## ArevaEPRDCPEm Resource

**From:** WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
**Sent:** Friday, October 26, 2012 5:41 PM
**To:** Snyder, Amy
**Cc:** WELLS Russell (AREVA); Miernicki, Michael; BENNETT Kathy (AREVA); DELANO Karen (AREVA); LEIGHLITER John (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); TOLLEY Tracey (AREVA); VANCE Brian (AREVA); Miernicki, Michael
**Subject:** DRAFT Revised Response to U.S. EPR Design Certification Application RAI No. 218, FSARCh. 3, Question 03.04.01-8
**Attachments:** RAI 218 Question 03.04.01-08 Response US EPR DC - DRAFT.pdf

Amy,

Attached is a DRAFT revised response for RAI 218 Question 03.04.01-8. This response was sent as Final in Supplement 2 on August 18, 2009. The purpose of this revision is as follows:

- To delete COL Information Item 3.4-5 in U.S. EPR FSAR Tier 2, Table 1.8-2 and U.S. EPR FSAR Tier 2, Section 3.4.1 since the information required by this COL information has been provided in revised U.S. EPR FSAR Tier 2, Section 3.4.3.3.
- U.S. EPR FSAR Tier 2, Section 3.4.3.3, and U.S. EPR FSAR Tier 2, Table 3D-1 were revised to provide the internal flood level for the RB as noted in this response.
- U.S. EPR FSAR Tier 1, Table 2.1.1-8, Item 2.10 will be revised to change “Essential equipment required for plant shutdown” to “Safety related equipment required for plant shutdown or to mitigate the consequences of an accident.” This revised terminology is consistent with the analyses in U.S. EPR FSAR Tier 2, Section 3.4.3.3, and the response to Question 03.04.01-9.a which was accepted by NRC in the Chapter 3 Group 1 SER.
- U.S. EPR FSAR Tier 1, Table 2.1.1-8, Item 2.10.a was deleted since the internal flooding analyses are fully described in U.S. EPR FSAR Tier 2, Section 3.4.1 and the list of the systems required for safe shutdown is provided in U.S. EPR FSAR Tier 2, Section 7.4.

We have provided a DRAFT of this revised response in order for NRC staff to review prior to sending it as a Final response. We would like to receive all NRC staff feedback and comments no later than **November 30**, such that we can send a final response date by December 14, 2012.

Please let me know if the staff has questions or if the response to this question can be sent as final.

Sincerely,

***Dennis Williford, P.E.***
***U.S. EPR Design Certification Licensing Manager***
**AREVA NP Inc.**
7207 IBM Drive, Mail Code CLT 2B
Charlotte, NC 28262
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**From:** Pederson Ronda M (AREVA NP INC)
**Sent:** Tuesday, August 18, 2009 3:23 PM
**To:** 'Getachew Tesfaye'
**Cc:** WELLS Russell (RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 218, FSARCh. 3, Supplement 2

Getachew,

AREVA NP Inc.'s (AREVA NP) provided a response to 2 of the 5 questions of RAI 218 on June 12, 2009 and provided a schedule for the remaining questions. On July 7, 2009, AREVA NP provided a revised schedule for responding to the remaining questions. The attached file, "RAI 218 Response US EPR DC.pdf" provides a technically correct and complete response to the remaining 3 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 218 Questions 03.04.01-8, 03.04.01-9, and 03.04.01-11.

The following table indicates the respective pages in the response document, "RAI 218 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|---|---|---|
| RAI 218 — 03.04.01-8 | 2 | 5 |
| RAI 218 — 03.04.01-9 | 6 | 7 |
| RAI 218 — 03.04.01-11 | 8 | 11 |

This concludes the formal AREVA NP response to RAI 218, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,


*Ronda Pederson*
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
**AREVA NP Inc.**
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3315 Old Forest Road
Lynchburg, VA 24506-0935
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**From:** Pederson Ronda M (AREVA NP INC)
**Sent:** Tuesday, July 07, 2009 4:59 PM
**To:** 'Tesfaye, Getachew'
**Cc:** WELLS Russell D (AREVA NP INC); DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 218, FSARCh. 3, Supplement 1

Getachew,

AREVA NP Inc.'s (AREVA NP) provided a response to 2 of the 5 questions of RAI 218 on June 12, 2009 and indicated that the responses to the remaining questions would be provided by July 9, 2009.

AREVA NP is unable to provide a technically correct and complete response to the remaining questions as scheduled.

The schedule for technically correct and complete responses to the remaining 3 questions has been revised as provided below:

| Question # | Response Date |
|---|---|
| RAI 218 — 03.04.01-8 | August 21, 2009 |
| RAI 218 — 03.04.01-9 | August 21, 2009 |
| RAI 218 — 03.04.01-11 | August 21, 2009 |

Sincerely,

*Ronda Pederson*

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**From:** Pederson Ronda M (AREVA NP INC)
**Sent:** Friday, June 12, 2009 2:38 PM
**To:** 'Getachew Tesfaye'
**Cc:** BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); WELLS Russell D (AREVA NP INC)
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 218, FSARCh. 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 218 Response US EPR DC.pdf" provides a technically correct and complete response to 2 of the 5 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 218 Questions 03.04.01-10 and 03.04.01-12.

The following table indicates the respective pages in the response document, "RAI 218 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

| Question # | Start Page | End Page |
|---|---|---|
| RAI 218 — 03.04.01-8 | 2 | 2 |
| RAI 218 — 03.04.01-9 | 3 | 3 |
| RAI 218 — 03.04.01-10 | 4 | 4 |
| RAI 218 — 03.04.01-11 | 5 | 5 |
| RAI 218 — 03.04.01-12 | 6 | 6 |

A complete answer is not provided for 3 of the 5 questions. The schedule for a technically correct and complete response to these questions is provided below.

| Question # | Response Date |
|---|---|
| RAI 218 — 03.04.01-8 | July 9, 2009 |
| RAI 218 — 03.04.01-9 | July 9, 2009 |

Sincerely,

*Ronda Pederson*

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**From:** Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
**Sent:** Friday, May 15, 2009 8:57 AM
**To:** ZZ-DL-A-USEPR-DL
**Cc:** Chang Li; John Segala; Michael Miernicki; Joseph Colaccino; ArevaEPRDCPEm Resource; Jay Patel
**Subject:** U.S. EPR Design Certification Application RAI No. 218 (2613), FSARCh. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on April 22, 2009, and discussed with your staff on May 12, 2009. No change was to the draft RAI questions as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

**Hearing Identifier:** AREVA_EPR_DC_RAIs
**Email Number:** 4085

**Mail Envelope Properties** (2FBE1051AEB2E748A0F98DF9EEE5A5D4ED9424)

**Subject:** DRAFT Revised Response to U.S. EPR Design Certification Application RAI No. 218, FSARCh. 3, Question 03.04.01-8
**Sent Date:** 10/26/2012 5:41:24 PM
**Received Date:** 10/26/2012 5:41:47 PM
**From:** WILLIFORD Dennis (AREVA)

**Created By:** Dennis.Williford@areva.com

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| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 7913 | 10/26/2012 5:41:47 PM |
| RAI 218 Question 03.04.01-08 Response US EPR DC - DRAFT.pdf | | 1014146 |

**Options**
**Priority:** Standard
**Return Notification:** No
**Reply Requested:** No
**Sensitivity:** Normal
**Expiration Date:**
**Recipients Received:**

**Response to**

**Request for Additional Information No. 218 (2613), Revision 0**
**Question 03.04.01-8**
**05/15/2009**

**U. S. EPR Standard Design Certification**
**AREVA NP Inc.**
**Docket No. 52-020**
**SRP Section: 03.04.01 - Internal Flood Protection for Onsite Equipment Failures**
**Application Section: 3.4.1**

**QUESTIONS for Balance of Plant Branch 2 (ESBWR/ABWR) (SBPB)**

**Question 03.04.01-8:**

This is a follow-up of RAI 03.04.01-1, -4, and -7.

