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From: HOTTLE Nathan (AREVA) [mailto:Nathan.Hottle@areva.com]
Sent: Thursday, June 12, 2014 8:16 PM
To: Eudy, Michael
Subject: Part 2

Nathan Hottle
AREVA Inc.
3315 Old Forest Road
Lynchburg, VA 24501
Phone 434-832-3864
Mobile 434-485-4239
nathan.hottle@areva.com

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Figure 10.3-1—Main Steam Supply System
Sheet 2 of 2

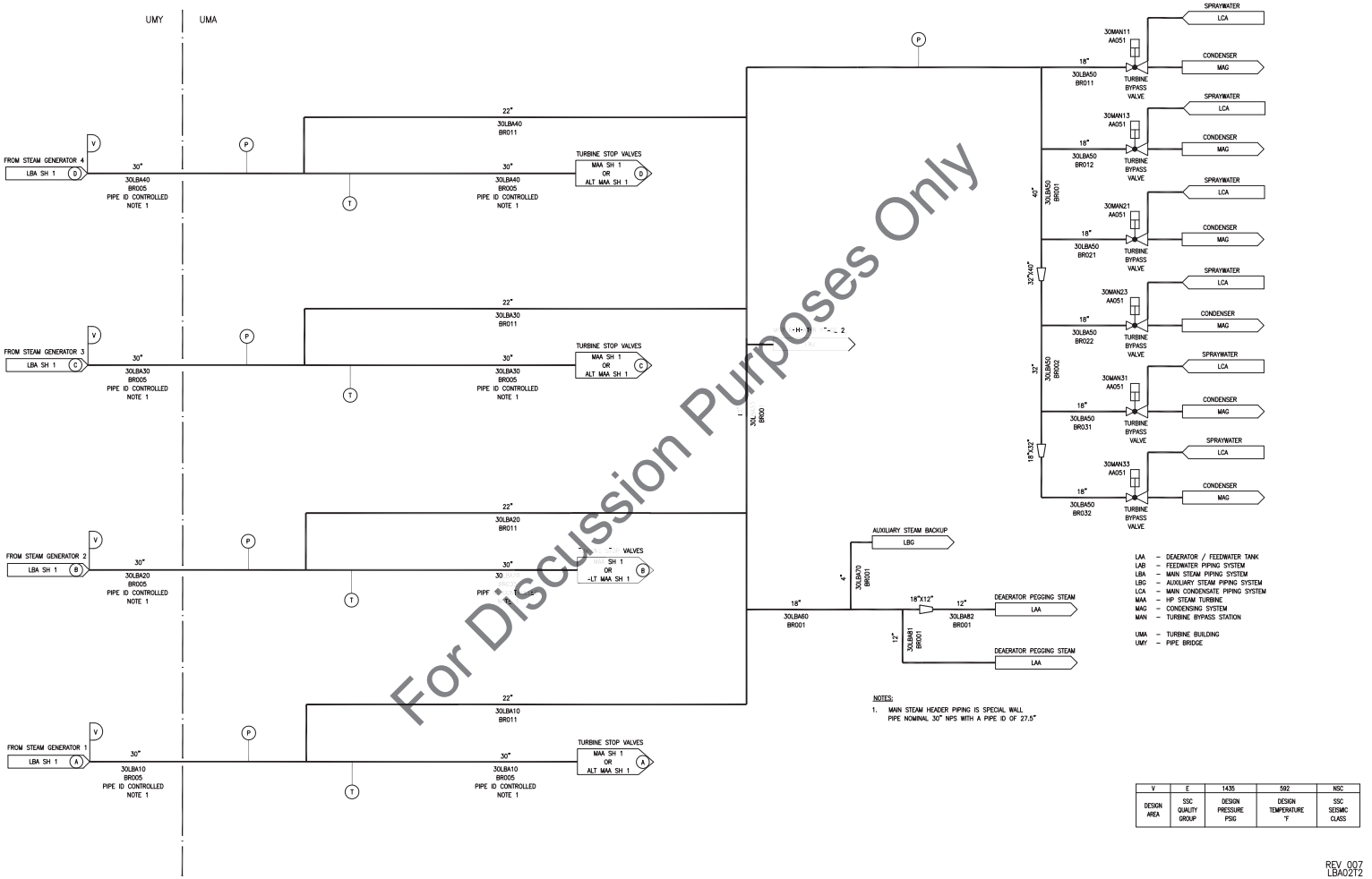
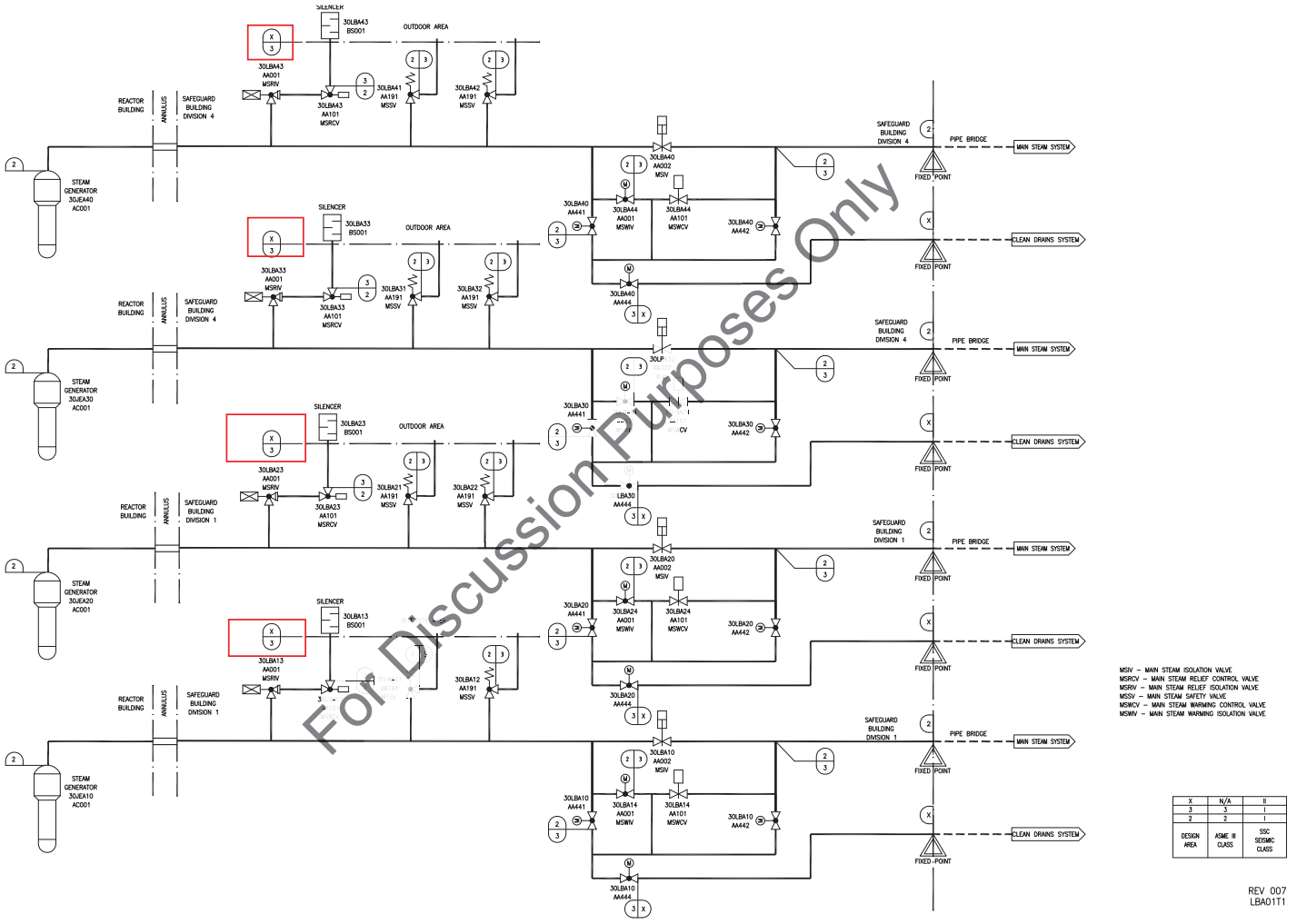


