its safety-related functions. Refer to Section 3.4.3.4 for a discussion of flooding in the valve compartments. Critical components in the MFWS are located inside the feedwater valve rooms.

Table 3.2.2-1—Classification Summary
Sheet 118 of 198

KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
QJB	Piping and Valves Inside Containment from Containment Isolation Valve to LCQ	S	B	I	Yes	UJA	ASME Class 2[2]
AUXILIARY SYSTEMS							
JMM	**Leak-off System**						
JMM30	Containment Inflating/ Deflating Subsystem - Air Intake and Discharge Piping	NS	E	NSC	No	UFA	ANSI/ASME B31.1[6]
JMM10	Containment Leaktightness Test Subsystem - Contaminant Isolation Valves and Related Piping	S	B	I	Yes	UJA, UJB, UJH	ASME Class 2[2]
JMM10	Containment Leaktightness Test Subsystem - Remaining Piping	NS	E	NSC	No	UJA, UJB, UJH, UZT	ANSI/ASME B31.1[6]
KT	**Nuclear Island Drain & Vent Systems**						
30KTC10 AP004	Annular Sump Pump - UJB	NS	D	NSC	No	UJB	Manufacturer Standards
30KTA10 AA017	Containment Isolation Valve	S	B	I	Yes	UJA	ASME Class 2[2]

Table 3.2.2-1—Classification Summary
Sheet 151 of 198

KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
30LAB60/70/80/90 AA307	Pressure Transmitter Isolation Valves	S	C	I	Yes	UJE	ASME Class 3[3]
30LAB60/70/80/90 CT708	Temperature Sensor Downstream of Flow Meters	S	N/A	I	Yes	UJE	
30LAB60/70/80/90 CT762	Temperature Sensors Downstream of FL/LL Junctions	S	N/A	I	Yes	UJE	
30LAB60/70/80/90 CT763	Temperature Sensors Downstream of FL/LL Junctions	S	N/A	I	Yes	UJE	
30LAB60/70/80/90 AA501	Vent Valves Downstream of FLCVs	S	C	I	Yes	UJE	ASME Class 3[3]
30LAB64/74/84/94 CG704-706	Very Low Load Control Valve Position Sensors	NS-AQ	N/A	II	Yes	UJE	RG 1.29[25]
30LAB64/74/84/94 AA102	Very Low Load Control Valves	S	C	I	Yes	UJE	ASME Class 3[3]
MAG	**Main Condenser**	NS	N/A	NSC	No	UMA	
LC, LD	**Condensate System**						
LC	Balance of Condensate Piping Inside Containment	~~NS-AQ~~S	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6] RG 1.29[25]~~

Table 3.2.2-1—Classification Summary
Sheet 152 of 198

KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
LC	Balance of Condensate Piping, Excluding Condensate Polishing	NS	E	NSC	No	UMY, UMA	ANSI/ASME B31.1[6], ANSI/ASME B16.34[7]
30LCA90 AA403/ 408	Condensate Drain Second Isolation Valves	NS	E	NSC	No	2UJE	ANSI/ASME B31.1[6]
30LCA90 AA406/ 410	Condensate Drain Second Isolation Valves	~~NS~~ AQS	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6] RG 1.29[25]~~
30JMK10 BQ304/305	Condensate Line Containment Penetrations	S	B	I	Yes	UJB	ASME Class 2[2]
LC	Condensate Piping Associated With Containment Penetrations	S	B	I	Yes	UJA	ASME Class 2[2]
LC	Condensate Piping From 2UJE to Deaerator	NS	E	NSC	No	UMY, UMA	ANSI/ASME B31.1[6], ANSI/ASME B16.34[7]
LD	Condensate Polishing	NS	E	NSC	No	UMA	ANSI/ASME B31.1[6], ANSI/ASME B16.34[7], ASME VIII[8]
30LCA90 AA511	Condensate Vent Isolation Valve	~~NS~~ AQS	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6] RG 1.29[25]~~

Table 3.2.2-1—Classification Summary
Sheet 153 of 198

KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
30LCA90 AA503/ 508	Condensate Vent Isolation Valves	NS	E	NSC	No	2UJE	ANSI/ASME B31.1[6]
30LCA90 AA009	First Stage Blowdown Cooler Bypass Valve	~~NS~~ AQS	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6] RG 1.29[25]~~
30LCA90 AA015-017	First Stage Blowdown Cooler Bypass Valves	~~NS~~ AQS	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6] RG 1.29[25]~~
30LCA90 AA030/ 031	First Stage Blowdown Cooler Bypass Valves	~~NS~~ AQS	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6] RG 1.29[25]~~
30LCA90 AA401/ 402	First Stage Blowdown Cooler Drain Isolation Valves	~~NS~~ AQS	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6] RG 1.29[25]~~
30LCA90 AA501/ 502	First Stage Blowdown Cooler Vent Isolation Valves	~~NS~~ AQS	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6] RG 1.29[25]~~
30LCA90 AA301-304	Flow Transmitter Isolation Valves	NS	E	NSC	No	2UJE	ANSI/ASME B31.1[6]
30LCA90 AA311-314	Flow Transmitter Isolation Valves	NS	E	NSC	No	2UJE	ANSI/ASME B31.1[6]

