Response to

Request for Additional Information No. 80(1208), Revision 0

10/27/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.06.01 - Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment
Application Section: FSAR 3.6.1
SBPB Branch

Question 03.06.01-1:

SRP Section 3.6.1, Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment, Review Procedures, Item 1 states that a review of the information presented in the FSAR identifying all high and moderate energy fluid systems should be performed, as well as verification of individual system temperatures and pressures to ensure that they have been correctly identified.

The staff could not independently confirm the proper classification of systems provided in Tier 2 FSAR Table 3.6.1-1. In order to complete this review, the staff requests the applicant to provide the following information:

a. Design temperatures and pressures for the systems listed in Table 3.6.1-1.

b. Maximum operating temperatures and pressures for the systems listed in Table 3.6.1-1.

In addition, Tier 2 FSAR Section 10.4.3, “Turbine Gland Sealing System,” states that at times turbine sealing steam is provided by an auxiliary steam system.

c. The staff requests the applicant to clarify what system provides heating to the Nuclear Island and identify any auxiliary steam or heating steam systems used in areas containing safety-related SSCs?

Response to Question 03.06.01-1:

a. Appendix A to BTP 3-3 provides the criteria for high-energy fluid systems (i.e., maximum operating temperature exceeds 200°F or maximum operating pressure exceeds 275 psig) and moderate-energy fluid systems (i.e., maximum operating temperature is 200°F or less, and maximum operating pressure is 275 psig or less). Confirmation that the systems listed in U.S. EPR FSAR Tier 2, Table 3.6.1-1 meet this criteria are contained in internal AREVA NP documents and drawings which are available for NRC inspection.

b. See the response to Question 03.06.01-1a above.

c. The Nuclear Island uses electric heating. There are no auxiliary steam systems used in areas containing safety related SSC.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 03.06.01-2:

Tier 2 FSAR Section 3.4.3.1, “Internal Flooding Events,” states that “an internal flooding analysis was performed for Seismic Category I structures to determine the adequacy of the design to protect safety-related SSCs. Sources of flooding considered include high and moderate energy line rupture.”

Tier 2 FSAR Tables 3.6.1-2 and 3.6.1-3 presents the results of evaluations performed to identify high energy systems, break locations, targets, and protection requirements for areas containing safety-related SSCs.

However, Tier 2 FSAR Section 3.6.1 states that the pipe break hazards analysis and the reconciliation of deviations between the as-designed and the as-built configuration will be performed by the COL Holder.

The staff requests the applicant to justify in the FSAR why the pipe break hazards analysis cannot be completed at the design certification stage; what portions have been completed; and which specific portions are within the scope of responsibility of the COL Holder.

Response to Question 03.06.01-2:

The pipe break hazards analysis is the responsibility of the COL holder as noted in U.S. EPR FSAR Tier 2, Table 1.8-2. The rationale for this COL information item is that intermediate pipe break locations depend on the ASME Code stress and fatigue analysis results which are available later in the design process. The pipe break hazards analysis is used to identify postulated break locations and to confirm layout, piping support design, whip restraint design, and jet shield design. The U.S EPR FSAR Tier 1 contains ITAAC to verify that essential SSC are protected from the dynamic effects of pipe breaks (see U.S EPR FSAR Tier 1, Table 2.1.1-7). An ITAAC will be added to U.S EPR FSAR Tier 1, Table 2.1.1-7, specifically for the pipe break hazards analysis.

FSAR Impact:

U.S. EPR FSAR Tier 1, Table 2.1.1-7 will be revised as described in the response and indicated on the enclosed markup.

Question 03.06.01-3:

Tier 2 FSAR Table 3.6.1-1 states that the safety-related portions of the component cooling water (CCW) system are considered high energy. Safety-related CCW pumps are located in each of the four safeguards buildings. Tier 2 FSAR Table 3.6.1-2 lists CCW high energy break locations at the heat exchanger nozzles, pump nozzles, and surge tank nozzles but only for locations in safeguard building 4 which is where the non-safety related severe accident heat removal system (SAHR) supplied portion of the CCW system resides. It appears as though the high energy portion may be associated with the non-safety related portion of the system which is contrary to what is stated in Table 3.6.1-1.

The staff requests the applicant to clarify in the FSAR why the CCW system or portions of it are considered high-energy, and clarify whether these break locations are listed in Tier 2 FSAR Table 3.6.1.2.