The staff in RAI 03.04.01-1 requested the applicant to:

> "…Clarify whether the U.S. EPR flood protection design intends to include the option of submerged SSCs operation in the design certification stage or in the COL application stage. If it is in the DC stage, provide the information about the submerged SSCs and the qualification program for those SSCs in the FSAR for the DC. However, if it is in the COL stage, identify a COL information item that requires the applicant to provide the above information, if the applicant will locate safety-related SSCs below the flood level. …"

The applicant responded as follows:

a. In Response to eRAI No. 109, Question 03.04.01-1, the applicant stated, "There are no safety-related structures, systems, and components (SSC) required to perform a safety-related function while being completely or partially flooded. The U.S. EPR flood protection design does not include an option of submerged SSC operation."

b. In Response to eRAI No. 118, Question 03.04.01-4, the applicant responded by stating that the safety-related SSCs for structures without physical separation between divisions (containment and annulus) have the safe shutdown systems and components located above the flood level.

c. In Response to eRAI No. 118, Supplement 1, Response to Question 03.04.01-7, the applicant responded with Tier 1 (ITAAC) and Tier 2 FSAR changes that state the U.S. EPR flood protection design includes the option of SSCs withstanding flooding. It states that a flood analysis will be performed prior to fuel load by the COL applicant, and COL Information Items (U.S. FSAR Tier 2, Table 1.8-2, Items 3.4-4 and 3.4-5) were created.

These RAI responses are inconsistent as related to the operation of submerged SSCs. The staff finds the response to RAI 03.04.01-7 with Tier 1 and Tier 2 FSAR changes acceptable in providing COL information items and ITAAC inspections. However, the details of the COL information items and the ITAAC inspection need to be revised; this is discussed in RAI 03.04.01-9.

To be consistent with this change in the response to RAI 03.04.01-7, the applicant needs to revise the FSAR Tier 2, Section 3.4.3.3, Page 3.4-6 changes associated with RAI 03.04.01-1. In addition, the applicant is requested to clarify this inconsistency among the responses to RAI 03.04.01-1, -4 and -07 with respect to the operation of submerged SSCs.

**Response to Question 03.04.01-8:**

The bounding internal flooding case for the Reactor Building (RB) in containment has been revised from a postulated pipe break in the fire water distribution system (FWDS) to a large break loss of coolant accident (LBLOCA) inside containment. This event results in the release of 20,659 ft$^3$ (154,540 gallons) of water which, because of the design features of the containment building is directed down to the IRWST, subsequently collecting on elevation -7'-6½" and rising to elevation -6'-2". Safety-related SSCs required for safe shutdown or to mitigate the consequences of an accident are located above this flood level. U.S EPR FSAR Tier 2, Section 7.4 provides a list of the SSC required for safe shutdown. The maximum credible flood level from a LBLOCA is conservatively estimated using a volume of released water equal to the contents of the reactor coolant system (RCS), the volume of water in the pressurizer (PZR), and the water volume of the accumulators. This is a conservative estimate because the portion of the RCS inventory in the vessel below the large break, remains in the vessel. The safety-related SSC located below the maximum internal flood level are not required to perform a function to achieve safe shutdown or to mitigate the consequences of an accident.

The FWDS has been removed as the bounding flood source by isolating the FWDS piping inside containment, including the spray deluge system, by normally closed containment isolation valves. The FWDS and spray deluge piping inside containment are dry, containing no water which could cause flooding from any postulated pipe rupture.

The bounding internal flooding case for the RB annulus (RBA) has also been revised from a postulated pipe break in the FWDS to operation of the fire protection system, which occurs during manual fire fighting by hose streams in the RBA. In order to decrease the risk posed by a flood in the RBA as addressed in the internal flooding probabilistic risk assessment (PRA), the position of the FWDS annulus isolation valves have been changed to normally closed, and a normally open bypass line has been added around each valve to reduce the amount of flooding in the event of a line rupture.

The FWDS piping inside the RBA is seismically designed so that a pipe break would not adversely affect safety-related SSC required for safe shutdown. Specifically, the FWDS piping for safe shutdown equipment protection is Seismic Category II. ANP-10264NP-A, “U.S. EPR Piping Analysis and Pipe Support Design Topical Report,” Section 3.1 states in order “to prevent adverse impact to Seismic Category I SSCs, Seismic Category II piping will be designed to the same requirements as Seismic Category I piping.” The internal flooding sources inside the RBA are the moderate-energy, water-carrying piping systems, including the FWDS piping. Because these piping systems are seismically designed inside the annulus, AREVA NP postulates flooding due to through-wall leakage cracks. The released water from these pipe failures is limited by either operator action to isolate the source or by the limited volume of water contained in a closed system. These systems do not release an amount of water that would flood safety-related SSC, and the resulting flood level is below elevation +0 feet.

Therefore, for RB and RBA flooding there are no submerged SSCs that are required to perform a safety-related function for safe shutdown of the plant or to mitigate the consequences of an accident. U.S. EPR FSAR Tier 2, Section 3.4.3.3 will be revised to reflect these revised flooding analyses.

The basis for postulating through-wall leakage cracks in the seismically designed moderate-energy FWDS piping inside the RBA is described below:

- BTP 3-3, Appendix A defines postulated piping failures as:

  > “Longitudinal and circumferential breaks in high energy fluid system piping and through-wall leakage cracks in seismically-designed moderate energy fluid system piping postulated according to the provisions BTP 3-4. Also, full circumferential breaks in nonseismic moderate energy piping should be considered (since these breaks are not

> considered in BTP 3-4 because it only applies during normal operation, not seismic events)."

Therefore, for seismically designed moderate-energy piping, only through-wall leakage cracks must be postulated.

- NUREG-1793, Section 3.4.1.2 identifies two internal flooding sources: "through-wall cracks in seismically supported, moderate-energy piping and breaks and through-wall cracks in nonseismically supported, moderate-energy piping."
- SRP 3.6.1, Technical Rationale Section, Item 1 regarding compliance with GDC 2, notes that full-circumferential ruptures are only considered for non-seismic moderate-energy piping. This implies that full-circumferential ruptures do not need to be considered in seismically designed moderate-energy piping.
- SRP 3.4, Section III.3 states:

  > "Moderate energy piping that is not seismically supported should be considered for full circumferential ruptures, not just cracks." Section IV of SRP 3.4 states "Identifying all possible sources of internal flooding, including all pipe breaks postulated in SRP Sections 3.6.1 and 3.6.2, full circumferential breaks of non-seismic moderate energy piping, failures of non-seismic internal and external tanks and vessels, backflow through drains, and operation of the fire protection system."

  This excerpt implies that full-circumferential ruptures do not need to be considered in seismically designed moderate energy piping.
- SRP 3.6.1, Section III.3 states:

  > "The reviewer evaluates for adequacy the system descriptions of the high and moderate energy piping runs and by reviewing the appropriate system arrangement and piping drawings, examines plant arrangement measures that were taken to ensure protection from the effects of postulated pipe breaks of high energy systems and non-seismic moderate energy systems, or of leakage cracks for seismically-designed moderate energy systems."

  This statement shows that only leakage cracks need to be evaluated in seismically designed moderate energy piping.