Figure 2.8.2-1—Main Steam Supply System Functional Arrangement
Sheet 1 of 2



Misc. Consistency Changes for Section 10.4

- Sections 10.4.1.3, 10.4.2.2.1, 10.4.2.4, 10.4.3.3, and 10.4.6.3
  - Removed radiation monitor point for various radiation monitors discussed in Chapter 10 for consistency (e.g., R-3)

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Butterfly valves are provided in the circulating water system (CWS) to permit half of the condenser tube bundles to be isolated and removed from service for maintenance.

During anticipated operational occurrences, the main condenser is capable of accepting steam from the TBS while maintaining condenser vacuum, provided the CWS remains in operation and spray water pressure is available if operating conditions require spray water (refer to Section 10.4.4 for a description of the TBS).

The operation of the main condenser supports other system operations within the steam and power conversion system.

10.4.1.3 Safety Evaluation

The main condenser has no nuclear safety-related function.

The design of the main condenser satisfies general design criterion (GDC 60), as it relates to the control of radioactive material releases to the environment. During normal operation and shutdown, the main condenser contains negligible quantities of radioactive contaminants. However, it is possible for the main condenser to become contaminated in the event of primary-to-secondary system leakage.

- Air and non-condensable gases are discharged from the main condenser by the MCES. Radiological activity of the MCES exhaust is monitored (refer to Section 10.4.2). The radiological aspects of primary-to-secondary leakage, which includes anticipated operating concentrations of radioactive contaminants, are addressed in Section 11.5 and Table 11.5-1~~, Monitor R 3~~.

- For the U.S. EPR, no hydrogen buildup is anticipated in the main condenser. Dissolved oxygen is present in the condensate and condenser hotwell inventory, but only trace amounts of this oxygen are released in the condenser, and the amounts are negligible compared to the amount of gas and vapor being evacuated by the MCES. There is no potential for explosive mixtures within the main condenser which would result in excessive releases of radioactivity; therefore, the main condenser design satisfies GDC 60 and is not required to be designed to withstand the effects of an explosion.

Failure of the main condenser and the resulting flooding does not prevent the operation of any essential system because no safety-related equipment is located in the Turbine Building.

Main condenser operation does not directly affect the reactor coolant system. If the main condenser performance is degraded, the turbine backpressure increases. This increase in backpressure causes a lowering of turbine cycle efficiency, which requires an increase in reactor power to maintain the demanded electrical power generation level. The reactor power increase is limited by the reactor control system, as described in Section 7.7. The reactor protection system, described in Section 7.2, maintains the plant within safe operation limits. If main condenser performance is sufficiently

10.4.2 Main Condenser Evacuation System

The main condenser evacuation system (MCES) removes air and non-condensable gases from the main condenser and connected steam side systems during plant startup, cooldown and normal operation.

10.4.2.1 Design Basis

The MCES performs no safety-related function and therefore has no nuclear safety-related design basis.

The MCES is designed to meet the following functional criteria:

- Air and non-condensable gases are removed from the condenser and connected steam side systems during plant startup, cooldown and normal operation.
- Vacuum is established and maintained in the condenser and connected steam side systems during plant startup and normal operation by using mechanical vacuum pumps.

10.4.2.2 System Description

10.4.2.2.1 General Description

The MCES is non-safety related and is located in the Turbine Building. The MCES is used to evacuate air rapidly from the main condenser and connected steam side systems during plant startup, and to continuously remove non-condensable gases during normal operation to maintain optimum condenser performance.

The MCES and air vent system are shown in Figure 10.4.2-1—Main Condenser Evacuation System and Figure 10.4.2-2—Vent System for Air Removal.

The steam and air mixture extracted from each condenser shell is routed to one of two 100 percent capacity holding vacuum pumps. Discharge from the vacuum pumps is routed by a header to the air vent system, where the radiological activity of the exhausted air is monitored (refer to Section 11.5.4 and Table 11.5-1~~, Monitor R 3~~.

Isolation valves serve to stop air removal from the air cooler tube bundle when the circulating water side of the associated condenser shell is shut off.

The connection of the condensers to the vacuum pumps is controlled by air-operated control valves at the inlet of each vacuum pump. These valves are normally open. The vacuum pumps are connected to the air removal header by air intake isolation valves. The vacuum pumps pass the steam and air mixture to the moisture separators–silencers. As a result of compression, the steam component condenses while the exhausted air is vented through the air vent system into the nuclear auxiliary building ventilation system.

- Dissolved oxygen is present in the condensate and condenser hotwell inventory but only trace amounts of this oxygen is released into the main condenser, and the amounts are negligible compared to the amount of gas and vapor being evacuated by the system.

- There is no potential for explosive mixtures within the MCES, which would result in excessive releases of radioactivity; therefore, the MCES design satisfies GDC 60 and is not required to be designed to withstand the effects of an explosion. The design capacity of the holding (continuously operating) vacuum pumps in the MCES is such that the water vapor content is above 58% by volume of the total mixture. There is no buildup of non-condensable gas in the main condenser because the MCES operates continuously whenever the main condenser is in operation. The vacuum pumps in the MCES are liquid ring vacuum pumps. Cooling water is used to seal the vacuum pumps. The mixture passing through the MCES is at low temperature and high humidity due to contact with the water ring in the vacuum pumps. As indicated in Table 10.1-1—Design Heat Balance for Steam and Power Conversion System Cycle, the average design backpressure is 2.5 inches HgA. Based upon standard steam tables the corresponding saturation temperature is approximately 109° F. The MCES operates at a lower pressure and temperature than the backpressure in the condenser.