Response to Question 03.06.01-3:

U.S. EPR FSAR Tier 2, Table 3.6.1-1 will be revised to rename the two subsystems of the component cooling water system as Component Cooling Water (Supply Train) and Component Cooling Water (Common Header). The four supply trains are moderate-energy at their maximum operating temperatures and pressures. The breaks noted in U.S. EPR FSAR Tier 2, Tables 3.6.1-2 and 3.6.1-3 are from a high-energy, non-safety train dedicated specifically to the severe accident heat removal system (SAHRS). This train is a part of the supply train subsystem, and is in Safeguard Building 4. A portion of the common header subsystem is high-energy, but with no terminal end breaks. U.S. EPR FSAR Tier 2, Table 3.6.1-1 will be also revised as follows:

- Classify the component cooling water (Common Header) subsystem as a high-energy system.
- Remove the moderate-energy bullet for the chemical and volume control system.
- Add note 9 for the nuclear sampling system and the sampling for SG blowdown system to indicate that these are sampling systems with only high-energy conditions following an accident; thus they satisfy the 2 percent criterion for moderate-energy systems.

FSAR Impact:

U.S. EPR FSAR Tier 2, Section Table 3.6.1-1 will be revised as described in the response and indicated on the enclosed markup.

Question 03.06.01-4:

Standard Review Plan Section 3.6.1, Review Procedure 1, states that the reviewer should evaluate for adequacy the system descriptions of the high and moderate energy piping runs and by reviewing the appropriate system arrangement and piping drawings, examines the plant arrangement measures taken to ensure protection form the effects of pipe breaks.

The staff requests the applicant to update the FSAR to:

a. include detailed design descriptions specifying how the piping systems listed in Tier 2 FSAR Table 3.6.1-1 are routed with respect to nuclear island buildings and safety-related SSCs,

b. provide arrangement drawings depicting the specific locations of high energy lines outside of containment, and

c. provide supporting design information relative to the determination of the terminal end locations for high energy lines contained in Tier 2 FSAR Table 3.6.1-2.

Response to Question 03.06.01-4:

a. Descriptions of each of the systems listed in U.S. EPR FSAR Tier 2, Table 3.6.1-1 are provided in their respective FSAR sections. Detailed information on these systems is provided in internal AREVA NP system descriptions and supporting documentation, which are available for NRC inspection.

b. AREVA NP does not understand the regulatory basis for this question, since neither RG 1.206 nor SRP 3.6.1 requires the information listed in this question. Arrangement drawings are available for NRC inspection.

c. The following methodology was used in developing the U.S. EPR FSAR Tier 2, Tables 3.6.1-1, 3.6.1-2 and 3.6.1-3:

- The starting point for the identification of high-energy lines in buildings containing safe shutdown equipment was an electronic manipulation of piping data (line number, design temperature, design pressure, and building/room location) from the 3-D plant models. This data was used to identify potential high-energy systems, supplemented by reviews of piping and instrumentation diagrams (P&IDs) and system descriptions.

- A calculation was performed to document and refine this list of high-energy systems based on the use of exclusion criteria, such as lines evaluated for leak-before-break, or known to be considered moderate-energy based on limited system operability above high-energy limits. This information was then used to develop Table 3.6.1-1, where moderate-energy systems were categorized as the remainder of the liquid systems not already identified as high-energy.

- The determination and location of terminal end breaks for the high-energy systems were identified based on the terminal end definitions in U.S. EPR FSAR Tier 2, Section 3.6.2. These terminal end breaks, along with their building and room locations are provided in U.S. EPR FSAR Tier 2, Table 3.6.1-2. Actual locations were determined from equipment arrangement drawings or the 3-D plant models.

- The effects of each terminal end break were evaluated based on the affected SSC. The evaluation of affected Safe Shutdown Earthquake (SSE) items was based on the safe shutdown equipment list, which identified equipment items by building and room location. For evaluations of nearby piping, electrical distribution targets (conduits and cable trays), HVAC duct targets, and safety related building structural elements, the 3-D plant models were utilized. The results of these evaluations identified the need for protection devices listed in U.S. EPR FSAR Tier 2, Table 3.6.1-3.

Supporting documentation is available for NRC inspection.

U.S. EPR FSAR Tier 2, Table 3.6.1-2 will be revised to include several terminal end breaks. These additional breaks include four 2 inch nozzles for each steam generator, where the piping was originally considered as 1 inch in diameter. Additionally, terminal ends at normally closed isolation valves for three high-energy systems have been added.