Table 3.2.2-1—Classification Summary
Sheet 155 of 198

KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
30LCA90 AA306/ 307	Leak Test Valves	~~NS~~ AQS	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6]~~ ~~RG 1.29[25]~~
30LCA90 AA010	Outbound Condensate Check Valve	NS	E	NSC	No	UMA	ANSI/ASME B31.1[6]
30LCA90 AA007	Outbound Condensate Isolation Valve	NS	E	NSC	No	2UJE	ANSI/ASME B31.1[6]
LC	Outbound Condensate Piping in 2UJE	NS	E	NSC	No	2UJE	ANSI/ASME B31.1[6]
30LCA90 AA101	Outbound Condensate Temperature Control Valve	NS	E	NSC	No	UMA	ANSI/ASME B31.1[6]
30LCA90 AA005	Outbound Containment Isolation Valve - Inside Containment	S	B	I	Yes	UJA	ASME Class 2[2]
30LCA90 AA006	Outbound Containment Isolation Valve - 1st Outside Containment	S	B	I	Yes	2UJE	ASME Class 2[2]
30LCA90 AA021	Outbound Containment Isolation Valve - 2nd Outside Containment	S	B	I	Yes	2UJE	ASME Class 2[2]
30LCA90 AA195	Pressure Relief Valve	S	B	I	Yes	UJA	ASME Class 2[2]

Table 3.2.2-1—Classification Summary
Sheet 156 of 198

KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
30LCA90 AA182/ 184/186/188/191	Pressure Relief Valves	~~NS-AQ~~S	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6]~~ ~~RG 1.29[25]~~
30LCA90 AA310	Pressure Transmitter Isolation Valve	~~NS-AQ~~S	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6]~~ ~~RG 1.29[25]~~
30LCA90 AA320/ 330	Pressure Transmitter Isolation Valve	~~NS-AQ~~S	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6]~~ ~~RG 1.29[25]~~
30LCA90 CP002/ 402/501	Pressure Transmitters	NS-AQ	N/A	II	Yes	UJA	RG 1.29[25]
30LCA90 CT001/002	Temperature Transmitters	NS-AQ	N/A	II	Yes	UJA	RG 1.29[25]
30LCA90 CT401-403	Temperature Transmitters	NS-AQ	N/A	II	Yes	UJA	RG 1.29[25]
QU	**Secondary Sampling System**						
QUA, QUB, QUD, QUE, QUG, QUP, QUS	Secondary Sampling System Piping and Valves in UMA, UBA, UQA	NS	E	NSC	No	UMA, UBA, UQA	ANSI/ASME B31.1[6]
QUC	Balance of QUC System Components	NS	E ~~N/A~~	NSC	No	UFA, UKA	ANSI/ASME B31.1[6]

Table 3.10-1—List of Seismically and Dynamically Qualified Mechanical and Electrical Equipment
Sheet 197 of 200

Name Tag (Equipment Description)	Tag Number	Local Area KKS ID	EQ Environment (Note 1)	Radiation Environment Zone (Note 2)	EQ Designated Function (Note 3)	Safety Class (Note 4)	EQ Program Designation (Note 5)
FWDS Isolation Valve	30JMQ45AA001	34UJH	M	H	SII	NS-AQ SII	Y(5)
Gaseous Waste Processing System (GWPS)							
Containment Isolation Valve (UFA Side)	30KPL84AA002	30UFA	M	H	ES PAM SI	S C/NM	Y (3) Y (5)
Containment Isolation Valve (UJA side)	30KPL84AA003	30UJA	H	H	ES PAM SI	S C/NM	Y (4) Y (5)
Containment Isolation Valve (UJA side)	30KPL85AA003	30UJA	H	H	ES PAM SI	S C/NM	Y (4) Y (5)
Containment Isolation Valve (UFA side)	30KPL85AA004	30UFA	M	H	ES PAM SI	S C/NM	Y (3) Y (5)
Test Connection Isolation Valve	30KPL85AA202	30UJA	H	H	ES SI	S C/NM	Y (4) Y (5)
Condensate (Inside Containment) System (CS)							
Condensate to BD Coolers 1st Outside C I-V	30LCA90AA003	32UJE	M	M	ES PAM SI	S C/NM	Y (5)
Condensate Containment I-V	30LCA90AA004	30UJA	H	H	ES SI	S C/NM	Y (4) Y (5)
Condensate C I-V	30LCA90AA005	30UJA	H	H	ES PAM SI	S C/NM	Y (4) Y (5)
Condensate from BD Coolers 1st Outside C I-V	30LCA90AA006	32UJE	M	M	ES PAM SI	S C/NM	Y (5)
Condensate BD Cooler I-V	30LCA90AA009	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
Condensate BD Cooler I-V	30LCA90AA015	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
Condensate BD Cooler I-V	30LCA90AA016	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
Condensate BD Cooler I-V	30LCA90AA017	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
Condensate to BD Coolers 2nd Outside C I-V	30LCA90AA020	32UJE	M	M	ES PAM SI	S C/NM	Y (5)
Condensate from BD Coolers 2nd Outside C I-V	30LCA90AA021	32UJE	M	M	ES PAM SI	S C/NM	Y (5)
Condensate BD Cooler Bypass I-V	30LCA90AA030	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
Condensate BD Cooler Bypass I-V	30LCA90AA031	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
BD Cooler Shell Relief Valve	30LCA90AA182	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
BD Cooler Shell Relief Valve	30LCA90AA184	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
BD Cooler Bypass Relief Valve	30LCA90AA186	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)
Condensate Relief Valve by BD Cooler	30LCA90AA188	30UJA	H	H	~~SII~~SI	~~NS-AQ~~S C/NM	Y (4) Y (5)