The following U.S. EPR FSAR sections will be revised to include the information in this response as described below:

- U.S. EPR FSAR Tier 2, Sections 3.4.1 and Section 3.4.3.3 were revised to reflect the revised internal flooding analysis described in this response (Note these changes were reflected in Revision 2 of the U.S. EPR FSAR). Additionally, U.S. EPR FSAR Tier 2, Section 3.4.3.3, and U.S. EPR FSAR Tier 2, Table 3D-1 will be revised to provide the internal flood level for the RB as noted in this response. The internal flood level for the RBA is already provided in U.S. EPR FSAR Tier 2, Section 3.4.3.3.

- COL Information Item 3.4-5 in U.S. EPR FSAR Tier 2, Table 1.8-2 and U.S. EPR FSAR Tier 2, Section 3.4.1 will be deleted. The information required by this COL information is provided in U.S. EPR FSAR Tier 2, Section 3.4.3.3 as modified above. Furthermore, the ITAAC in U.S. EPR FSAR Tier 1, Table 2.1.1-8, Item 2.10 will verify that safety related equipment required for safe shutdown of the plant or to mitigate the consequences of an accident are located above the internal flood level.

- U.S. EPR FSAR Tier 1, Table 2.1.1-8, Item 2.10 will be revised to change “Essential equipment required for plant shutdown” to “Safety related equipment required for plant shutdown or to mitigate the consequences of an accident.” This revised terminology is consistent with the analyses in U.S. EPR FSAR Tier 2, Section 3.4.3.3, and the response to Question 03.04.01-9.a which was accepted by NRC in the Chapter 3 Group 1 SER (see page 3-4 of the SER).

- U.S. EPR FSAR Tier 1, Table 2.1.1-8, Item 2.10.a will be deleted since the internal flooding analyses are fully described in U.S. EPR FSAR Tier 2, Section 3.4.1 and the list of the systems required for safe shutdown is provided in U.S. EPR FSAR Tier 2, Section 7.4.

- U.S. EPR FSAR Tier 1, Section 2.1.1.1, Item 2.10 and Item 2.10 in Table 2.1.1-8, were revised to delete the phrase “or is designed to withstand flooding.” Similarly, this phrase was also deleted from the COL information item in U.S. EPR FSAR Tier 2, Table 1.8-2, and Section 3.4.1. (Note these changes were reflected in Revision 2 of the U.S. EPR FSAR).

- U.S. EPR FSAR Tier 2, Table 3 2 2-1 was revised to add the Reactor Building annulus (KKS code UJB) to the locations of the fire water distribution system. (Note these changes were reflected in Revision 2 of the U.S. EPR FSAR).

- A new Table 3.4-1 was added to U.S. EPR FSAR Tier 2 to identify the internal flooding sources inside the RB. (Note these changes were reflected in Revision 2 of the U.S. EPR FSAR).

- U.S. EPR FSAR Tier 2, Table 3.10-1 and 3.11-1 will be revised to add FWDS annulus isolation valves SGB30AA021 and SGB30AA022.

- U.S. EPR FSAR Tier 2, Table 6.2.4-1 was revised to show the position of the FWDS containment isolation valves as normally closed. (Note these changes were reflected in Revision 2 of the U.S. EPR FSAR).

- U.S. EPR FSAR Tier 2, Section 9.5.1 was revised to change FWDS annulus isolation valves SGB30AA021 and SGB30AA022 to normally closed motor operated valves. (Note these changes were reflected in Revision 2 of the U.S. EPR FSAR).

- U.S. EPR FSAR Tier 2, Figure 9.5.1-1 (Sheets 4 and 7) was revised to add a normally open bypass line around the FWDS annulus isolation valves. (Note these changes were reflected in Revision 2 of the U.S. EPR FSAR).

**FSAR Impact:**

U.S. EPR FSAR Tier 1, Section 2.1.1.1 and Table 2.1.1-8 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Table 1.8-2, Section 3.4.1, and Section 3.4.3.3 will be revised as described in the response and indicated on the enclosed markup.

(Note all other FSAR changes described in this response were reflected in Revision 2 of the U.S. EPR FSAR).

# U.S. EPR Final Safety Analysis Report Markups

2.8 The RCB includes provisions for water flow to the in-containment refueling water storage tank (IRWST):

- As shown on Figure 2.1.1-4, RCB rooms which are adjacent to the IRWST contain wall openings to allow water flow into the IRWST.
- As shown on Figure 2.1.1-5—Reactor Building Plan Elevation +5 ft., RCB rooms which are directly above the IRWST, contain 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.

2.9 RBA penetrations that contain high-energy lines, as listed in Table 2.1.1 7—RBA Penetrations that Contain High Energy Pipelines, have guard pipes.

2.10 Safety-related equipment~~Essential equipment required for plant shutdown~~ located in the RCB and RBA required for safe shutdown or to mitigate the consequences of an accident are~~is~~ located above the internal flood level.

2.11 The reactor pressure vessel, reactor coolant pumps, pressurizer, steam generators, and interconnecting RCS piping are insulated with reflective metallic insulation.

2.12 The RB structures have key dimensions and tolerances specified in Table 2.1.1-5.—Key Dimensions of Reactor Building Structures

2.13 The RCB has a minimum containment free volume.

2.14 The RCB and RB internal structures have a minimum containment heat sink surface area.

2.15 The integrated leak rate from the RCB does not exceed the maximum allowable leakage rate.

2.16 The location of the doors and blowout panels is as listed in Table 2.1.1-6(a)) —Pressure Relief Doors in the Reactor Containment Building.

2.17 Pressure relief doors in the RCB listed in Table 2.1.1-6(a) will withstand seismic design basis loads without a loss of the function listed.

2.18 RCB doors and blowout panels provide pressure relief.

2.19 RCB doors with blowout panels listed in Table 2.1.1-6(a) are provided with missile restraint.

2.20 RCB vent path areas provide pressure relief for the rooms listed in Table 2.1.1-6(b)—Vent Path Areas in Reactor Containment Building for Pressure Relief.

2.21 The RCB has a maximum volume of Microtherm insulation within the zone of influence.

2.22 Deleted.

**Table 2.1.1-8—Reactor Building ITAAC**
**Sheet 5 of 9**

| | Commitment Wording | Inspections, Tests, Analyses | Acceptance Criteria |
|---|---|---|---|
| 2.10 | ~~Essential equipment required for plant shutdown located in the RCB and RBA is located above the internal flood level~~Safety-related equipment located in the RCB and RBA required for safe shutdown or to mitigate the consequences of an accident are located above the internal flood level.. | ~~a. An internal flood analysis will be performed to define the essential equipment required for plant shutdown and the internal flood level in the RCB and RBA~~. ~~b. An inspection will be performed to verify as-built essential equipment in the RB and RBA required for plant shutdown are located above the internal flood level.~~ a. An inspection will be performed to verify as-built safety-related equipment located in the RCB required safe shutdown or to mitigate the consequences of an accident are located above the internal flood level. b. An inspection will be performed to verify as-built safety-related equipment in the RBA required for safe shutdown or to mitigate the consequences of an accident are located above the internal flood level. | ~~a. The internal flood analysis for the RCB and RBA defines the essential equipment required for plant shutdown and the internal flood level in the RCB and RBA.~~ ~~b. Essential equipment in the RB and RBA required for plant shutdown are located above the internal flood level.~~ a. Safety-related equipment located in the RCB required for safe shutdown or to mitigate the consequences of an accident are located above the internal flood level of -6 ft 2 inches. b. Safety-related equipment in the RBA required for safe shutdown or to mitigate the consequences of an accident are located above the internal flood level of +0 ft. |
| 2.11 | The reactor pressure vessel, reactor coolant pumps, pressurizer, steam generators, and interconnecting RCS piping are insulated with reflective metallic insulation. | An inspection will be performed to verify the as-built ~~equipment, such as the~~ reactor pressure vessel, reactor coolant pumps, pressurizer, steam generators, and interconnecting RCS piping, are insulated with reflective metallic insulation. | The reactor pressure vessel, reactor coolant pumps, pressurizer, steam generators, and interconnecting RCS piping are insulated with reflective metallic insulation. |