FSAR Impact:

U.S. EPR FSAR Tier 2, Table 3.6.1-2 will be revised as described in the response and indicated on the enclosed markup.

Question 03.06.01-5:

SRP Section 3.6.1, Review Procedures, states that reviewers need to determine that high and moderate energy fluid systems are separated from essential systems and components.

Tier 2 FSAR Tables 3.6-2 and 3.6-3 only addresses high energy systems and do not include all the equipment that needs to be protected against moderate piping failures.

The staff requests the applicant to update the FSAR and justify, why the evaluation and protection for moderate energy line breaks is not addressed in FSAR 3.6.1, or to update the FSAR with information that identify:

a. the energy line break locations,

b. the primary means of protection for each of these line ruptures (e.g., separation, enclosure, special means, etc.), and

c. a listing of SSCs in each area requiring protection.

Response to Question 03.06.01-5:

The evaluation and protection for moderate energy line breaks is provided in U.S. EPR FSAR Tier 2, Section 3.6.2, which is consistent with the “Review Interfaces” section of SRP 3.6.1 which states, “The acceptability of the locations and types of piping failures to be considered, the design of piping restraints and other protective measures, and the resultant dynamic effects is evaluated in accordance with SRP Section 3.6.2.” Further information is provided in the response to RAI No. 80, Question 03.06.01-7.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 03.06.01-6:

Tier 2 FSAR Section 3.6.1.2.1 states that the use of separation and redundancy, and barriers and shields, are used to protect SSCs. This section further states that in some cases special protection considerations are necessary to protect essential equipment.

Table 3.6.1-3 lists jet shields and whip restraints as special protection features, but it is not clear to the staff if there are any other type of special protection devices used in the design of the U.S. EPR.

The staff requests the applicant to update the FSAR to include a complete list of the special protection devices credited for pipe rupture mitigation, and to provide a listing of the locations where enclosures are the primary means for protection against pipe rupture.

Response to Question 03.06.01-6:

U.S. EPR FSAR Tier 2, Table 3.6.1-3 provides a complete list of special protection devices used in the design of the U.S. EPR.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 03.06.01-7:

As stated in SRP Section 3.6.1, the application of General Design Criteria 2 in this section is to incorporate environmental effects of full-circumferential ruptures of non-seismic moderate-energy piping in areas where effects are not already bounded by failures of high-energy piping.

No detailed design description or table of results was identified in Tier 2 FSAR Section 3.6.1, describing the results of the failure of non-seismic piping. The staff requests the applicant to update the FSAR to address the environmental effects of full-circumferential ruptures of non-seismic moderate energy piping in areas containing SSCs.

The RAI response should address the following items

a. What non-seismically designed systems were or will be evaluated as part of the hazards analyses?

b. Are any of these systems located in two or more of the Safeguards buildings? If so, what are the primary means for protecting multiple divisions?

c. Describe the extent to which floor drains are credited for removal of resulting flooding associated with moderate energy line breaks. Describe also how they would be maintained to ensure their availability.

d. Are any floor drain system components credited in analyses to provide building separation for failures of non-seismic lines or other moderate energy line breaks? If so, describe how they would be maintained to ensure their availability.

Response to Question 03.06.01-7:

An evaluation of pipe rupture environmental effects is discussed in U.S. EPR FSAR Tier 2, Section 3.6.2. As noted in U.S. EPR FSAR Tier 2, Section 3.6.2.5.3, these environmental effects include increased temperature, increased pressure, increased humidity, spray wetting, and flooding.

In areas where there are both high-energy and moderate-energy pipes, the effects of the high-energy pipe ruptures are the dominant concern. In areas where there are only moderate-energy pipes, the most severe effect will likely be from flooding. The flooding analyses described in U.S. EPR FSAR Tier 2, Section 3.4 considered full breaks of moderate-energy lines, where the discharge of such lines might challenge safe shutdown equipment. Environmental effects due to temperature, pressure, and humidity are considered in the essential system environmental equipment qualification profiles (see U.S. EPR FSAR Tier 2, Section 3.11).