Table 3.10-1—List of Seismically and Dynamically Qualified Mechanical and Electrical Equipment
Sheet 198 of 200

Name Tag (Equipment Description)	Tag Number	Local Area KKS ID	EQ Environment (Note 1)	Radiation Environment Zone (Note 2)	EQ Designated Function (Note 3)	Safety Class (Note 4)		EQ Program Designation (Note 5)	
Condensate Relief Valve by BD Cooler	30LCA90AA191	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
CondensateContainmentPenetration Relief	30LCA90AA195	30UJA	H	H	ES SI	S	C/NM	Y (4)	Y (5)
Condensate BD Cooler Press Instr I-V	30LCA90AA310	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
Condensate BD Cooler Press Instr I-V	30LCA90AA320	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
Condensate BD Cooler Press Instr I-V	30LCA90AA330	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
Condensate Drain I-V	30LCA90AA401	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
Condensate Drain I-V	30LCA90AA402	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
BD Cooler Drain Valve	30LCA90AA406	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
Condensate Drain Valve	30LCA90AA410	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
BD Cooler Vent Valve	30LCA90AA501	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
BD Cooler Vent Valve	30LCA90AA502	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
BD Cooler Vent Valve	30LCA90AA511	30UJA	H	H	~~SI~~SI	~~NS~~ ~~AQ~~S	C/NM	Y (4)	Y (5)
Central Gas Distribution (Nitrogen) System (CGDS)									
QJB Outside Containment Isolation Valve	30QJB40AA001	30UFA	M	H	ES PAM SI	S	C/NM	Y (3)	Y (5)
QJB INside Containment Isolation Valve	30QJB40AA002	30UJA	H	H	ES PAM SI	S	C/NM	Y (4)	Y (5)
QJB Outside Containment Isolation Valve	30QJB40AA003	30UFA	M	H	ES PAM SI	S	C/NM	Y (3)	Y (5)
QJB Inside Containment Isolation Valve #	30QJB40AA004	30UJA	H	H	ES PAM SI	S	C/NM	Y (4)	Y (5)
Operational Chilled Water System - Nuclear Island (OCWS)									
Outside Containment Isolation Valve #1	30QNJ41AA002	30UFA	M	H	ES PAM SI	S	C/NM	Y (3)	Y (5)
Inside Containment Isolation Valve #1	30QNJ41AA003	30UJA	H	H	ES SI	S	C/NM	Y (4)	Y (5)
Inside Containment Isolation Valve #2	30QNJ41AA027	30UJA	H	H	ES PAM SI	S	C/NM	Y (4)	Y (5)
Outside Containment Isolation Valve #2	30QNJ41AA028	30UFA	M	H	ES PAM SI	S	C/NM	Y (3)	Y (5)
OCWS Thermal Relief	30QNJ41AA192	30UJA	H	H	ES SI	S	C/NM	Y (4)	Y (5)
Secondary Sampling (SG Blowdown) System (SECSS)									

Section 10.4.8, Steam Generator Blowdown System (PWR)

- Figure 10.4.8-1, Steam Generator Blowdown System Discharge and Cooling (Sht 2 of 3)
  - Corrected system identifier on figure