- The exhaust from the MCES is discharged to the air vent system. The exhaust flow is monitored for radioactivity as described in Section 11.5.4 and discharged to the nuclear auxiliary building ventilation system. The radiological aspects of primary-to-secondary leakage, including anticipated releases from the system, are described in Section 11.5.4 (refer to Table 11.5-1~~, Monitor R-3~~).

Malfunction of MCES components does not affect the safe operation of the plant or any safety related system.

- MCES operation does not directly affect the reactor coolant system. If the air removal system fails completely, a gradual reduction in condenser vacuum results from the buildup of non-condensable gases. This reduction in vacuum causes a lowering of turbine cycle efficiency, which requires an increase in reactor power to maintain the demanded electrical power generation level. The reactor power increase is limited by the reactor control system, as described in Section 7.7. The reactor protection system, described in Section 7.2, maintains the plant within safe operation limits. If the MCES remains inoperable, condenser vacuum increases to the turbine trip setpoint and a turbine trip is initiated. A loss of condenser vacuum is addressed in Section 15.2.

10.4.2.5 Inspection and Testing Requirements

Inspection and testing of the system is performed prior to plant operation. Refer to Section 14.2 (test abstract #065) for initial plant startup test program.

Components of the system are monitored during operation to confirm proper operation. Periodic inspections of the evacuation system are performed in conjunction with the scheduled maintenance outages. The vacuum pumps are initially tested for

excess steam escaping at higher loads is dumped to the main condenser through the seal steam leak-off valve. Leak-off steam from the seals of the main stop and control valves is also discharged into the TGSS header. The steam seal leak-off valve is a pneumatically actuated pressure control valve, which fails to the position designated by the turbine supplier.

10.4.3.3 Safety Evaluation

The TGSS performs no safety-related functions and is not required to operate during or after an accident. The design of the TGSS satisfies general design criteria GDC 60 and GDC 64, related to the TGSS design for control and monitoring of release of radioactive materials.

The air and noncondensable gases discharged from the gland steam exhausters are not normally radioactive during plant operation. However, in the event of significant primary-to-secondary system leakage due to a steam generator tube rupture, it is possible for the seal steam to become contaminated resulting in the potential to discharge a radioactively contaminated mixture.

The gland steam condenser receives steam and noncondensable gases from the TGSS and condenses the steam. Air and non-condensable gases are evacuated from the gland steam condenser and discharged into the air vent system by exhaust fans. The exhaust flow is monitored for radioactivity as described in Section 11.5.4 (refer to Table 11.5-1~~, Monitor R-3~~) and discharged to the Nuclear Auxiliary Building ventilation system.

10.4.3.4 Inspection and Testing Requirements

The TGSS components are inspected during construction and functionally tested during plant startup. Refer to Section 14.2 (test abstract #064) for initial plant startup test program. Components of the TGSS are designed to permit periodic inspection and testing during plant operation. Components of the system are monitored during operation to demonstrate satisfactory functioning of TGSS equipment.

10.4.3.5 Instrumentation Requirements

The following TGSS parameters are monitored during plant operation:

- Steam seal header temperature.
- Steam seal header pressure.
- Gland steam exhauster vacuum.
- Gland condenser outlet temperature.
- Gland condenser pressure.

Next File

Condensate Polisher

The condensate polisher consists of at least four trains of deep mixed bed demineralizers with downstream resin traps. Spent polisher resin is replaced or regenerated offsite. The number and size of the ion exchangers allow functional requirements to be met while permitting replacement of resin in one ion exchanger at a time.

Resin Trap

Resin traps are installed downstream of each ion exchanger to remove resin fines.

Spent Resin Tank

The spent resin tank is used for storage of exhausted or spent resin prior to shipping offsite for regeneration or disposal.

Resin Addition Equipment

Equipment is provided to replace the ion exchange resin.

10.4.6.3 System Operation

The CPS cleans up the condensate during startup to meet condensate and feedwater system water chemistry specifications as described in Section 10.3.5. The condensate is recirculated to the hotwell during startup until the desired water quality is attained. Condensate and feedwater system operation is described in Section 10.4.7.

During power operation, the condensate polishers are used only when abnormal secondary cycle conditions exist. This allows continuous operation of the plant with condenser tube leakage until repairs can be made. Flow through the condensate polisher is controlled by the condensate polisher bypass valve.

Exhausted or spent resin is removed from the polisher vessel and replaced with new or regenerated resin. Resin replacement requires the polisher vessel to be out of service. The standby vessel is placed in service when another vessel needs to be removed from service. Spent resin may be transferred directly to a truck or the spent resin storage tank until it can be removed offsite. Spent resin will normally be nonradioactive and not require any special packaging prior to disposal. In the event the resin becomes contaminated with radioactive material, shielding is provided, if required. Spent resins are shipped offsite per the Process Control Program (PCP). Information about the PCP can be found in Section 11.4.3. Radiation monitors associated with the steam generator blowdown system, main steam system and Vent System for Air Removal System vent are used to detect secondary side radioactive contamination (refer to Section 11.5,-Table 11.5-1~~, Monitors R-46 through R-49 (Steam Generator BLowdown System), and R-3 (Vent System for Air Removal)~~).

Section 10.4.2, Main Condenser Evacuation System

- Figure 10.4.2-1, Main Condenser Evacuation System
  - Conforming change for quality group to be consistent with design requirements
- Figure 10.4.2-2, Vent System for Air Removal
  - Corrected nomenclature of valve designation
  - Removed call out design temperature and pressure from figure
  - Change in quality group to be consistent with design requirements

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Figure 10.4.2-1—Main Condenser Evacuation System