Responses to each of the specific items in this question are provided as follows:

a. The non-seismic moderate-energy systems that will need to be considered for environmental effects are the moderate-energy systems in U.S. EPR FSAR Tier 2, Table 3.6.1-1 that are classified as non-seismic (see U.S. EPR FSAR Tier 2, Table 3.2.2-1). These systems will be evaluated only in areas where high-energy line effects do not govern.

b. As noted in U.S. EPR FSAR Tier 2, Section 3.6.2:

> "The U.S. EPR design has many essential systems with redundant safety trains located in each of four separate Safeguard Buildings. This four train separation and redundancy allows for one train to be lost due to the rupture, while a second train is lost due to single active failure and a third is down due to normal maintenance. With the fourth train still capable of operating the system, the effects of ruptures need not be specifically evaluated or protection provided."

Therefore, even if piping ruptures of moderate-energy non-seismic (non-safety related) systems occur in more than one Safeguard Building, this is not a concern as rupture events are assumed to occur as separate events. If the separation and redundancy requirements of the essential systems are not met in any individual case, then special protection of the targets would be established in accordance with U.S. EPR FSAR Tier 2, Sections 3.6.1 and 3.6.2.

c. Internal flood protection measures are described in U.S. EPR FSAR Tier 2, Section 3.4.1. Floor drains are assumed to be not available at all times; therefore, they are not relied upon for removal of internal flood water. Floor drains will contribute to flood water removal since it is unlikely that all floor drains in a division will be simultaneously unavailable. Large openings (e.g., stairwells, elevator shafts, and flooding pits equipped with burst openings) are the primary flood protection features which provide flood protection by directing flood water within the affected division to the lower building elevations. Since floor drains are not relied upon for removal of internal flood water there is no need take measures to maintain their availability.

d. Floor drains are not considered a path for bypassing divisional separation since they are not interconnected between safety-related divisions or between safety-related buildings. As described in U.S. EPR FSAR Tier 2, Section 3.4.1, "The nuclear island drain and vent system (NIDVS) prevents backflow of water from affected areas of the plant that contain safety-related equipment. The NIDVS is conservatively considered not available for reducing water volume by the respective sump pumps." Also U.S. EPR FSAR Tier 2, Section 9.3.3.3 states "The NIDVS is designed to prevent backflow of water through the drains systems into areas of the plant containing safety-related equipment by the use of check valves." U.S. EPR FSAR Tier 2, Figure 9.3.3-1 shows redundant check valves on sump pump discharge lines.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 03.06.01-8:

The U.S. EPR utilizes a shield building that encloses the containment building with an annulus between these two structures. Tier 2 FSAR Section 3.6.1.2.2 states that high energy piping penetrating these two structures is enclosed within guard pipes such that the annulus is not affected by pipe ruptures inside or outside containment.

The staff requests the applicant to update the FSAR to specify whether moderate energy lines are enclosed with guard pipes and whether leakage cracks are postulated in these areas. If these lines are not enclosed with guard pipes, provide the limiting moderate energy line break location and flowrate, and describe the means for detection and mitigation of such an event and consequences on SSCs.

Response to Question 03.06.01-8:

Moderate energy lines are not enclosed in guard pipes inside the annulus. The limiting moderate energy line break in the annulus is a full break in the fire water distribution system piping and a flow rate equal to the maximum pump capacity. Leak detection inside the annulus consists of two level measurements in the sump located at elevation -14 feet, 1-1/4 inches. These level measurements initiate an alarm for filled sump (considered as the first alarm for initiating the operator action time for isolation) and an alarm for a flooding event above floor elevation -14 feet, 1-1/4 inches. Upon receiving the first alarm in the main control room, the operator has 30 minutes to isolate the system. The resulting flood level in the annulus is below elevation +0 feet, 0 inches. The lowest safety-related equipment is located above elevation +16 feet, 10-3/4 inches. Some ventilation system ducting is expected to be flooded; however these consequences are acceptable since the safety-related functions of these systems are not adversely affected by the flood. Refer to U.S. EPR FSAR Tier 2, Section 3.4.3.3 for a description of the flooding analysis in the Reactor Building Annulus. Guard pipes are also addressed in U.S. EPR FSAR Tier 2, Section 3.6.2.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 03.06.01-9:

It is expected that the final pipe design may not be completed by the time of COLA review. The applicant has proposed to create a COL holder item that would instruct the license holder to complete the pipe hazards analysis. The staff believes that the pipe hazards analysis should be addressed by an ITAAC that will require the COL holder to complete the pipe hazards analysis. This ITAAC should have sufficient details about the assumptions and the method of developing the analysis that the staff will have confidence that the license holder will be able to properly address all of the staff concerns related to the pipe hazards analysis. The completion and submittal of this report should provide the staff with sufficient time to evaluate the report before the start of the construction phase.