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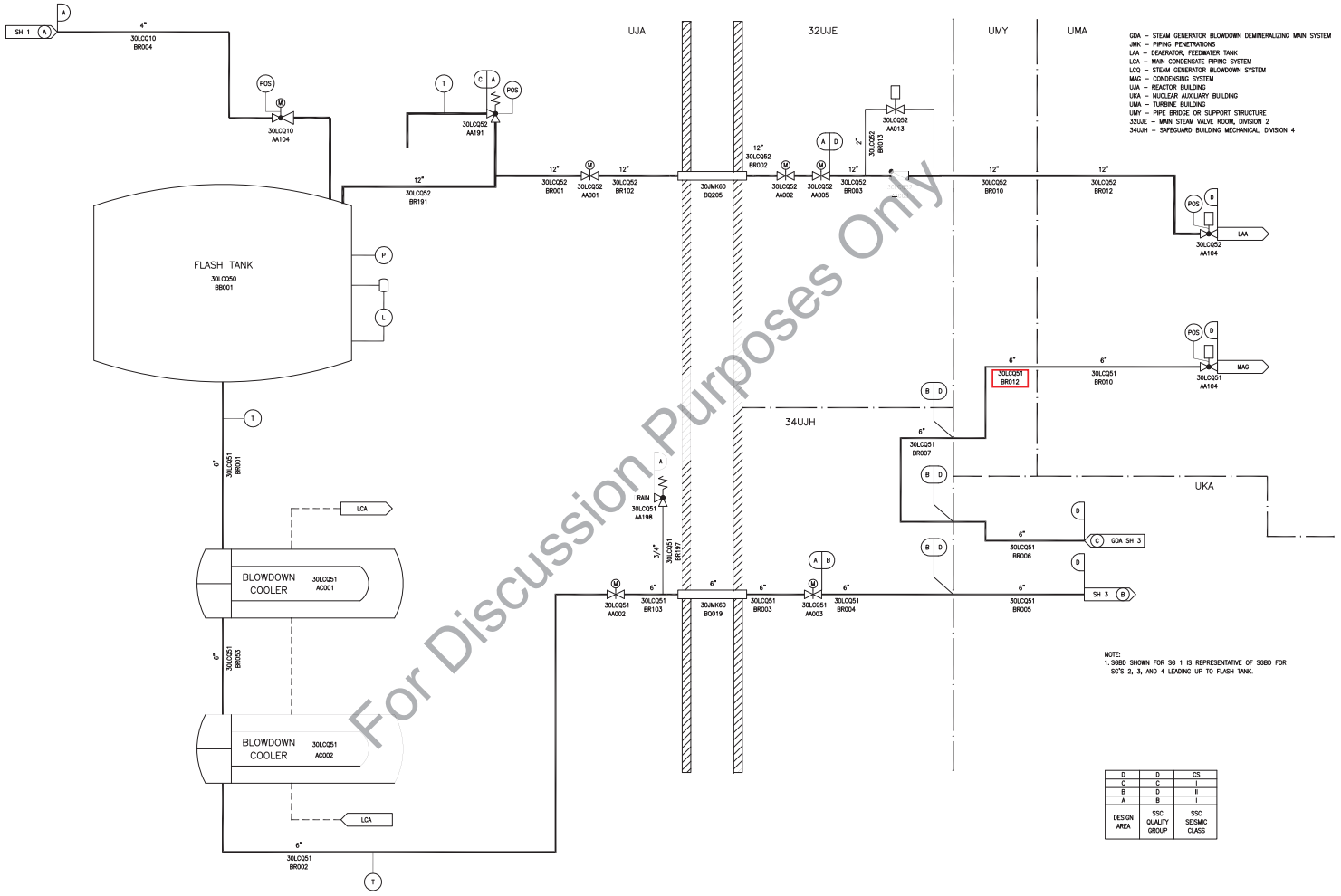
Figure 10.4.8-1—Steam Generator Blowdown System Discharge and Cooling
Sheet 2 of 3



Section 10.4.9, Emergency Feedwater System

- 10.4.9.2.3.3, Accident Conditions
  - Steam Generator Tube Rupture (SGTR) and Main Feedwater Line Break (MFWLB)
    - Corrected statement “within 30 minutes….” to “after 30 minutes” This change is consistent with Chapter 15 analysis since no operator action is credited before 30 minutes for any DBA .
- 10.4.9.3, Safety Evaluation
  - Conforming change for EFW flow based on SBO analysis, which states 144,000 gallons

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Section 10.4.9 (cont'd)

- Table 10.4.9-4, Emergency Feedwater System Indicating, Alarm, and Actuation Control Devices
  - Conforming change to remove local indication for EFW pump discharge pressure
- Table 10.4.9-5, EFWS Unreliability Results
  - Conforming change based on current PRA model in FSAR Chapter 19 (last updated 2013)
- Figure 10.4.9-1, Emergency Feedwater System Flow Diagram (Sht 1 of 3)
  - Conforming change to show valve size for drain on the fire water tie in (6 in. to 4 in. valve) and added 4 in. x 6 in. reducers

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resulting high-temperature condition and provides an alarm in the MCR to alert the operators to close the EFWS isolation valve and to promptly perform any other required actions to return the affected pump train to service.

10.4.9.2.3.3 Accident Conditions

Small Break Loss of Coolant Accident (SBLOCA)

A small break loss of coolant accident (SBLOCA) results in a loss of reactor coolant inventory which cannot be compensated for by the chemical and volume control system (CVCS). The loss of primary coolant results in a decrease in reactor coolant pressure and pressurizer level. The EFWS is automatically started if SG low level is reached. On safety injection signal, partial cool down is initiated to enable medium head safety injection (MHSI) flow.

A minimum of two EFWS trains are available to restore and maintain SG water inventory during RCS cooldown to RHR system entry conditions.

Steam Generator Tube Rupture (SGTR)

An SGTR results in a leak of primary coolant into the affected SG. The EFWS is utilized to assist in RCS cooldown, as necessary. In addition, EFWS flow to the affected SG can be isolated manually after 30 minutes or by the automatic closure of the SG isolation valve and the level control valve upon SG high level. The associated EFWS pump is shut down manually. A minimum of two EFWS trains are normally available to restore and maintain SG water inventory during RCS cool down to RHR system entry conditions.

In the unlikely event of an SGTR in one SG coincident with a single failure of another EFWS train and a third EFWS pump out for maintenance, only one intact SG is fed initially by the EFWS. ~~Within~~ After 30 minutes, the operator opens the required discharge header isolation MOVs to align the EFWS pump feeding the affected SG to feed an intact SG.

The EFWS maintains SG water inventory during RCS cooldown to RHR system entry conditions.