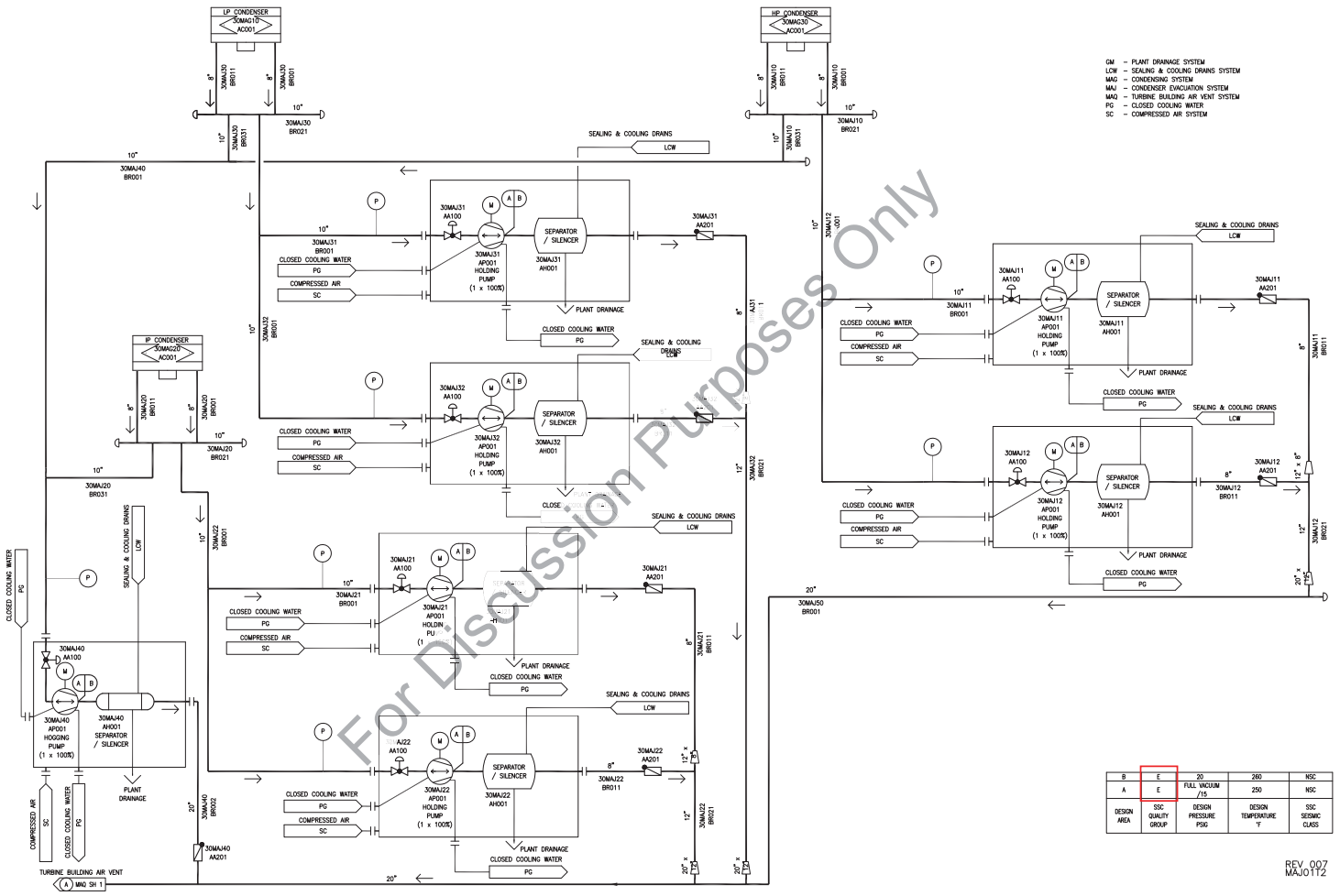
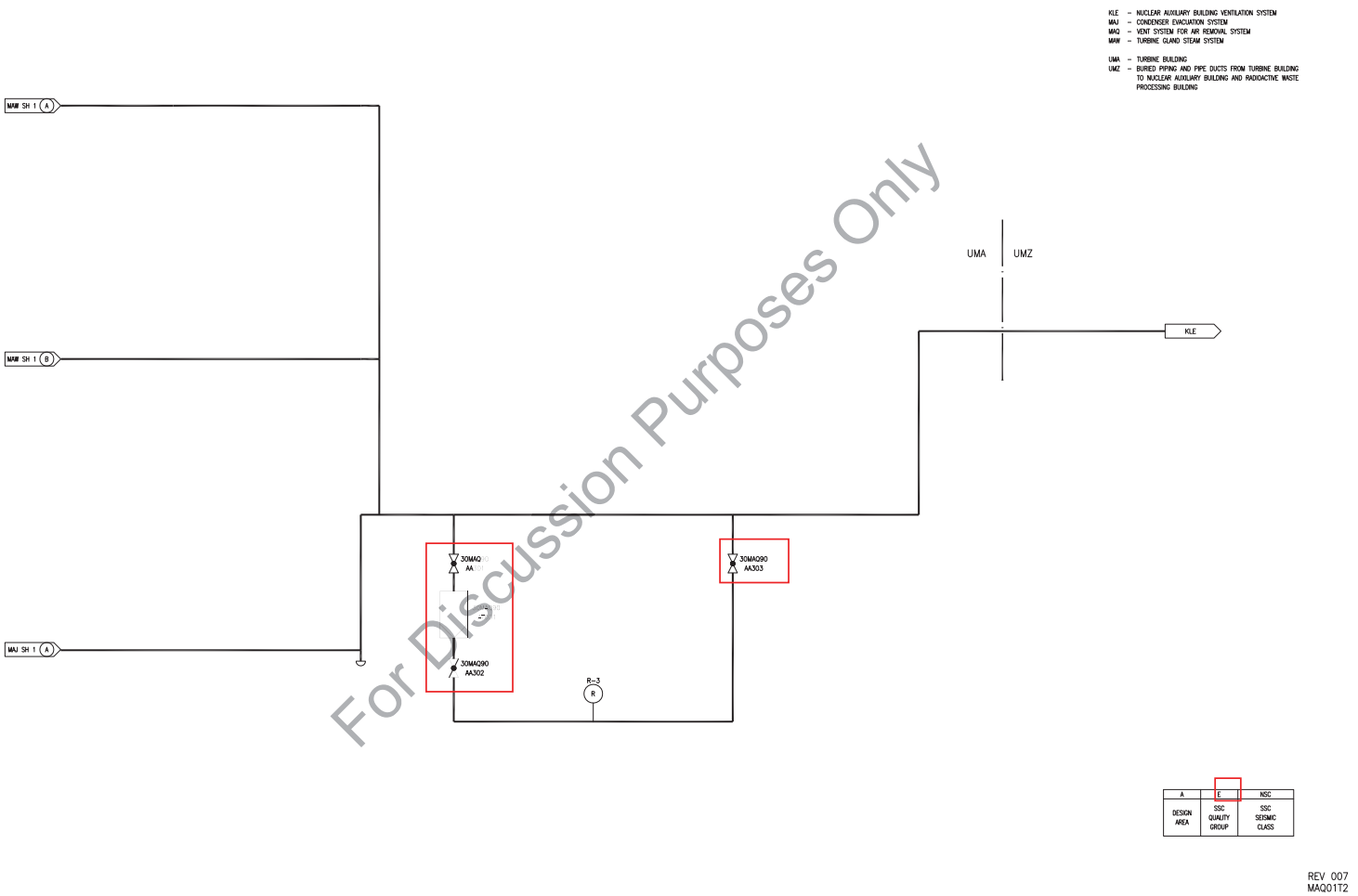