The staff requests the applicant to justify why they have not created an ITAAC that requires the completion of the pipe hazards analysis before the start of the construction of the plant.

Response to Question 03.06.01-9:

See the response to RAI No. 80, Question 03.06.01-2.

FSAR Impact:

The U.S. EPR FSAR Tier 1, Table 2.1.1-7 will be revised as described in the response to Question 03.06.01-2 and indicated on the enclosed markup.

Question 03.06.01-10:

During the construction of the plant, it is expected that some SSCs may be located, or routed in areas other than originally planned. The staff reviewed the applicant's proposed ITAACs and determined that the applicant has not proposed an ITAAC that would complete an as-constructed pipe hazards analysis. This analysis should verify the final position of all SSCs addressed in the pipe hazards analysis, and verify that all assumptions and conclusions of the final pipe hazards analysis are still valid.

The staff requests the applicant to justify why there is no ITAAC that would instruct the COL Holder to complete an as-constructed pipe hazards analysis.

Response to Question 03.06.01-10:

See the response to RAI No. 80, Question 03.06.01-2.

FSAR Impact:

The U.S. EPR FSAR Tier 1, Table 2.1.1-7 will be revised as described in the response to Question 03.06.01-2 and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

4.5 The components of the NI structures that provide post-accident radiation barriers to support post-accident mitigating actions are as described in Table 2.1.1-2—Post-Accident Radiation Barriers.

4.6 The RSB and the RCB are constructed of reinforced concrete and the RCB is pre-stressed.

4.7 The RBA is separated from the SBs and the FB by barriers, doors, dampers, and penetrations that have a minimum 3-hour fire rating.

4.8 The following are provided for water flow to the in-containment refueling water storage tank (IRWST):

- As shown on Figure 2.1.1-11—Trapezoidal Openings, Weirs, and Trash Racks, RCB rooms which are directly above the IRWST, contain trapezoidal-shaped openings in the floor to allow water flow into the IRWST. The floor openings are protected by weirs and trash racks to provide a barrier against material transport into the IRWST.
- As shown on Figure 2.1.1-12—Wall Openings to IRWST, RCB rooms which are adjacent to the IRWST contain wall openings slightly above the floor to allow water flow into the IRWST.

4.9 Essential ~~SSCs~~SSC in RCB rooms listed in Table 2.1.1-4—RCB Rooms With Pipe Whip Restraints are protected from the dynamic effects of pipe breaks.

4.10 Guard pipes are placed around high energy pipelines that pass through RBA penetrations so that consequential failures to other safeguard systems cannot occur. RBA penetrations containing high energy pipelines are described in Table 2.1.1-5—RBA Penetrations that Contain High Energy Pipelines.

4.11 Safety related ~~SSCs~~SSC in the RBA are located above the structural flood design elevation 0 feet 0 inches to protect them from the effects of flooding.

4.12 Above elevation 0 feet, 0 inches of the SBs, flooding pits and flood relief panels, as described in Table 2.1.1-6—SBs Flooding Pits and Relief Panels, provide for water flow to lower building levels or outside to prevent water ingress into adjacent divisions.

4.13 Rooms within the SBs and the FB below elevation 0 feet, 0 inches are provided with sufficient interconnections to keep the maximum released water volume stored within the affected division.

4.14 To provide adequate radiological protection, the Spent Fuel Storage Pool (SFSP) has a depth of 47 feet 3 inches as measured from the bottom of the SFSP to the fuel pool floor.

4.15 A pipe break hazards analyses summary exists that concludes the plant can be shut down safely and maintained in cold safe shutdown following a pipe break with loss of offsite power.

03.06.01-2
03.06.01-9
03.06.01-10

Table 2.1.1-7—Nuclear Island Inspections, Tests, Analyses, and Acceptance Criteria (~~5~~7 Sheets)

Commitment Wording		Inspection, Test or Analysis	Acceptance Criteria
4.15	A pipe break hazards analyses summary exists that concludes the plant can be shut down safely and maintained in cold safe shutdown following a pipe break with loss of offsite power.	A pipe break hazards analysis will be performed.	A pipe break hazards analyses summary exists that concludes the plant can be shut down safely and maintained in cold safe shutdown following a pipe break with loss of offsite power and confirms whether: • Piping stresses in the containment penetration area are within allowable stress limits. • Pipe whip restraints and jet shield designs can mitigate pipe break loads. • Loads on safety-related SSC are within design load limits. • SSC are protected or qualified to withstand the environmental effects of postulated failures.