Main Steam Line Break (MSLB)

A MSLB results in a significant reduction of RCS pressure and temperature and associated positive reactivity. At break initiation the secondary side pressure falls, a reactor trip occurs and the main steam isolation valves (MSIV) close. The EFWS pump aligned to the affected SG automatically starts upon SG low level. The EFWS pump flow to the depressurized SG is limited by the flow control valve to protect the pump against run-out flow and to prevent RCS overcooling. The flow to the affected SG is

isolated manually from the MCR ~~within~~ after 30 minutes. A minimum of two EFWS trains are normally available to restore and maintain SG water inventory.

In the unlikely event of an MSLB on one loop coincident with a single failure of another EFWS train and a ~~third EFW pump~~ out for maintenance, only one intact SG is fed initially by the EFWS. ~~Within~~ After 30 minutes, the operator will open the required discharge header isolation MOVs to align the EFWS pump feeding the affected SG to feed an intact SG.

The EFWS maintains SG water inventory during RCS cooldown to RHR system entry conditions.

Main Feedwater Line Break (MFWLB)

A main feedwater line break (MFWLB) results in a significant loss of SG water mass leading to a RCS heat-up. The MFWLB accident is the most limiting accident for EFWS flow. The break results in a reactor trip and closure of the MSIVs. The main steam relief train opens and low level in all the SGs is reached. The EFWS is automatically actuated and the EFWS pump flow to the depressurized SG is limited by the flow control valve to protect the pump against runout flow. The flow to the affected SG is isolated manually from the MCR ~~within~~ after 30 minutes. A minimum of two EFWS trains are normally available to restore and maintain SG water inventory.

In the unlikely event of an MFWLB on one loop coincident with a single failure of another EFWS train and a third EFWS pump out for maintenance, only one intact SG is fed initially by the EFWS. ~~Within~~ After 30 minutes, the operator opens the required discharge header isolation MOVs to align the EFWS pump feeding the affected SG to feed an intact SG.

The EFWS maintains SG water inventory during RCS cooldown to RHR system entry conditions.

10.4.9.3 Safety Evaluation

The design of the EFWS satisfies GDC 2 regarding protection from the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, and external missiles.

- The Reactor Building and Safeguard Buildings that house the EFWS are Seismic Category I designed structures that are also located and designed to provide protection from flood, hurricane/tornado winds and missiles. Section 3.4, Section 3.5, Section 3.7, and Section 3.8 provide the bases for the adequacy of the structural design of these buildings with respect to natural phenomena.

- The EFWS normal and makeup water supplies are clean water stored in tanks or pools that are not susceptible to common-mode failures caused by blockage.

- Detailed equipment specifications, vendor quality assurance (QA) of equipment manufacturing, owner oversight of manufacturing activities, shop testing, and pre-service and in-service inspection will reduce the risk of hardware-related common-cause factors. QA and testing programs will be established for the EFWS-related hardware.

- In the unlikely event that the emergency feedwater capability is lost due to a common cause failure, the effects are reduced by the plant's large primary and secondary water inventories. Analysis of a postulated loss of the EFWS without taking mitigating actions shows that the time to steam generator dry-out is greater than 1.5 hours, and that the core remains covered with sub-cooled water for greater than 2 hours. The analysis of this beyond design basis event assumed:

  - A LOOP with the plant running at full-load steady state power.

  - Normal operating steam generator and pressurizer levels.

  - Best estimate decay heat curve.

  - Primary and secondary temperature and pressure conditions, and latent heat as calculated by S-RELAP5.

This extended coping time provides time for compensatory actions to initiate decay heat removal. For example, following a loss of normal and emergency AC power, two EFW pumps can be energized from the alternate source of AC power and the pumps started from the control room ~~within~~ after 30 minutes of the initiating event. The SBO timeline is further described ~~in Section~~ 8.4.2.6.2.

Depending on the initiating event, other compensatory measures that may be used for decay heat removal include:

- Removing core decay heat using the plant's safety-related feed and bleed capability.

- Removing core decay heat using the plant's non-safety-related Startup Feedwater system or the plant's non-safety-related Main Feedwater system.

The design of the EFWS satisfies GDC 45 as is relates to provisions for periodic inservice inspection of system components and equipment as described in Section 10.4.9.4.

The design of the EFWS satisfies GDC 46 regarding provisions made to permit appropriate functional testing of the system and components, as described in Section 10.4.9.4.

The design satisfies 10 CFR 50.62 regarding provisions for automatic initiation in an ATWS. A diverse low SG level EFWS actuation signal is provided for ATWS mitigation.

The design of the EFWS satisfies 10 CFR 50.63 regarding the capability for responding to a SBO. Station blackout is addressed in Section 8.4.

- Trains 1 and 4 of the EFWS are powered from the SBODGs, including the air recirculation fans of the room coolers for these EFWS pumps. The cooling medium for these coolers is supplied by the safety chilled water system (SCWS), which is also powered by the SBODGs.

- The EFWS water inventory required to meet SBO requirements is ~~166~~ 144,000 gallons. This is based on the EFWS providing the necessary flow for decay heat removal while remaining in the hot standby conditions for eight hours.

10.4.9.4 Inspection and Testing Requirements

During fabrication of the EFWS components, tests and inspections are performed and documented in accordance with code requirements to verify quality construction. As necessary, performance tests of components are performed in the vendor facility. The EFWS is designed and installed to permit in-service inspections and tests in accordance with ASME operation and maintenance (OM) code requirements (Reference 5).