**Table 1.8-2—U.S. EPR Combined License Information Items**
**Sheet 8 of 40**

| Item No. | Description | Section |
|---|---|---|
| 3.3-3 | A COL applicant that references the U.S. EPR design certification will demonstrate that failure of site-specific structures or components not included in the U.S. EPR standard plant design, and not designed for tornado loads, will not affect the ability of other structures to perform their intended safety functions. | 3.3.2 |
| 3.4-1 | A COL applicant that references the U.S. EPR design certification will confirm the potential site specific external flooding events are bounded by the U.S. EPR design basis flood values or otherwise demonstrate that the design is acceptable. | 3.4.3.2 |
| 3.4-2 | A COL applicant that references the U.S. EPR design certification will perform a flooding analysis for the ultimate heat sink makeup water intake structure based on the site-specific design of the structures and the flood protection concepts provided herein. | 3.4.3.10 |
| 3.4-3 | A COL applicant that references the U.S. EPR design certification will define the need for a site-specific permanent dewatering system. | 3.4.3.11 |
| 3.4-4 | A COL applicant that references the U.S. EPR design certification will perform internal flooding analyses prior to fuel load for the Safeguard Buildings and Fuel Building to demonstrate that the impact of internal flooding is contained within the Safeguard Building or Fuel Building division of origin. | 3.4.1 |
| Deleted~~3.4-5~~ | Deleted~~A COL applicant that references the U.S. EPR design certification will perform an internal flooding analysis prior to fuel load for the Reactor Building and Reactor Building Annulus to demonstrate that the essential equipment required for safe shutdown is located above the internal flood level.~~ | Deleted~~3.4.1~~ |
| 3.4-6 | A COL applicant that references the U.S. EPR design certification will include in its maintenance program appropriate watertight door preventive maintenance in accordance with manufacturer recommendations so that each Safeguards Building and Fuel Building watertight door above elevation +0 feet remains capable of performing its intended function. | 3.4.1 |
| 3.4-7 | A COL applicant that references the U.S. EPR design certification will design the watertight seal between the Access Building and the adjacent Category I access path to the Reactor Building Tendon Gallery. Watertight seal design will account for hydrostatic loads, lateral earth pressure loads, and other applicable loads. | 3.4.2 |

**Table 3.2.2-1—Classification Summary**
**Sheet 116 of 192**

| 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 |
|---|---|---|---|---|---|---|---|
| SGA | Fire Water Distribution System, Conventional Area (Safe Shutdown Equipment Protection) | NS-AQ | N/A | II | Yes | USG, UZT | NFPA 20, 2007 Ed. NFPA 22, 2003 Ed. NFPA 24, 2007 Ed. NFPA 25, 2002 Ed. NFPA 804, 2006 Ed. ANSI/ASME B31.1[6], ASCE/SEI Std. 43-05, ANSI/AWWA D100-2005; Required for safe shutdown earthquake protection |
| SGB | Fire Water Distribution System, SGB Subsystem within UKS and UKA inside Nuclear Island | NS-AQ | N/A | NSC | No | UKS, UKA | NFPA 14, 2007 Ed. NFPA 25, 2002 Ed. NFPA 804, 2006 Ed. |
| SGB | Fire Water Distribution System, SGB Subsystem (Safe Shutdown Equipment Protection) | NS-AQ | N/A | II | Yes | UBP, UFA, UJA, UJH, UJK, URB, UJB | NFPA 14, 2007 Ed. NFPA 25, 2002 Ed. NFPA 804, 2006 Ed. ANSI/ASME B31.1[6]; Required for safe shutdown earthquake protection |

contained within the division of hazard origin and are not allowed to propagate to other divisions. Consequently, in a large internal flooding event in buildings with divisional separation safety-related SSC within the affected division are assumed to be flooded. The plant arrangement provides divisional separation walls to physically separate the redundant trains of safe shutdown systems and components. A combination of fluid diversion flow paths and passive features contain the water within the affected division.

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Division walls below elevation +0 feet, 0 inches (hereinafter +0 feet) provide separation and serve as flood barriers to prevent flood waters spreading to adjacent divisions. These division walls are watertight, have no doors, and a minimal number of penetrations all of which are watertight up to elevation +0 feet. Water is directed within one division to the building elevations below +0 feet, where it is stored. Above elevation +0 feet, a combination of watertight doors and openings for water flow to the lower building levels prevent water ingress into adjacent divisions. Watertight doors have position indicators for control of the closed position and are periodically inspected and maintained so that they remain capable of performing their intended function. Existing openings (e.g., stair cases, elevator shafts, and equipment openings) are credited as water flow paths. Watertight doors are designed to functional requirements such as leak-rate limits, door-closure indication, door-seal aging-degradation characteristics, and maintainability. Maintenance requirements are based on manufacturer recommendations and maintenance procedures are written by COL applicants in accordance with their respective regulatory approved maintenance programs.

A COL applicant that references the U.S. EPR design certification will include in its maintenance program appropriate watertight door preventive maintenance in accordance with manufacturer recommendations so that each Safeguards Building and Fuel Building watertight door above elevation +0 feet remains capable of performing its intended function.

Flooding pits with burst openings collect and direct water flow to lower building levels. Rooms within divisions have interconnections so that the maximum released water volume can be distributed and stored in the lower building levels of the affected division. Interconnections include doors with flaps, wall openings, and other wall penetrations that are not required to be sealed. Elevated thresholds, curbs, and pedestals are provided as necessary.

In Seismic Category I buildings that are not designed with divisional separation, e.g., the Reactor Building (RB), the layout allows water released inside the building to flow to the lower level of the building. In containment, water flows down to the in-containment refueling water storage tank (IRWST). In the annulus, water flows to the bottom level where it is stored. Safety-related SSC in these buildings, required to achieve safe shutdown or mitigate the consequences of an accident, are located above the maximum water level, protecting them from the effects of flooding. Locations of safety-related SSC required for safe shutdown or to mitigate the consequences of an accident and features provided to withstand flooding will be verified by walk-down.

Leak detection and isolation measures mitigate the consequences of postulated pipe ruptures. Water level instrumentation and other leak detection measures detect pipe ruptures that could result in internal flooding. These leak detection systems provide a signal to automatically isolate the affected system or to provide indication to the main control room (MCR) to initiate operator action from within the MCR or locally. Section 3.6 provides further information on protection mechanisms associated with the postulated rupture of piping.

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, and floor drains are assumed to be plugged.

A COL applicant that references the U.S. EPR design certification will perform internal flooding analyses prior to fuel load for the Safeguard Buildings and Fuel Building to demonstrate that the impact of internal flooding is contained within the Safeguard Building or Fuel Building division of origin. Features credited in the analysis will be verified by walk-down.

~~A COL applicant that references the U.S. EPR design certification will perform an internal flooding analysis prior to fuel load for the Reactor Building and Reactor Building Annulus to demonstrate that the essential equipment required for safe shutdown is located above the internal flood level. Locations of essential SSC and features provided to withstand flooding will be verified by walk-down.~~

### 3.4.2 External Flood Protection

The Seismic Category I SSC listed in Section 3.2 can withstand the effects of external flooding due to natural phenomena and postulated component failures. Seismic Category I structures, provide protection from external floods and groundwater by incorporating the following external flood protection measures:

- The PMF elevation of the U.S. EPR generic design is one foot below finished yard grade (as noted in Section 2.4).
- The maximum groundwater elevation for the U.S. EPR generic design is 3.3 ft below finished yard grade (as noted in Section 2.4).
- The finished yard grade slopes away from Seismic Category I structures so that external flood water flows away from these structures.

event does not cause the loss of equipment required to achieve and maintain safe shutdown of the plant, emergency core cooling capability, or equipment whose failure could result in unacceptable offsite radiological consequences. Section 7.4 describes the safety-related systems and components required for safe shutdown of the plant. The internal flooding analysis also describes the flooding protection measures that mitigate the consequences of flooding in areas that contain safety-related systems and components.