Figure 10.4.2-2—Vent System for Air Removal



Next File

Section 10.4.3, Turbine Gland Sealing System

- Figure 10.4.3-1, Turbine Gland Sealing System:
  - Corrected nomenclature of system identifier on index and drawing
  - Added missing system identifier on index

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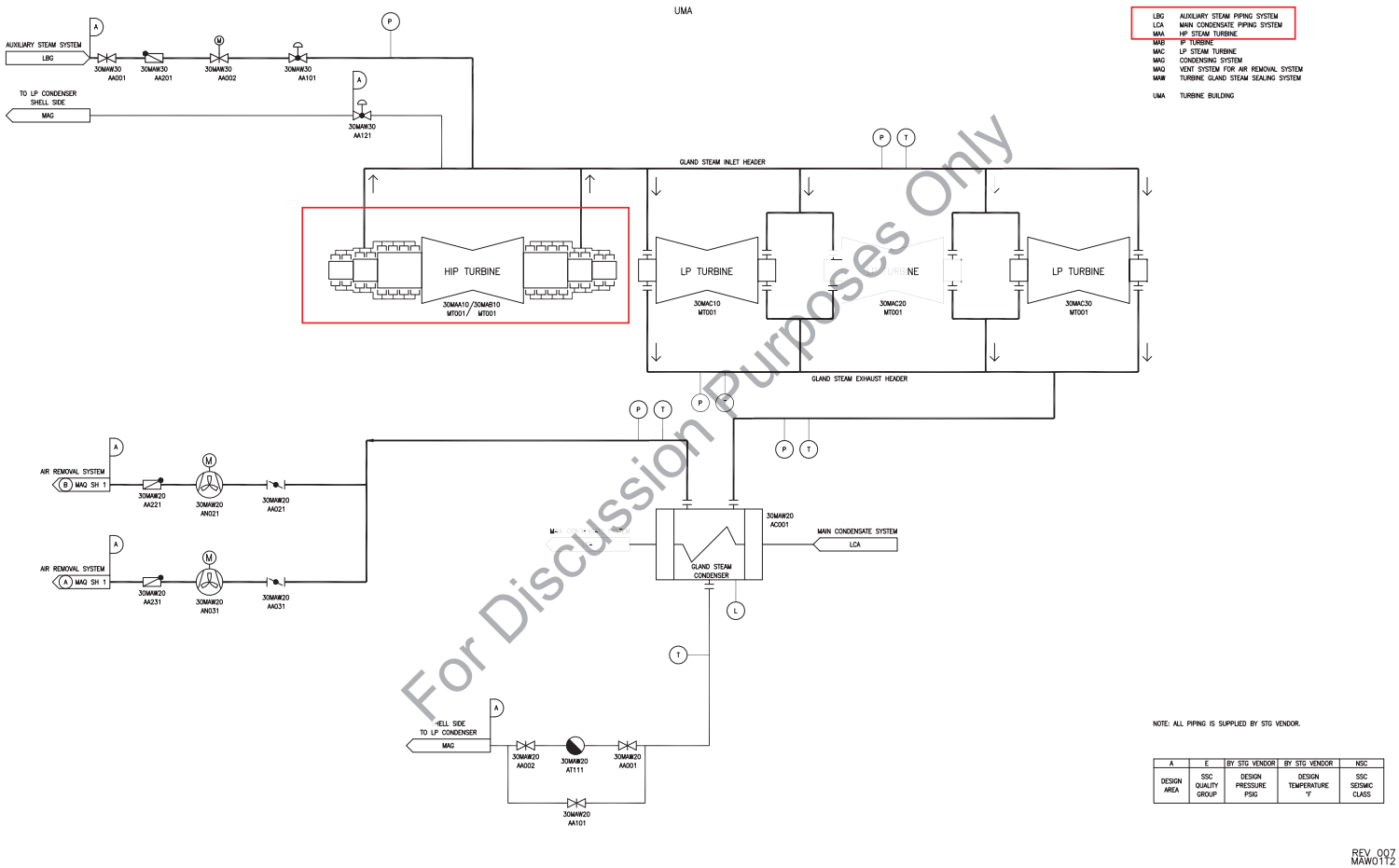
Figure 10.4.3-1—Turbine Gland Sealing System



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Section 10.4.4, Turbine Bypass System

- 10.4.4.2.3, System Operation (Shutdown)
  - Conforming change, if TBS is not available, cooldown is accomplished by MSRTs (and not by MSSVs)

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10.4.4.2.2 Component Description

Table 3.2.2-1 provides the seismic design and other design classifications for components in the TBS. Section 3.2 describes how the guidance of RG 1.26 is implemented for the U.S. EPR.

Bypass Valves

The turbine bypass valves are designed to codes and standards consistent with the design of the main steam line piping in the Turbine Building. Turbine bypass valves and actuators are designed to Turbine Building environmental conditions and fail closed on loss of electrical signal or actuating fluid.

Piping

Piping upstream of turbine bypass valves is designed to codes and standards consistent with the design of the Turbine Building main steam line piping. A drain pot is provided in the turbine bypass valve header because the valves are normally closed and are located at a piping low point that can collect condensate during normal operation.

10.4.4.2.3 System Operation

Normal Operation

During power operation, the TBS is normally not used. During mild pressure transients, the turbine bypass valves help prevent opening of the main steam relief isolation valves (MSRIV) and main steam safety valves (MSSV). In the case of an imbalance between core power and turbine load, excess steam is dumped to the main condenser via the TBS.

Shutdown

MSSS shutdown coincides with unit shutdown. Unit load is reduced to no-load and the turbine and reactor are shut down. During normal shutdown, steam generated in the SGs is dumped to the main condenser through the turbine bypass valves. Steam flow is a function of the power supplied by the reactor coolant pumps (RCP) and core decay heat. The SG water inventories are maintained by the startup and shutdown feedwater system described in Section 10.4.7.

Cooldown from no-load to the point of residual heat removal (RHR) connection is performed by gradually reducing the main steam pressure. The turbine bypass flow is regulated automatically to the desired cooldown rate. Once the RHRS is connected, heat transfer from the reactor is via the RHRS per Section 5.4.7. At this point, the turbine bypass and MSSS may be taken out of service and the SGs isolated.