The EFWS components are inspected and tested as part of the initial plant startup. Refer to Section 14.2 (test abstract #020, #021, #153, #154 and #195) for initial plant startup test program. Consistent with the recommendations of Reference 2, a 48-hour endurance test is performed on the EFWS pumps to demonstrate the pumps have the capability for continuous operation over an extended time period without failure. The layout of the system pumps, valves, and piping facilitate periodic inspection. Adequate room and accessibility is provided to conduct the required examinations.

The EFWS is a standby system that is not routinely operated, except for testing. After the plant is brought into operation, tests to verify proper operation of the EFWS components are conducted. These tests supplement the system level tests by verifying acceptable performance of each active component in the EFWS. Pumps and valves are tested in accordance with Reference 5. The capability to perform quarterly full-flow testing is provided. The inservice testing program is described in Section 3.9.6 and the surveillance requirements for the EFWS are detailed in Chapter 16.

Table 10.4.9-4—Emergency Feedwater System Indicating, Alarm, and Actuation Control Devices

Device	Indication (CR)	Indication (Local)	Alarm (CR)	Actuation
EFW pool level wide range	X	X	X	
EFW pool level narrow range	X		X	(H) Isolate DI Water
EFW pool temperature	X		X	
EFW pump suction temperature	X			
EFW pump discharge pipe temperature	X		X	
EFW pump suction pressure	X			(L) Pump trip[1]
EFW pump head	X			
EFW pump discharge pressure	X	~~X~~		(L) Pump trip[1]
EFW LCV pressure drop	X			
EFW pump flow	X			FCV Control
EFW flow to SG	X			
EFW FCV valve position	X			FCV Control
EFW LCV valve position	X			SG Level Control
EFW pump discharge manual valve position switches	X			
EFW supply header valve position switches	X			
EFW discharge header valve position switches	X			
EFW pump bearing temperature	X		X	(H) Pump trip[1]
EFW pump motor winding temperature	X		X	(H) Pump trip[1]
EFW pump motor current	X			
EFW pump vibration	X			

Note:

1. Pump will not trip following a safety actuation signal.

Table 10.4.9-5—EFWS Unreliability Results

Initiating Event	Secondary Cooling Systems Credited	Probability that the Credited Systems Fail to Provide Adequate Steam Generator Flow
General Transient	MFW, SSS, and EFWS	5.40E-07 ~~3.55E-07~~
Loss of Main Feedwater	EFWS	3.41E-05 ~~3.89E-05~~
~~Loss of Main Feedwater~~	~~EFWS and SSS~~	~~1.14E-05~~
Loss of Offsite Power	EFWS (~~without~~ no power recovery)	1.38E-04 ~~1.01E-04~~
Loss of Offsite Power	EFWS (offsite power recovery considered)	8.83E-05 ~~7.15E-05~~
Loss of Offsite Power	EFWS and SSS (offsite power recovery considered)	7.61E-05 ~~5.68E-05~~