Sources of flooding in the internal flooding analyses include:

- High-energy piping (breaks and cracks).
- Through-wall cracks in seismically supported moderate-energy piping.
- Breaks and cracks in non-seismically supported moderate-energy piping.
- Improper system valve alignments.
- Tanks.
- Fire protection systems.
- Water from adjacent buildings.

The internal flooding analysis is conducted on a level-by-level and room-by-room basis for the Seismic Category I structures for the postulated flooding events. The analysis consists of the following:

- Identification of safety-related equipment.
- Identification of potential flooding sources.
- Determination and comparison of flood water volumes and building volumes.
- Evaluation of effects on required equipment.
- Determination of the need for protection and mitigation measures.

The following criteria and assumptions are used to determine flood water volumes and flow rates:

- For closed systems and storage tanks, the complete system or tank content is assumed to be released.
- If isolation of the pipe leak or break is assumed, only the released water volume within the operator action time is considered.
- The maximum operational pressure is used to estimate leakage flow rates.

- Released steam is considered to be completely condensed.
- Criteria and assumptions described in Section 3.6 are used to determine break configurations, locations, and flow rates for postulated high- and moderate-energy pipe ruptures.
- Floor drains are assumed to be plugged and sump pumps are assumed to be not available for reducing flood water volume.
- Volume of water released from operation of the fire protection system is determined based on 500 gpm for 2 hours.

The internal flood analysis relies upon leak detection instrumentation, automatic isolation of systems and components, and operator action to limit the volume of released water from pipe ruptures in water-carrying systems. The following approaches regarding flooding duration are assumed:

- For leaks and breaks that are detected by instrumentation and controls for which an automatic isolation is provided, the flooding duration spans the time it is detected through the duration of the automatic isolation.
- For leaks and breaks that can be detected by signals in the MCR, for which isolation by operator action from the MCR is provided, the flooding duration spans the time from when the first alarm in the MCR is received through a thirty minute operator action time from the MCR.
- For leaks and breaks that can be detected by signals in the MCR and for which isolation by local actions is provided, the flooding duration spans the time from when the first alarm in the MCR is received through a one hour local action time (e.g., the time for personnel to perform a manual valve isolation).
- Leaks and breaks that cannot be detected or isolated are assumed to release the entire water inventory if the discharge is not otherwise limited.

### 3.4.3.2 External Flooding Events

The Seismic Category I structures can withstand the hydrostatic effects associated with the PMF and maximum groundwater elevation given in Section 3.4.2. These hydrostatic effects are transformed into loads and loading combinations and factored into the structural design of Seismic Category I structures as addressed in Section 3.8.

The Seismic Category I structures are not designed for dynamic effects associated with external flooding (e.g., wind waves and currents) because the design basis flood level is below the finished yard grade.

The types of external flood-producing phenomena and combinations of flood-producing phenomena that are considered in establishing the design basis flood are described in Section 2.4. A COL applicant that references the U.S. EPR design certification will confirm the potential site-specific external flooding events are bounded by the U.S. EPR design basis flood values or otherwise demonstrate that the design is acceptable.

### 3.4.3.3 Reactor Building Flooding Analysis

#### Containment

The lowest elevation safe shutdown systems and components relevant to internal flooding inside containment include the safety injection system/residual heat removal system (SIS/RHRS), containment isolation valves, and reactor protection system. Equipment and components of these systems that are sensitive to flooding are generally located above the maximum internal flood level. This arrangement provides a margin between the normal operation maximum water level of the IRWST and these components, in order to store water released from postulated pipe failures and avoid a consequential failure by flooding.

In the event of piping failures, water flows directly to the IRWST while steam condenses on structures (e.g., concrete walls, containment walls, ceilings, and floors) and flows to the IRWST.

The analysis is focused on postulated piping failures that result in the largest volume of released water inside containment. Table 3.4-1 is a compilation of water-carrying piping systems located in the RB containment and RB annulus which were considered as potential internal flooding sources in the flooding analysis of these buildings. The following cases are enveloping scenarios for released water volume in containment:

- Water from a large break loss-of-coolant-accident (LOCA) in the reactor coolant pressure boundary (i.e., release of reactor coolant system inventory, pressurizer water volume, and the inventory of accumulators).
- Operation of the fire protection system.

A large break LOCA is determined to be the bounding case for the maximum released water volume in containment. ~~There are no submerged SSC required to achieve safe shutdown or mitigate the consequences of an accident.~~This event results in the release of 20,659 ft3 (154,540 gallons) of water which, because of the design features of the containment building is directed down to the IRWST, subsequently collecting on elevation -7'-6½" and rising to elevation -6'-2". Safety-related SSCs required for safe shutdown or to mitigate the consequences of an accident are located above this flood level. Section 7.4 provides a list of the SSC required for safe shutdown. The safety-related SSC located below the maximum internal flood level are not required to perform a function to achieve safe shutdown or to mitigate the consequences of an accident. No other postulated pipe breaks, through-wall cracks, or operation of the fire protection system inside containment release a volume of water which could cause flooding of safety-related SSC required for safe shutdown or to mitigate the consequence of accidents.

Inside containment, leakages are integrally detected by measuring humidity, temperature, condensate flow, and water levels in drain and vent collection tanks or sumps. Depending on the leak and break size and the affected system, the protection system initiates automatic measures as required to cope with the event (e.g., LOCA, main steam line break, or main feedwater line break). A NIDVS sump located at level -7 feet, 6-1/2 inches is equipped with safety-related Seismic Category I level instrumentation to initiate alarms in the MCR for a filled sump and large flooding event. These alarms notify the MCR operator to begin action to isolate the flooding sources.

To avoid water ingress into the corium spreading area, which could produce a steam explosion in case of an accident, the venting area from the spreading compartment has a watertight door.

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**Reactor Building Annulus**

Below elevation +0 feet, the annulus between the Shield Building and the Containment Building is a single volume; therefore, it is considered one room for flooding protection purposes. Water released from a specific location flows down in the annulus and collects on the bottom level. Because high-energy piping (e.g., main steam lines and main feedwater lines) is routed inside guard pipes, there is no water accumulation in the annulus due to their failure. Therefore, the analysis is focused on water-carrying systems without guard pipes. Table 3.4-1 lists the water-carrying piping systems in the annulus evaluated in the flooding analysis. The internal flooding sources inside the reactor building annulus are the moderate-energy water-carrying piping systems. Since these piping systems are seismically designed inside the annulus, through-wall leakage cracks were postulated. The released water from these pipe failures is limited by either operator action to isolate the source or by the limited volume of water contained in a closed system. The systems listed in Table 3.4-1 do not release an amount of water which would flood safety-related SSC and the resulting flood level is below elevation +0 feet. The bounding internal flooding source becomes operation of the fire protection system which occurs during manual fire fighting by hose stream. The released water during fire fighting does not flood safety-related SSC and the resulting flood level is below +0 feet.

Inside the annulus, only the plug boxes of cable penetrations for electrical and instrumentation and control equipment located above elevation +16 feet, 10-3/4 inches could be affected by flooding. In the event of operation of the fire water distribution system, the annulus ventilation system supply is lost because the annulus ventilation duct is flooded through the grids. Furthermore, the normal operating mode of the SB controlled area ventilation system could be lost because of water entering through the inspection openings. These consequences are acceptable because the safety-related functions are fulfilled by the annulus ventilation system exhaust trains which maintain sub-pressure in the annulus, the accident mode of the SB controlled area ventilation system which maintains sub-pressure in the SBs, and the recirculation mode of the SB controlled area ventilation system which maintains ambient conditions in the SBs.