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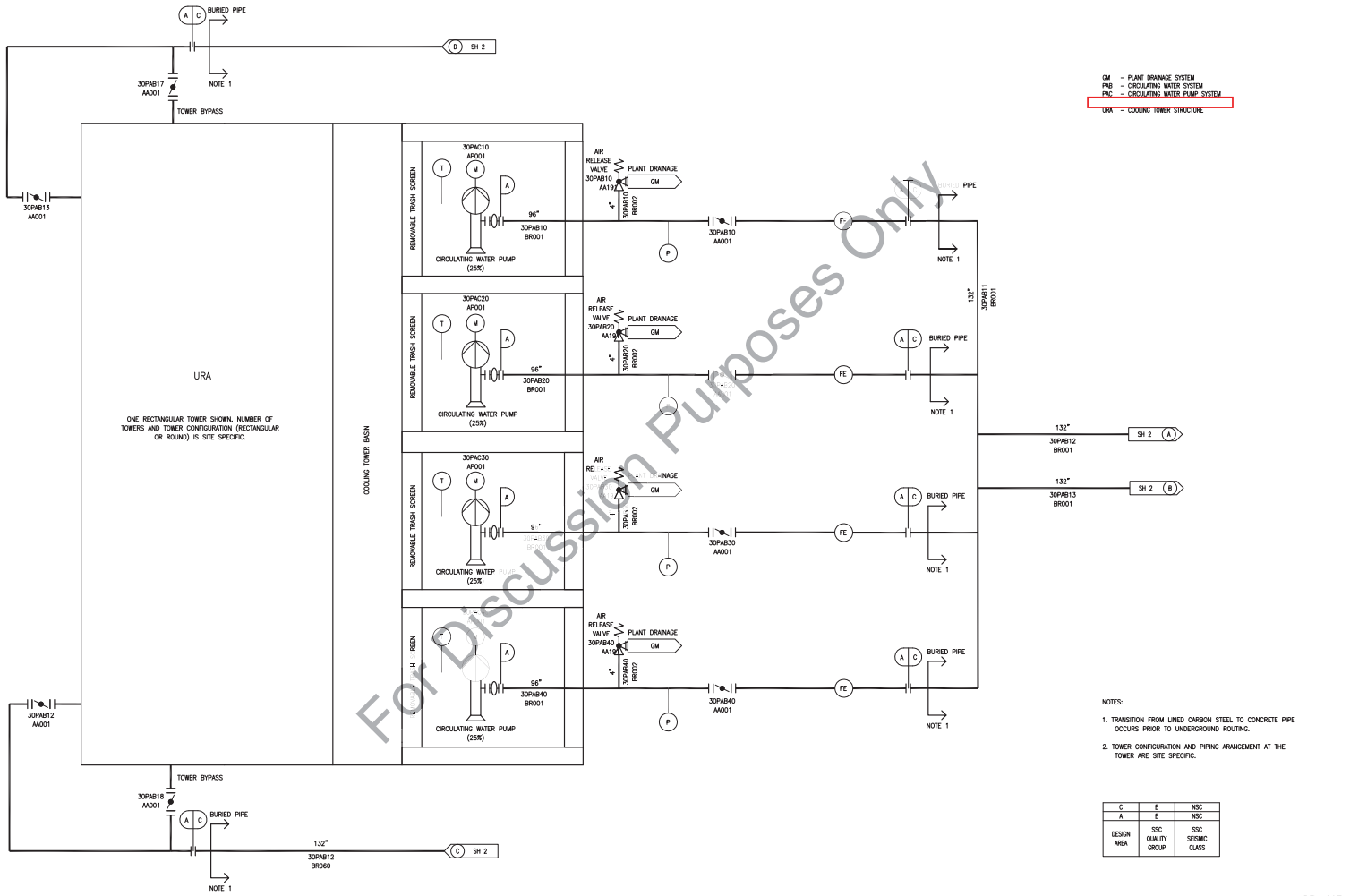
Figure 10.4.5-1—Circulating Water System Flow Diagram
Sheet 1 of 2