Next File

Figure 10.4.9-1—Emergency Feedwater System Flow Diagram
Sheet 1 of 3

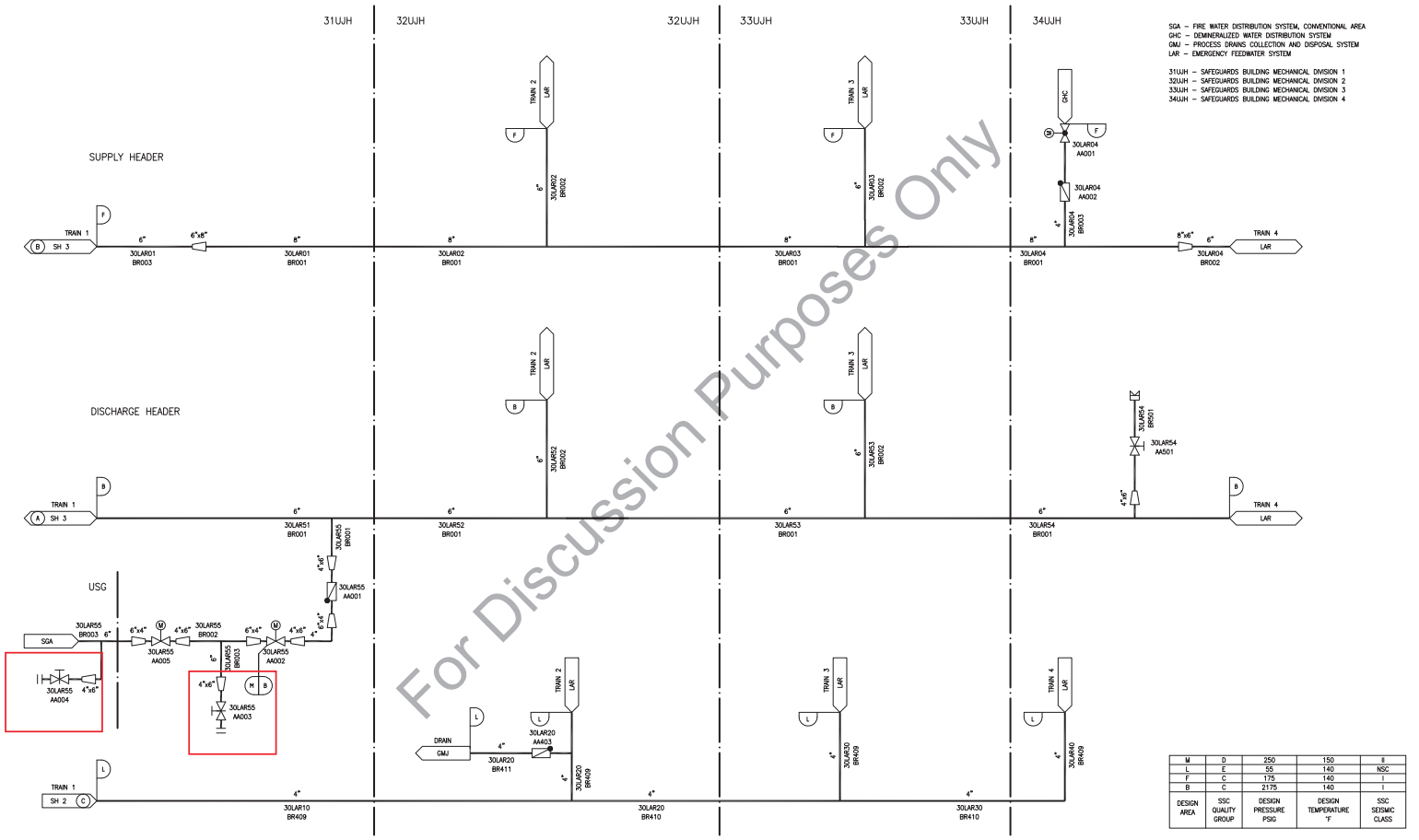

Table 3.2.2-1, Classification Summary

- Conforming changes for various systems classification listed on the table for consistency with design requirements

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Table 3.2.2-1—Classification Summary
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KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
LBA	Balance of LBA Piping within UJA, UJE, and UJH (Miscellaneous Vents and Drains, etc.)	NS-AQ	D	II	Yes	UJA, UJE, UJH	ANSI/ASME B31.1[6] RG 1.29[25]
LB	Balance of LB System Piping and Components	NS	E. ~~N/A~~	NSC	No	UMA, UMY	ANSI/ASME B31.1[6]
MAA, MAB, MAC	**Main Turbine Generator**	NS	N/A	NSC	No	UMA	
LCQ	**Steam Generator Blowdown System**						
LCQ	All LCQ Piping and Valves in 2UJE Downstream of Outer Containment Isolation Valve	NS-AQ	D	CS	No	2UJE	ANSI/ASME B31.3[9], ANSI/ASME B16.34[7], RG 1.143[25], RW-IIc
LCQ	All LCQ Piping and Valves in 4UJH Downstream of Outer Containment Isolation Valve	NS-AQ	D	II	Yes	4UJH	ANSI/ASME B31.1[6], ANSI/ASME B16.34[7], Safety-Related piping in close proximity RG 1.29[25]
30LCQ51 AC001/ 002	First Stage Blowdown Coolers	S	B	I	Yes	UJA	ASME Class 2[2]
30LCQ51 AA002	Inner Containment Isolation Valve	S	B	I	Yes	UJA	ASME Class 2[2]
30LCQ52 AA001	Inner Containment Isolation Valve	S	B	I	Yes	UJA	ASME Class 2[2]

Table 3.2.2-1—Classification Summary
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KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
30LCQ10/20/30/40 AA003	Steam Generator Common Leg Blowdown Isolation Valves	S	B	I	Yes	UJA	ASME Class 2[2]
30LCQ10/20/30/40 AA001	Steam Generator Hot Leg Blowdown Isolation Valves	S	B	I	Yes	UJA	ASME Class 2[2]
LCQ	UMY, UKA and UMA Piping and Valves	NS-AQ	D	CS	No	UMY, UMA, UKA	ANSI/ASME B31.3[9], ANSI/ASME B16.34[7], RG 1.143[25], RW-IIc
LCQ	All LCQ Piping Upstream of Outer Containment Isolation Valves	S	B	I	YES	UJA, 2UJE, 4UJH	ASME Class 2[2]
LA	**Feedwater System**						
LA	Balance of Feedwater System Piping and Components	NS	E ~~N/A~~	NSC	No	UMY, UMA	ANSI/ASME B31.1[6], ANSI/ASME B16.34[7], ASME VIII[8]
30LAB60/70/80/90 AA003	Check Valves Upstream of Steam Generators	S	B	I	Yes	UJA	ASME Class 2[2]
30LAB64/74/84/94 AA301/302	Differential Pressure Transmitter Isolation Valves	S	C	I	Yes	UJE	ASME Class 3[3]