Leak detection inside the annulus consists of safety-related Seismic Category I level measurements in the NIDVS sump located on elevation -14 feet, 1-1/4 inches. These level measurements initiate an alarm in the MCR for a filled sump (considered as the first alarm for initiating the operator action time for isolation) and an alarm for a flooding event above floor level -14 feet, 1-1/4 inches.

The hydrostatic water loads corresponding to an elevation of +0 feet are taken into account in the structural design of the annulus walls and for the watertight design of cable and piping penetrations below this elevation.

The annulus is not divisionally separated; however, redundant divisions are separated in fire zones. In case of fire fighting or a postulated piping failure, overlapping areas exist where redundancies belonging to another division could be indirectly impacted by water flow through the horizontally arranged fire separation structures on the inner and outer walls of the annulus. In these cases, the plug boxes of cable penetrations for electrical and instrumentation and control equipment are designed to withstand this water flow.

### 3.4.3.4 Safeguard Buildings Flooding Analysis

The arrangement of the SBs provides physical separation of the redundant safe shutdown systems and components using structural barriers. The building layout directs released water within one SB to building levels below elevation +0 feet.

#### Below Elevation +0 Feet, 0 Inches

Division walls below elevation +0 feet, 0 inches provide separation and serve as flood barriers to prevent the spread of flood water to the adjacent SB. Below elevation +0 feet, SB-1 and SB-4 are connected to the Fuel Building (FB) via passageways. Postulated piping failures below elevation +0 feet could lead to consequential failures in only one division. Common flooding of SB-1 and the left hand side of the FB (i.e., FB-1, see Section 3.4.3.5 and the general arrangement drawings in Section 1.2), or of SB-4 and the right hand side of the FB (i.e., FB-2, see Section 3.4.3.5 and the general arrangement drawings in Section 1.2), is acceptable, because they belong to the same division.

Relevant component and system piping failures considered in the analysis of these building levels include loss of one demineralized water pool, a leak in the SIS suction generator. The motors of the feedwater isolation and control valves are located at least 6 feet, 6-3/4 inches above floor elevation +55 feet, 1-1/2 inches. In these compartments, no other safety-related components are located below this elevation. To avoid flooding the motors, burst flaps in the compartment wall are capable of releasing the complete water flow rate. The burst flaps open at a water level below the elevation of the motors, which provides a margin before water reaches the motors. Pipe failure is detected by changes in system parameters in the feedwater system and level changes in the steam generator. Depending on the size of the pipe failure, automatic measures from the protection system or manual actions from the MCR are initiated for isolation.

For the main steam valve compartments, the relevant case considered for protection of equipment from flooding is a postulated break of the warm-up line. Valve motors are located at least 6 feet, 6-3/4 inches above floor elevation +64 feet, 7-1/2 inches. In these compartments, no other safety-related components are located below this elevation. In case of flooding, the pressure relief opening located in the floor slab of elevation +64 feet, 7-1/2 inches drains the valve compartment. The pressure relief opening opens from a water column that provides a margin prior to flood waters reaching the motors. Pipe failure is detected by changes of feedwater system parameters and by temperature measurement in the compartment. Depending on the size of the pipe failure, automatic measures from the protection system or manual actions from the MCR are initiated for isolation. Water from postulated failures in the SCWS is enveloped by the relevant cases above.

Postulated piping failures in the valve room for the steam generator blowdown system are not considered relevant to the flooding analysis because protection of this equipment is not necessary for safe shutdown. However, the released water will flow through the provided pressure relief opening to the service corridor, where it drains to the maintenance area and then flows down the outer SB wall.

In the event of fire in one valve compartment, the fire brigade will extinguish the fire using hoses. The maximum flow rate for manual fire fighting by hose streams is enveloped by the flow rates from the postulated pipe failures considered above. If a door is opened to connect the hose to the hydrant inside the SB, the threshold will prevent backflow of extinguishing water into the SBs through the open door.

### 3.4.3.5 Fuel Building Flooding Analysis

The divisional separation of the FB (see Section 3.4.1) is denoted by referring to the two divisions as FB-1 and FB-2. The upper building levels are not separated for flood protection because of the layout of the fuel pools. The flooding analysis for the FB follows the separation for fire protection, which separates the building into two main fire areas. This principle is followed so that only one division of the building is flooded in the event of postulated pipe failures.

**Table 3.4-1—Water-Carrying Piping in the Reactor Building**

| Description | Reactor Building | |
|---|---|---|
| | Containment | Annulus |
| Fuel pool purification system | X | X |
| Demineralized water distribution system | X | X |
| Extra borating system | X | X |
| Reactor coolant system | X | |
| Reactor coolant pump seal injection and leak-off system | X | X |
| Containment heat removal system | X | X |
| Residual heat removal system | X | X |
| Medium head safety injection system | X | X |
| Low head safety injection system | X | X |
| In-containment refueling water storage tank | X | X |
| Component cooling water system | X | X |
| Chemical and volume control system | X | X |
| Nuclear island drain and vent system | X | X |
| Nuclear sampling system | X | X |
| Feedwater system | X | X |
| Emergency feedwater system | X | X |
| Main steam system | X | X |
| Condensate system | X | X |
| Steam generator blowdown system | X | X |
| Operational chilled water system | X | X |
| Secondary sampling system | X | X |
| Fire water distribution system | X | X |
| Spray deluge system | X | |



Next File

## Table 3.10-1—List of Seismically and Dynamically Qualified Mechanical and Electrical Equipment
## Sheet 199 of 199

| Name Tag (Equipment Description) | Tag Number | Local Area KKS ID (Room Location) | EQ Environment (Note 1) | Radiation Environment Zone (Note 2) | EQ Designated Function (Note 3) | Safety Class (Note 4) | EQ Program Designation (Note 5) |
|---|---|---|---|---|---|---|---|
| Compressed Air Outer Containment Isolation Valve | 30SCB02AA001 | 30UFA13054 | M | H | ES SI | S C/NM | Y (3) Y (5) |
| Compressed Air Inner Containment Isolation Valve | 30SCB02AA002 | 30UJA15016 | H | H | ES SI | S C/NM | Y (4) Y (5) |
| Fire Water Distribution System (FWDS) | | | | | | | |
| Fire Water Distribution System Containment Isolation Valve | 30SGB30AA031 | 30UFA13054 | M | H | ES PAM SI | S C/NM | Y (3) Y (5) |
| Fire Water Distribution System Containment Isolation Valve | 30SGB30AA032 | 30UJA15016 | H | H | ES PAM SI | S C/NM | Y (4) Y (5) |
| Annulus Isolation Valve | 30SGB30AA021 | 32UJH10003 | M | H | SII | NS-AQ C/NM | Y (3) Y (5) |
| Annulus Isolation Valve | 30SGB30AA022 | 32UFA10052 | M | H | SII | NS-AQ C/NM | Y (3) Y (5) |
| Fire Water Distribution Thermal Relief Valve | 30SGB30AA191 | 30UJA15016 | H | H | ES SI | S C/NM | Y (4) Y (5) |
| Nuclear Island Drain & Vent System (NI DVS) | | | | | | | |
| Inner Containment Isolation Valve | 30KTA10AA017 | 30UJA07016 | H | H | ES PAM SI | S C/NM | Y (4) Y (5) |
| Inner Containment Isolation Valve | 30KTC10AA005 | 30UJA07016 | H | H | ES PAM SI | S C/NM | Y (4) Y (5) |
| Outer Containment Isolation Valve | 30KTC10AA006 | 30UFA06095 | M | H | ES PAM SI | S C/NM | Y (3) Y (5) |
| Outer Containment Isolation Valve | 30KTC10AA010 | 30UFA06095 | M | H | ES PAM SI | S C/NM | Y (3) Y (5) |
| Outer Containment Isolation Valve Floor Drn 2 RB | 30KTD10AA015 | 30UFA06095 | M | H | ES PAM SI | S C/NM | Y (3) Y (5) |
| Inner Containment Isolation Valve Flr Drn 2 RB | 30KTD10AA024 | 30UJA07016 | H | H | ES PAM SI | S C/NM | Y (4) Y (5) |
| Outer Containment Isolation Valve Annulus | 30KTD10AA025 | 30UFA10095 | M | H | ES PAM SI | S C/NM | Y (3) Y (5) |
| Outer Containment Isolation Valve | 30KTA10AA018 | 30UFA06045 | M | H | ES PAM SI | S C/NM | Y (3) Y (5) |
| Containment Penetrations -Piping | | | | | | | |
| As a result of the EQ program screening no components in this system were identified for seismic qualification. These penetrations are considered part of the Containment Building Inner Shell and are analyzed as part of that structure. | | | | | | | |
| For a List of Components Requiring EQ see Table 3.11-1 | | | | | | | |