03.06.01-2
03.06.01-9
03.06.01-10

Table 3.6.1-1—High-Energy and Moderate-Energy Fluid Systems Considered for Protection of Essential Systems[1]
Sheet 1 of 2

03.06.01-3

System	High-Energy	Moderate-Energy
Chemical and Volume Control	•	•
Component Cooling Water (~~Safety Related~~Supply Train)	•	
Component Cooling Water (~~Process Related~~Common Header)	•	•
Coolant Treatment		•
Decontamination Equipment[3]		•
Demineralized Water		•
Emergency Feedwater[6]	•	
Essential Service Water		•
Extra Borating[3]		•
Feedwater	•	
Fuel Handling		•
Fuel Pool Cooling		•
Fuel Pool Purification[2]		•
Gaseous Fire Extinguishing[8]	•	
Gaseous Waste Processing	•	
In-Containment Refueling Water Storage Tank		•
Leak-Off		•
Low Head Safety Injection[7]	•	
Main Condensate	•	
Medium Head Safety Injection[3]		•
Main Steam[5]	•	
Nuclear Island Drain and Vent[8]	•	
Nuclear Sampling[9]		•
Operational Chilled Water		•
Potable and Sanitary Water		•
RC Pump Seal Injection of CVCS	•	
Reactor Coolant[4,5]	•	
Residual Heat Removal[6]	•	
Safety Chilled Water		•
Sampling for SG Blowdown[9]		•

03.06.01-3

03.06.01-3

03.06.01-3

03.06.01-3

Table 3.6.1-1—High-Energy and Moderate-Energy Fluid Systems Considered for Protection of Essential Systems[1]
Sheet 2 of 2

System	High-Energy	Moderate-Energy
Seal Water Supply		•
Severe Accident Heat Removal	•	
Stationary Fire Protection		•
Steam Generator Blowdown	•	

Notes:

1. Systems included in this list are high- or moderate-energy fluid systems ~~located in the Reactor Building, SB-1 through SB-4, or the Fuel Building~~. Systems that operate at approximately atmospheric pressure, such as vents and drains, have been excluded. Moderate-energy gas systems have also been excluded.

2. This system is considered to be moderate-energy, as it operates above the high-energy limits less than 2% of the system's total operating time.

3. This system is considered to be moderate-energy, as it operates above the high-energy limits less than 1% of the total plant operating time.

4. The reactor coolant loop has been analyzed for LBB criteria.

5. Main steam inside containment and the pressurizer surge line have been analyzed to LBB criteria.

6. This system is only high-energy from its connection to the ~~reactor coolant system~~ reactor coolant pressure boundary (RCPB) for the residual heat removal (RHR) system (or SG secondary side for the emergency feedwater (EFW) system) upstream to its isolation valve. The remainder of this system does not operate during normal plant operations, and thus falls under the 1% rule.

7. Portions of this system fall under the 1% or 2% rules.

8. Only a small portion of this system has been identified as high-energy.

9. This system is a sampling system with only high-energy conditions following an accident; thus it falls under the 2% rule.

03.06.01-3

Table 3.6.1-2—Building, Room, and Postulated Pipe Ruptures[1,2]
Sheet 1 of 6

Compartment		Lines Evaluated to LBB		Lines Not Evaluated to LBB	
Building	**Room No.**	**System**	**Terminal End**	**System**	**Terminal End**
Reactor Building	UJA07-018	None	None	Condensate	Blowdown Cooler 1 Nozzle
				Condensate	Blowdown Cooler 2 Nozzle
				SG Blowdown	Blowdown Flash Tank Nozzle
				SG Blowdown	Blowdown Cooler 1 Nozzles
				SG Blowdown	Blowdown Cooler 2 Nozzles
	UJA07-024	None	None	NI Drain & Vent	Reactor Coolant Drain Tank Nozzle
	UJA07-026	None	None	CVCS	CVCS Cooler Nozzles
	UJA07-027	None	None	CVCS	CVCS Cooler Nozzles
	UJA11-002	Reactor Coolant	Crossover to RCP	CVCS	Connection to Crossover
	UJA11-003	None	None	RHR	Closed Isolation Valve
				Low Head SI	Closed Isolation Valve
	UJA11-004	None	None	RHR	Closed Isolation Valve
				Low Head SI	Closed Isolation Valve
	UJA11-005	Reactor Coolant	Crossover to RCP	CVCS	Connection to Crossover
	UJA11-006	Reactor Coolant	Crossover to RCP	CVCS	Connection to Crossover
	UJA11-007	None	None	RHR	Closed Isolation Valve
				Low Head SI	Closed Isolation Valve
	UJA11-008	None	None	RHR	Closed Isolation Valve
				Low Head SI	Closed Isolation Valve
	UJA11-009	Reactor Coolant	Crossover to RCP	CVCS	Connection to Crossover
	UJA11-018	None	None	SG Blowdown	Blowdown Flash Tank Nozzles