Table 3.2.2-1—Classification Summary
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KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
30LCA90 AA182/ 184/186/188/191	Pressure Relief Valves	~~NS-AQ~~S	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6]~~ ~~RG 1.29[25]~~
30LCA90 AA310	Pressure Transmitter Isolation Valve	~~NS-AQ~~S	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6]~~ ~~RG 1.29[25]~~
30LCA90 AA320/ 330	Pressure Transmitter Isolation Valve	~~NS-AQ~~S	~~D~~B	~~H~~I	Yes	UJA	ASME Class 2[2] ~~ANSI/ ASME B31.1[6]~~ ~~RG 1.29[25]~~
30LCA90 CP002/ 402/501	Pressure Transmitters	NS-AQ	N/A	II	Yes	UJA	RG 1.29[25]
30LCA90 CT001/002	Temperature Transmitters	NS-AQ	N/A	II	Yes	UJA	RG 1.29[25]
30LCA90 CT401-403	Temperature Transmitters	NS-AQ	N/A	II	Yes	UJA	RG 1.29[25]
QU	**Secondary Sampling System**						
QUA, QUB, QUD, QUE, QUG, QUP, QUS	Secondary Sampling System Piping and Valves in UMA, UBA, UQA	NS	E	NSC	No	UMA, UBA, UQA	ANSI/ASME B31.1[6]
QUC	Balance of QUC System Components	NS	E ~~N/A~~	NSC	No	UFA, UKA	ANSI/ASME B31.1[6]

Table 3.2.2-1—Classification Summary
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KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
~~QUS~~	~~Circulating Water Sampling System~~	~~NS~~	~~N/A~~	~~NSC~~	~~No~~	~~UQA~~	~~ANSI/ASME B31.1[6]~~
~~QUE~~	~~Condensate Sampling Systems~~	~~NS~~	~~N/A~~	~~NSC~~	~~No~~	~~UMA~~	~~ANSI/ASME B31.1[6]~~
~~QUP~~	~~Cooling System for Secondary Samples~~	~~NS~~	~~N/A~~	~~NSC~~	~~No~~	~~UMA~~	~~ANSI/ASME B31.1[6]~~
~~QUG~~	~~Demineralized Water Supply Sampling System~~	~~NS~~	~~N/A~~	~~NSC~~	~~No~~	~~UBA~~	~~ANSI/ASME B31.1[6]~~
~~QUA~~	~~Feedwater Sampling System~~	~~NS~~	~~N/A~~	~~NSC~~	~~No~~	~~UMA~~	~~ANSI/ASME B31.1[6]~~
~~QUB~~	~~Main Steam Sampling System~~	~~NS~~	~~N/A~~	~~NSC~~	~~No~~	~~UMA~~	~~ANSI/ASME B31.1[6]~~
~~QUD~~	~~Sampling System for Auxiliary Steam and Feedwater~~	~~NS~~	~~N/A~~	~~NSC~~	~~No~~	~~UMA~~	~~ANSI/ASME B31.1[6]~~
QUC	Sampling System for Steam Generator Blowdown System - Containment Penetrations, including Containment Isolation Valves	S	B	I	Yes	UJA, UFA	ASME Class 2[2]

Table 3.2.2-1—Classification Summary
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KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
QUC14	SECSS (SG) sample cooler supply and return piping to the nearest valves	NS-AQ	D	II	Yes	UFA	ASME B31.1
MAJ	**Condenser Evacuation System Components**	NS	E ~~N/A~~	NSC	No	UMA	ANSI/ASME B31.1[6], ASME VIII[8], HEI[21], Manufacturer Standards
MAW	**Turbine Gland Steam Sealing System Components**	NS	E ~~N/A~~	NSC	No	UMA	ANSI/ASME B31.1[6], ASME VIII[8]
GD	**Steam Generator Blowdown Demineralizing System**						
GDA	Air Lines Connected to Backwash Air Vessel and Buffer Tank for Pneumatic Valves	NS	E	NSC	No	UKA	ANSI/ASME B31.1[6]
30GDA14 AT010	Backwash Air Vessel	NS	E	NSC	No	UKA	ASME VIII[8]
GDA	Balance of GDA Piping and Valves	NS-AQ	D	RS	No	UKA	ANSI/ASME B31.3[9], RG 1.143[25], RW-IIa
30GDA20 AT010	Buffer Tank for Pneumatic Valves	NS	E	NSC	No	UKA	ASME VIII[8]
30GDA10 AT010	Cartridge Filter	NS-AQ	D	RS	No	UKA	ASME VIII[8], RG 1.143[25], RW-IIa

Table 3.2.2-1—Classification Summary
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KKS System or Component Code	SSC Description	Safety Classification (Note 15)	Quality Group Classification	Seismic Category (Note 16)	10 CFR 50 Appendix B Program (Note 5)	Location (Note 17)	Comments/ Commercial Code
30GDA10 AT001	Cation Exchanger	NS-AQ	D	RS	No	UKA	ASME VIII[8], RG 1.143[25], RW-IIa
30GDA13 AT012	Drain Buffer Tank	NS-AQ	D	RS	No	UKA	ASME VIII[8], RG 1.143[25], RW-IIa
30GDA10 AT002	Mixed Bed Exchanger	NS-AQ	D	RS	No	UKA	ASME VIII[8], RG 1.143[25], RW-IIa
30GDA10 AT011	Resin Trap	NS-AQ	D	RS	No	UKA	ASME VIII[8], RG 1.143[25], RW-IIa
30GDA13 AP001	Waste Water Pump	NS-AQ	D	RS	No	UKA	ASME VIII[8], RG 1.143[25], RW-IIa
PA	**Circulating Water Supply System Components**	NS	E ~~N/A~~	NSC	No	UMA, UZT	
PG	**Turbine Building Closed Cooling Water System Components**	NS	E ~~N/A~~	NSC	No	UMA, UZT	ASME B31.1[6], ASME VIII[8]