**NOTES**

1. EQ Environment: (M= Mild, H= Harsh)
2. Radiation Environment Zone: (M= Mild, H= Harsh)
3. EQ Designated Function: RT (Reactor Trip), ES (Engineered Safeguards), PAM (Post Accident Monitoring), SI (Seismic I), SII (Seismic II)
4. Safety Class: S (Safety Related), NS-AQ (Supplemental Grade Non-Safety), 1E (Class 1E), EMC (Electromagnetic Compatibility), C/NM (Consumables/Non Metallics)
5.EQ Program Designation: Yes (1) = Full EQ Electrical, Yes (2) = EQ Radiation Harsh-Electrical, Yes (3) = EQ Radiation Harsh-Consumables, Yes (4) = EQ for Consumables, Yes (5) = EQ Seismic, Yes (6) = EQ EMC.

Next File

## Table 3.11-1—List of Environmentally Qualified Electrical/I&C Equipment
## Sheet 130 of 135

| Name Tag (Equipment Description) | Tag Number | Local Area KKS ID (Room Location) | EQ Environment (Note 1) | Radiation Environment Zone (Note 2) | EQ Designated Function (Note 3) | Safety Class (Note 4) | EQ Program Designation (Note 5) |
|---|---|---|---|---|---|---|---|
| SG3 2ndary Sampling Outer C I-V Motor | 30QUC13AA001 | 30UFA06083 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| SG3 2ndary Sampling Inner C I-V Motor | 30QUC13AA011 | 30UJA11016 | H | H | ES PAM SI | S 1E EMC | Y (1) Y (5) |
| SG4 2ndary Sampling Outer C I-V Motor | 30QUC14AA001 | 30UFA10095 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| SG4 2ndary Sampling Inner C I-V Motor | 30QUC14AA011 | 30UJA11016 | H | H | ES PAM SI | S 1E EMC | Y (1) Y (5) |
| **Compressed Air System (CAS)** | | | | | | | |
| Compressed Air Outer CI Valve | 30SCB01AA001 | 30UFA13054 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Compressed Air Inner CI Valve | 30SCB01AA002 | 30UJA15016 | H | H | ES PAM SI | S 1E EMC | Y (1) Y (5) |
| **Fire Water Distribution System (FWDS)** | | | | | | | |
| Fire Water Distribution System CI Valve | 30SGB30AA031 | 30UFA13054 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Fire Water Distribution System CI Valve | 30SGB30AA032 | 30UJA15016 | H | H | ES PAM SI | S 1E EMC | Y (1) Y (5) |
| Annulus Isolation Valve Motor | 30SGB30AA021 | 32UJH10003 | M | H | SII | NS-AQ EMC | Y (2) Y (5) Y (6) |
| Annulus Isolation Valve Motor | 30SGB30AA022 | 32UFA10052 | M | H | SII | NS-AQ EMC | Y (2) Y (5) Y (6) |
| **Nuclear Island Drain & Vent System (NI DVS)** | | | | | | | |
| Inner Cont Iso Vlv Actuator | 30KTA10AA017 | 30UJA07016 | H | H | ES PAM SI | S 1E EMC | Y (1) Y (5) |
| Outer Cont Iso Valve Actuator | 30KTA10AA018 | 30UFA06045 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Inner Cont Iso Vlv Floor Drn 1 Actuator | 30KTC10AA005 | 30UJA07016 | H | H | ES PAM SI | S 1E EMC | Y (1) Y (5) |
| Outer Cont Iso Vlv Floor Drn 1 Actuator | 30KTC10AA006 | 30UFA06095 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Outer Cont Iso Vlv Chem Reinj Actuator | 30KTC10AA010 | 30UFA06095 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Outer Cont Iso Vlv Floor Drn 2 Actuator | 30KTD10AA015 | 30UFA06095 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Inner Cont Iso Vlv Floor Drn 2 Actuator | 30KTD10AA024 | 30UJA07016 | H | H | ES PAM SI | S 1E EMC | Y (1) Y (5) |
| Outer Cont Iso Vlv Annulus Actuator | 30KTD10AA025 | 30UFA10095 | M | H | ES PAM SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Level Sensor for Sump KTE20 BB001 | 30KTE20CL001 | 31UJH01026 | M | H | SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Level Sensor for Sump KTE20 BB002 | 30KTE20CL003 | 32UJH01038 | M | H | SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Level Sensor for Sump KTE20 BB003 | 30KTE20CL005 | 33UJH01038 | M | H | SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Level Sensor for Sump KTE20 BB004 | 30KTE20CL007 | 34UJH01026 | M | H | SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Level Sensor for Sump 30KTC30 BB001 | 30KTC30CL001 | 30UFA01042 | M | H | SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Level Sensor for Sump 30KTC30 BB002 | 30KTC30CL003 | 30UFA01097 | M | H | SI | S 1E EMC | Y (2) Y (5) Y (6) |
| Level Sensor for Sump 30KTD10 BB001 | 30KTD10CL002 | 30UJB05003 | M | M | SI | S 1E EMC | Y (5) Y (6) |
| Level Sensor for Sump 30KTC10 BB001 | 30KTC10CL001 | 30UJA11013 | H | H | SI | S 1E EMC | Y (1) Y (5) |
| Level Sensor for Sump 30KTC10 BB001 | 30KTC10CL002 | 30UJA11013 | H | H | SI | S 1E EMC | Y (1) Y (5) |
| Level Sensor for Sump 30KTC10 BB002 | 30KTC10CL005 | 30UJA11016 | H | H | SI | S 1E EMC | Y (1) Y (5) |
| **Containment Penetrations - Electrical** | | | | | | | |