03.06.01-4

03.06.01-4

Table 3.6.1-2—Building, Room, and Postulated Pipe Ruptures[1,2]
Sheet 2 of 6

Compartment		Lines Evaluated to LBB		Lines Not Evaluated to LBB	
Building	**Room No.**	**System**	**Terminal End**	**System**	**Terminal End**
Reactor Building (Cont'd.) ~~Reactor Building~~	UJA11-019	None	None	PZR Relief Disch.	PZR Relief Tank Nozzles
	UJA11-024	None	None	CVCS	CVCS Regen. HX Nozzles
	UJA15-001	Reactor Coolant	RPV Cold Leg and Hot Leg Nozzles	None	
	UJA15-002	Reactor Coolant	RCP Cold Leg Nozzle	RC Pump	RCP Nozzles
				Low Head SI	Cold Leg Connection
	UJA15-003	Reactor Coolant	SG Crossover & Hot Leg Nozzle	RHR	Hot Leg Connection
				SG Blowdown	SG Nozzles
	UJA15-004	Reactor Coolant	SG Crossover & Hot Leg Nozzle	RHR	Hot Leg Connection
				SG Blowdown	SG Nozzles
	UJA15-005	Reactor Coolant	RCP Cold Leg Nozzle	RC Pump	RCP Nozzles
				RC Pressurizing	Cold Leg Connection
				Low Head SI	Cold Leg Connection
				CVCS	Cold Leg Connection
	UJA15-006	Reactor Coolant	RCP Cold Leg Nozzle	RC Pump	RCP Nozzles
				RC Pressurizing	Cold Leg Connection
				Low Head SI	Cold Leg Connection
	UJA15-007	Reactor Coolant	SG Crossover to Hot Leg Connection	RHR	Hot Leg Connection
		RC Pressurizing	Surge Line to Hot Leg Connection	SG Blowdown	SG Nozzles

Table 3.6.1-2—Building, Room, and Postulated Pipe Ruptures[1,2]
Sheet 3 of 6

Compartment		Lines Evaluated to LBB		Lines Not Evaluated to LBB	
Building	Room No.	System	Terminal End	System	Terminal End
Reactor Building (Cont'd.)	UJA15-008	Reactor Coolant	SG Crossover to Hot Leg Connection	RHR	Hot Leg Connection
				SG Blowdown	SG Nozzles
	UJA15-009	Reactor Coolant	RCP Cold Leg Nozzle	RC Pump	RCP Nozzles
				Low Head SI	Cold Leg Connection
				CVCS	Cold Leg Connection
	UJA15-013	None	None	Low Head SI	LHSI Accumulator Nozzle
				Low Head SI	2" to 12" Branch Connection
	UJA15-014	None	None	Low Head SI	LHSI Accumulator Nozzle
				Low Head SI	2" to 12" Branch Connection
	UJA15-015	None	None	Low Head SI	LHSI Accumulator Nozzle
				Low Head SI	2" to 12" Branch Connection
	UJA15-016	None	None	Low Head SI	LHSI Accumulator Nozzle
				Low Head SI	2" to 12" Branch Connection
	UJA18-003	None	None	Steam Generator	(4) SG Nozzles
	UJA18-004	None	None	Steam Generator	(4) SG Nozzles
	UJA18-007	None	None	Steam Generator	(4) SG Nozzles
	UJA18-008	None	None	Steam Generator	(4) SG Nozzles
	UJA18-019	RC Pressurizing	Surge Line to PZR Nozzle	None	None
	UJA23-013	None	None	Low Head SI	LHSI Accumulator Nozzle
	UJA23-014	None	None	Low Head SI	LHSI Accumulator Nozzle
	UJA23-015	None	None	Low Head SI	LHSI Accumulator Nozzle