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

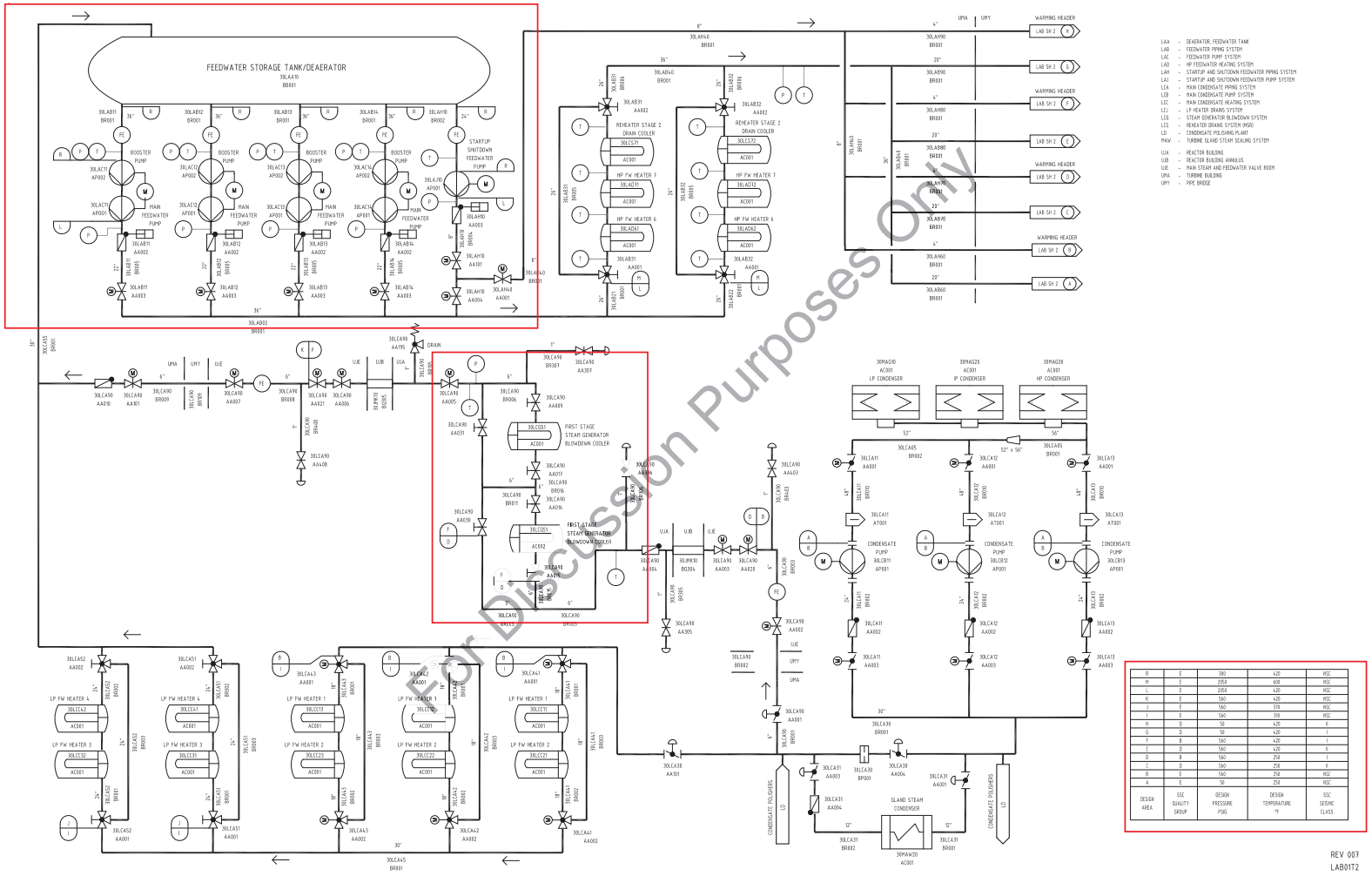
Main Feedwater Piping (Safety-Related Portion)	
Design (VWO) flow rate	21,479,950 lb/hr ~~21,492,900 lb/hr~~
Number of lines	4
Main line nominal size	20 in.
Piping MFWCKV Outlet to SG	
Schedule	120
Design pressure	1435 psig
Design temperature	600°F
Design code	ASME Section III, Class 2
Seismic design	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
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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 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
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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 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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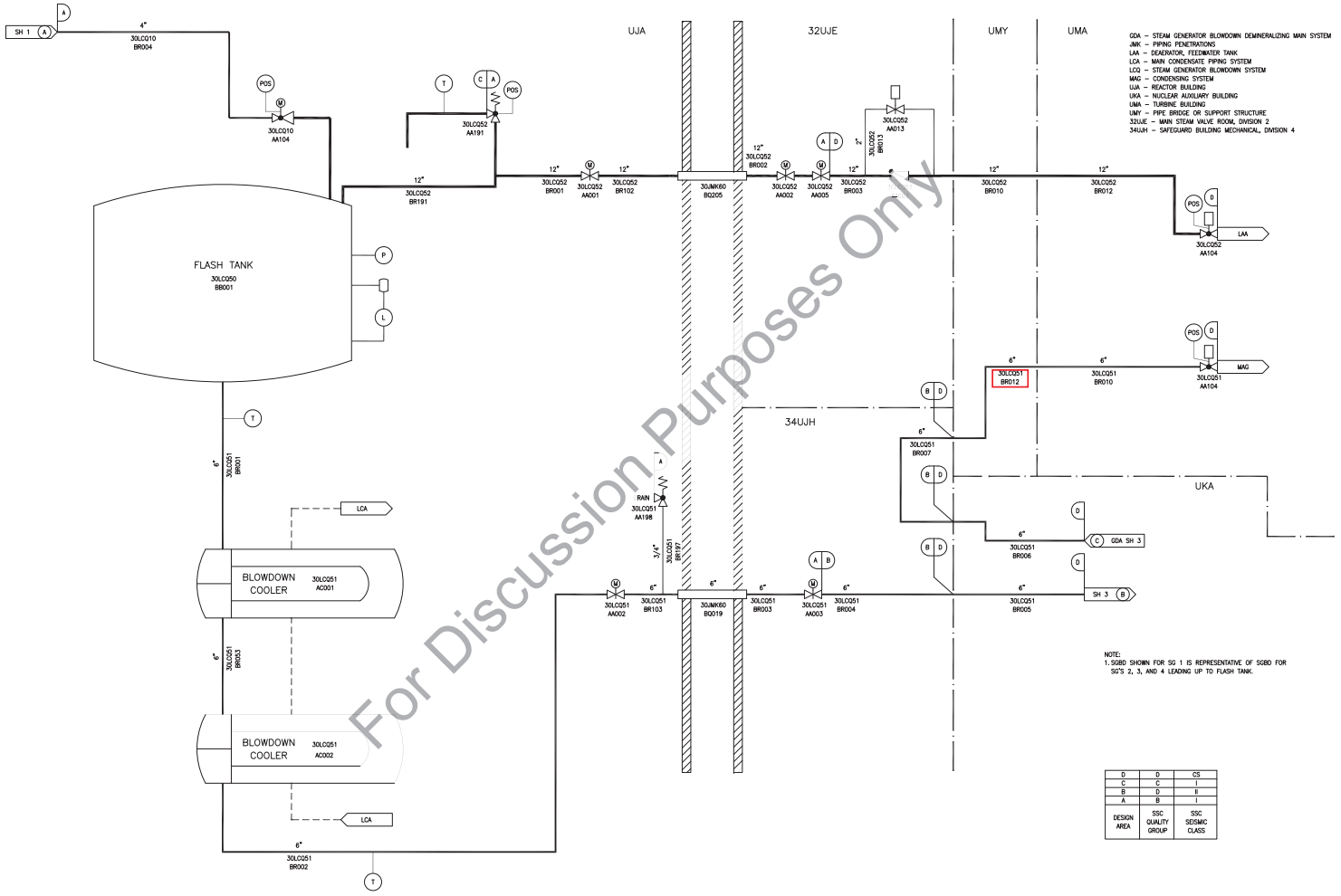
Figure 10.4.8-1—Steam Generator Blowdown System Discharge and Cooling
Sheet 2 of 3



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.