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Table 3.6.1-2—Building, Room, and Postulated Pipe Ruptures[1,2]
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Compartment		Lines Evaluated to LBB		Lines Not Evaluated to LBB	
Building	Room No.	System	Terminal End	System	Terminal End
Reactor Building (Cont'd.) ~~Reactor Building~~	UJA23-016	None	None	Low Head SI	LHSI Accumulator Nozzle
	UJA29-003	None	None	Feedwater	SG Nozzle
				Emergency FW	SG Nozzle
				Emergency FW	Closed Isolation Valve
	UJA29-004	None	None	Feedwater	SG Nozzle
				Emergency FW	SG Nozzle
				Emergency FW	Closed Isolation Valve
	UJA29-007	None	None	Feedwater	SG Nozzle
				Emergency FW	SG Nozzle
				Emergency FW	Closed Isolation Valve
	UJA29-008	None	None	Feedwater	SG Nozzle
				Emergency FW	SG Nozzle
				Emergency FW	Closed Isolation Valve
	UJA29-019	None	None	RC Pressurizing	PZR Nozzles
	UJA34-003	MS	SG Nozzle	None	None
	UJA34-004	MS	SG Nozzle	None	None
	UJA34-007	MS	SG Nozzle	None	None
	UJA34-008	MS	SG Nozzle	None	None
	UJA34-019	None	None	RC Pressurizing	PZR Nozzles
				PZR Relief Disch.	PZR Nozzles

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Table 3.6.1-2—Building, Room, and Postulated Pipe Ruptures[1,2]
Sheet 5 of 6

Compartment		Lines Evaluated to LBB		Lines Not Evaluated to LBB	
Building	**Room No.**	**System**	**Terminal End**	**System**	**Terminal End**
Safeguard Building 1	1UJE26-001	None	None	Feedwater	Piping Anchors
	1UJE29-002	None	None	MS	Decoupled Branch Connections
	1UJH01-008	None	None	SAHR	SAHR Pump Nozzles
	1UJH05-012	None	None	SAHR	SAHR HX Nozzles
	1UJK26-030	None	None	Feedwater	Piping Anchors
				MS	Piping Anchors
	2UJE29-002	None	None	MS	Decoupled Branch Connections
	2UJE34-003	None	None	Condensate	Piping Anchors
Safeguard Building 2	2UJK26-040	None		Gaseous Fire Ext.	SGJ Tanks Nozzles
Safeguard Building 3	N/A	None	None	None	None
Safeguard Building 4 ~~Safeguard Building 4~~	3UJE26-001	None	None	Feedwater	Piping Anchors
	3UJE29-002	None	None	MS	Decoupled Branch Connections
	4UJE29-002	None	None	MS	Decoupled Branch Connections
	4UJH01-007	None	None	CCW	2" to 10" Branch Connection
	4UJH01-008	None	None	SAHR	SAHR Pump Nozzles
				CCW	SAHR Pump Nozzles
	4UJH01-027	None	None	CCW	CCW Pump Nozzles
				CCW	1.5" to 10" Branch Connections

Table 3.6.1-2—Building, Room, and Postulated Pipe Ruptures[1,2]
Sheet 6 of 6

Compartment		Lines Evaluated to LBB		Lines Not Evaluated to LBB	
Building	**Room No.**	**System**	**Terminal End**	**System**	**Terminal End**
Safeguard Building 4 (Cont'd.)	4UJH05-012	None	None	SAHR	SAHR HX Nozzles
				CCW	SAHR HX Nozzles
	4UJH05-026	None	None	CCW	CCW Pump Nozzles
				CCW	CCW Surge Tank Nozzle
				CCW	2" to 10" Branch Connection
	4UJH10-026	None	None	CCW	CCW HX Nozzles
				CCW	2" to 10" Branch Connection
	4UJK26-030	None	None	Feedwater	Piping Anchors
				MS	Piping Anchors
Fuel Building	UFA01-035	None	None	CVCS	CVCS Charging Pump Nozzle
	UFA01-085	None	None	CVCS	CVCS Charging Pump Nozzle

Notes:

1. The high-energy breaks listed are terminal end breaks associated with the systems in Table 3.6.1-1 which do not fall under the 1% or 2% rules. The terminal end breaks where the piping has been evaluated to LBB criteria have also been shown as such.
2. The U.S. EPR subscribes to the Kraftwerks Kennzeichen System (KKS) for coding and nomenclature of structures, systems, and components.