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

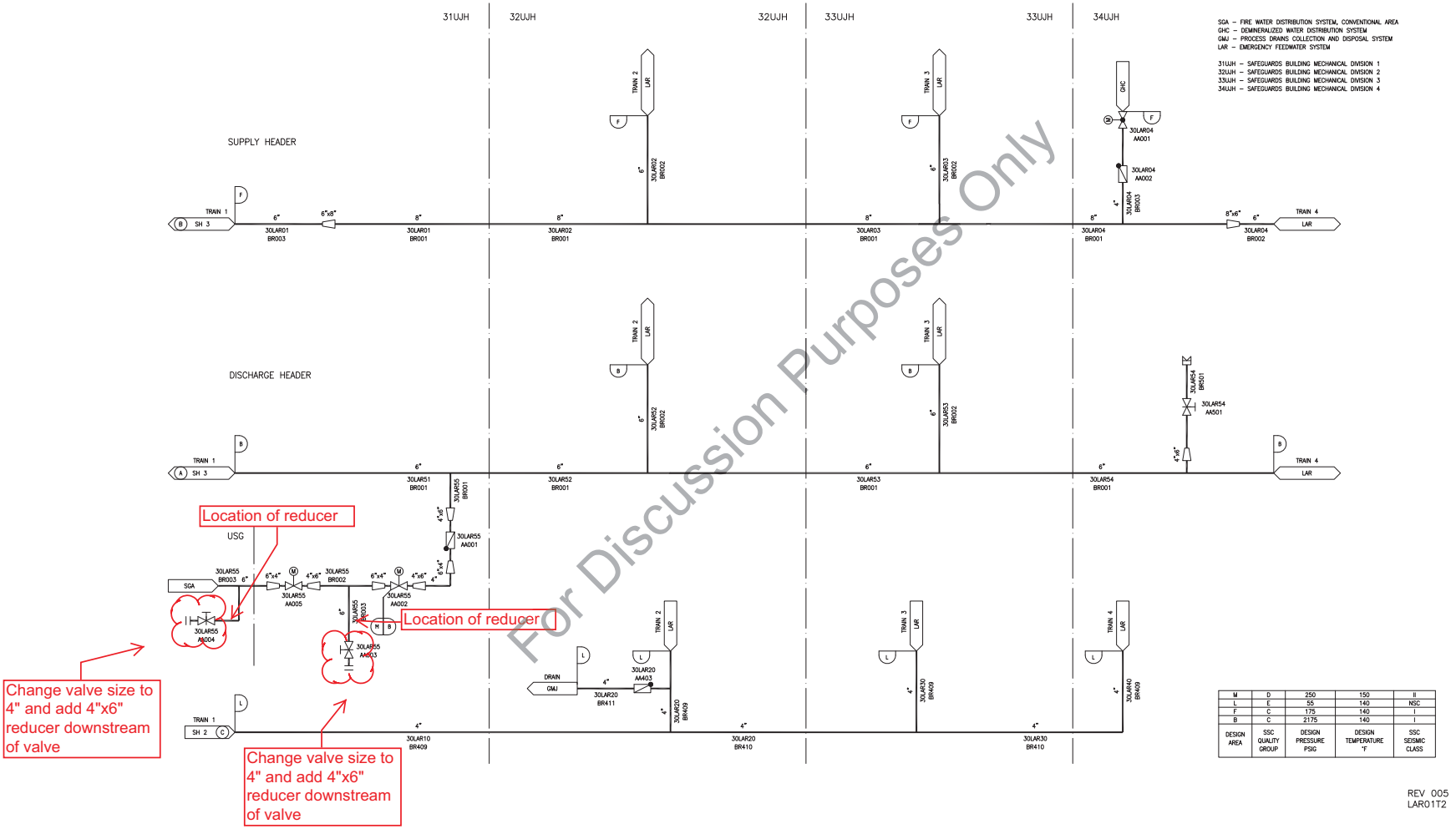

Table 3.2.2-1, Classification Summary

- 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]

U. S. EPR FSAR Chapter 8

For Discussion Purposes Only

June 16, 2014
NRC Public Meeting

Agenda – FSAR Chapter 8

- Non-RAI Associated Change to Chapter 8
- Safe Shutdown Equipment List (SSEL)
- PICS Power Supply

Chapter 8 Non-RAI Change

Basis for Final FSAR Change

- **Minor change to SBO Coping Analysis**
  - 8 hour coping analysis final RCS temperature value of 602°F replaced with statement that the acceptance criterion is satisfied: "the RCS remains subcooled, and temperature is slowly decreasing"
  - **Cooldown Analysis objective is to verify that the RCS remains subcooled**
    - Temperature value removed so that any change in parameters that are used in the analysis will not require a change to the FSAR.
  - **No Change to Electrical System Architecture**

Chapter 8 Closure

Safe Shutdown Equipment List (SSEL)

- Fire Safe Shutdown Analysis used to develop the SSEL will use the current Chapter 8 electric system design.
- FSAR Chapter 9 update may include additional electrical equipment classification requirements for fire protection, i.e., RG 1.189 (included in Chapter 3).
- No impact on FSAR Chapter 8.

PICS Power Supply

PICS Power

- The PICS is powered from the 12 Hr UPS
- For LOOP event, SBODGs supply power
- Fire Safe Shutdown Analysis will use the current electric system design as a basis for the analysis.
- No change to electrical system architecture.
- No change to FSAR Chapter 8.

design specifications limit the seal leakage after a seal failure to 25 gpm per seal or 100 gpm total. Total RCS leakage rises to 111 gpm or less.

4. Ten minutes or less into the event, the SBODGs are available for manual loading of safe shutdown equipment. EUPS two-hour batteries and battery chargers are loaded onto the SBODGs. Thus, their supplied loads are available during the entire SBO period. The HVAC equipment in divisions 1 and 4 can be restored. Some Safeguard Building areas may briefly exceed 122°F before HVAC is restored.

5. Fifteen minutes into the event, the standstill seal system terminates RCP seal leakage. Standstill seal system leakage is 0.5 gpm per standstill seal. Total RCS leakage drops to 13 gpm or less; this leakage continues for the duration of the event.

6. Thirty minutes into the event, two EFW pumps are started and begin feeding four SGs. The SG levels in the fed SGs recover from their low of 40 percent wide range (WR) to the normal post trip value of 82.2 percent WR.

7. After eight hours, the SGs are maintained at their normal post-trip level, pressurizer level is on scale, the RCS remains subcooled, and temperature is slowly decreasing. ~~and core exit temperature is 602°F and decreasing slowly.~~ Ambient air temperatures in the division 2 and division 3 equipment areas are within limits.

8.4.2.6.3 RG 1.155 C.3.3 – Modifications to Cope with Station Blackout – AAC Power Sources

Consistent with SECY-90-016 (Reference 6), "Evolutionary Light Water Reactor (LWR) Certification Issues and Their Relationship to Current Regulatory Requirements," the U.S. EPR design provides two full capacity AAC power sources of diverse design, capable of powering at least one complete set of normal safe shutdown loads.

As required by RG 1.155 for AAC power sources selected specifically for satisfying the requirements of SBO, the design meets the following criteria:

- The AAC power sources are not normally directly connected to the preferred or blacked-out unit onsite emergency power system. The SBODGs are normally not running. Two breakers exist between each SBODG and the nearest Class 1E bus.

- There is a minimum potential for common cause failure with the preferred or the blacked-out unit onsite EAC power sources. No single-point vulnerability exists whereby a weather-related event or single active failure could disable any portion of the blacked-out unit's onsite sources and simultaneously fail the AAC power sources. This is also accomplished by specifying and selecting equipment, including the engine, generator, and primary support equipment, that is different from the corresponding EDG equipment.

- Including the time required to prepare the SBODG bus, the AAC power sources can be connected to their associated EPSS buses within ten minutes after the onset