All indicated changes are in response to RAI 218, Question 03.04.01-8



**Table 3D-1—Typical Mild Environment Parameter Limits**

| Description | Limit | Comments |
|---|---|---|
| Temperature | ≤115°F | Outside Containment Building |
| | ≤122°F | Inside Containment Building |
| Pressure | atmospheric | nominal |
| Humidity | 20%–80% | Outside Containment Building (unless noted otherwise) |
| | Non-Condensing | Outside Containment Building (main steam and feedwater valve compartment, diesel buildings, Turbine Building) |
| | Non-Condensing | Inside containment |
| Radiation | ≤$10^3$ rads gamma | Electronic devices and components |
| | ≤$10^4$ rads gamma | Non-electronic devices and components |
| Chemical Spray | Not applicable | Refer to Sections 3.11.5 |
| Submergence | -6~~5~~ ft–2~~4~~ in Elev. | Inside containment |

| Fluid | Line Size (in) | Essent System | Potent Bypass Path | Valve Number | Valve Location | LLRT | Valve Type and Operator | Primary Act-uation | Secon-dary Act-uation | Normal Position | Shut-down Position | Post Accident Position | Power Failure Position | Cont. Isolation Signal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| air | 2.0 | no | no | SCB01 AA002 | inside | C | globe/ MOV | PS | RM | open | open | close | as-is | stage 1 |
| air | 2.0 | no | no | SCB01 AA001 | outside | C | globe/ MOV | PS | RM | open | open | close | as-is | stage 1 |
| air | 2.0 | no | no | SCB02 AA002 | inside | C | globe/ manual | n/a | n/a | close | open | close | n/a | admin close |
| air | 2.0 | no | no | SCB02 AA001 | outside | C | globe/ manual | n/a | n/a | close | open | close | n/a | admin close |
| water | 8.0 | no | no | SGB30 AA032 | inside | C | gate/ MOV | PS | RM | close | open | close | as-is | stage 1 |
| water | 8.0 | no | no | SGB30 AA031 | outside | C | gate/ MOV | PS | RM | close | open | close | as-is | stage 1 |
| air | 36.0 | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| air | n/a | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| air | n/a | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| air | n/a | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| air | n/a | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| air | n/a | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| air | n/a | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| air | n/a | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| air | n/a | n/a | n/a | n/a | n/a | no | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

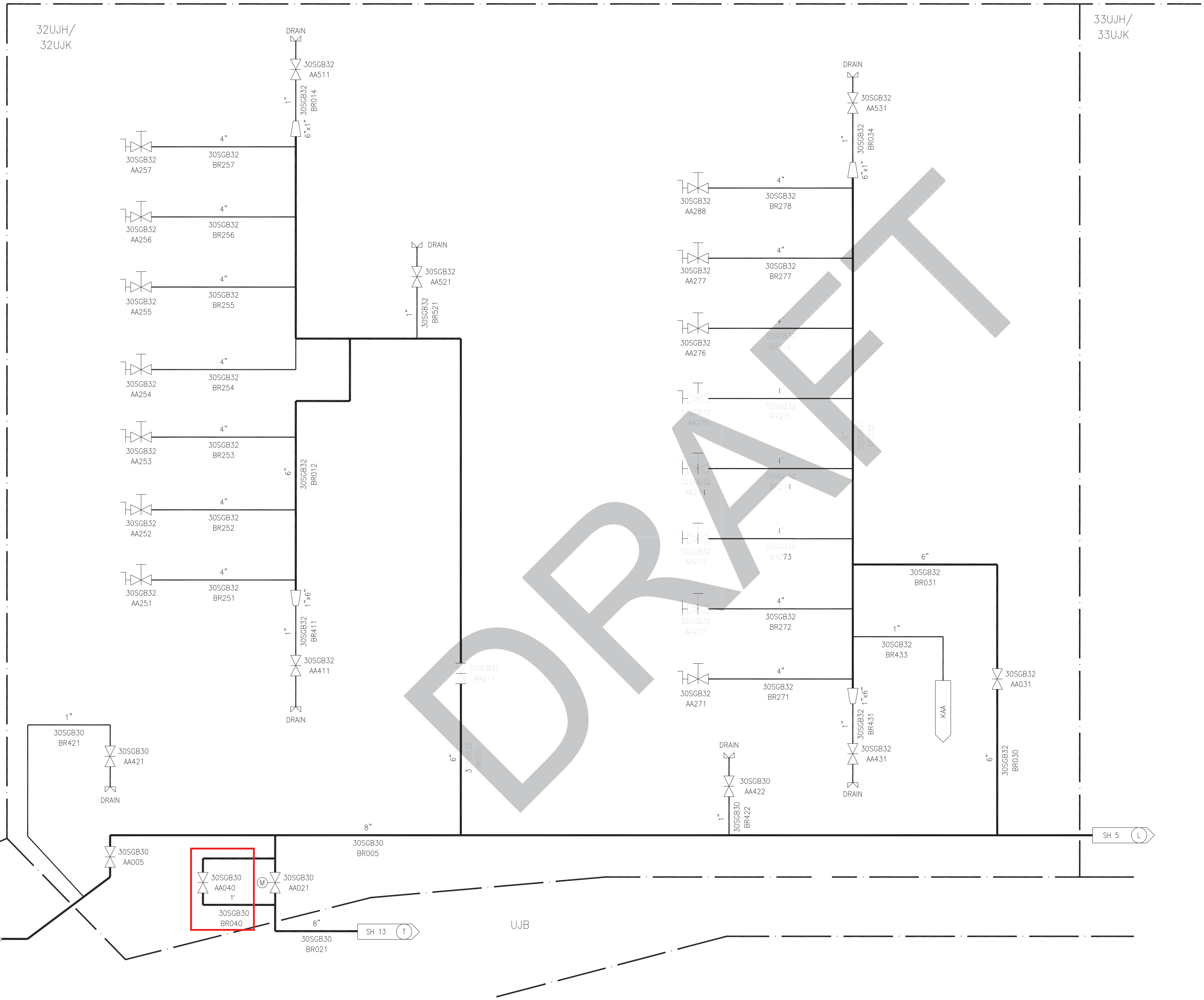
on all floors, Class III standpipe systems, designed and installed in accordance with NFPA 14 (Reference 3) are provided with hose connections equipped with a maximum of 100 feet of 1.5 inch diameter woven-jacket, lined fire hose, and suitable nozzles. Hose stations are located to facilitate access and use for firefighting operations. Alternative hose stations are provided if a fire hazard could block access to a single hose station serving a plant area.

Supply water distribution capability is provided for reasonable assurance of an adequate water flowrate and nozzle pressure for all hose stations. Hose station pressure reducers are provided where necessary for the safety of plant fire brigade members and offsite fire department personnel.

Automatic standpipe systems are provided throughout except in the Reactor Building and including the Reactor Annulus. Automatic standpipe systems are attached to a water supply capable of supplying the system demand at all times and requiring no action other than opening a hose valve to provide water at hose connections. The Reactor Building, including the Reactor Annulus, have semiautomatic standpipe systems that are attached to a water supply capable of supplying the system demand at all times, but requiring activation of motor-operated control valves to provide full water supply to hose connections. In the inner Reactor Containment Building the inboard and outboard containment isolation, motor-operated control valves are normally kept closed and are only opened during a fire emergency requiring the use of the standpipe system in the Reactor Containment Building. The inboard control valve can be manually operated. Prefire plans include this action for the fire brigade should automatic operation of the valve be rendered inoperable due to fire effects inside containment. In the Reactor Annulus there are two supply connections to the annulus standpipe system with a motor-operated control valve in each connection. These are normally kept closed and only opened during a fire emergency requiring the use of the standpipe system in the Reactor Annulus. In addition, each of the control valves for the Reactor Annulus standpipe system has a 1 inch by-pass line which will keep the standpipe filled and pressurized.

The proper type of hose nozzle provided for each hose station is based on the fire hazards in the area. Combination spray or straight-stream nozzles are not used in plant areas where a straight stream could cause unacceptable damage or present an electrical hazard to firefighting personnel. UL listed electrically safe fixed fog nozzles are provided in areas where high-voltage shock hazards exist. All nozzles have full shutoff capability.

Fire hose meets the applicable criteria of NFPA 1961 (Reference 26) and is hydrostatically tested in accordance with the applicable guidance of NFPA 1962 (Reference 27).

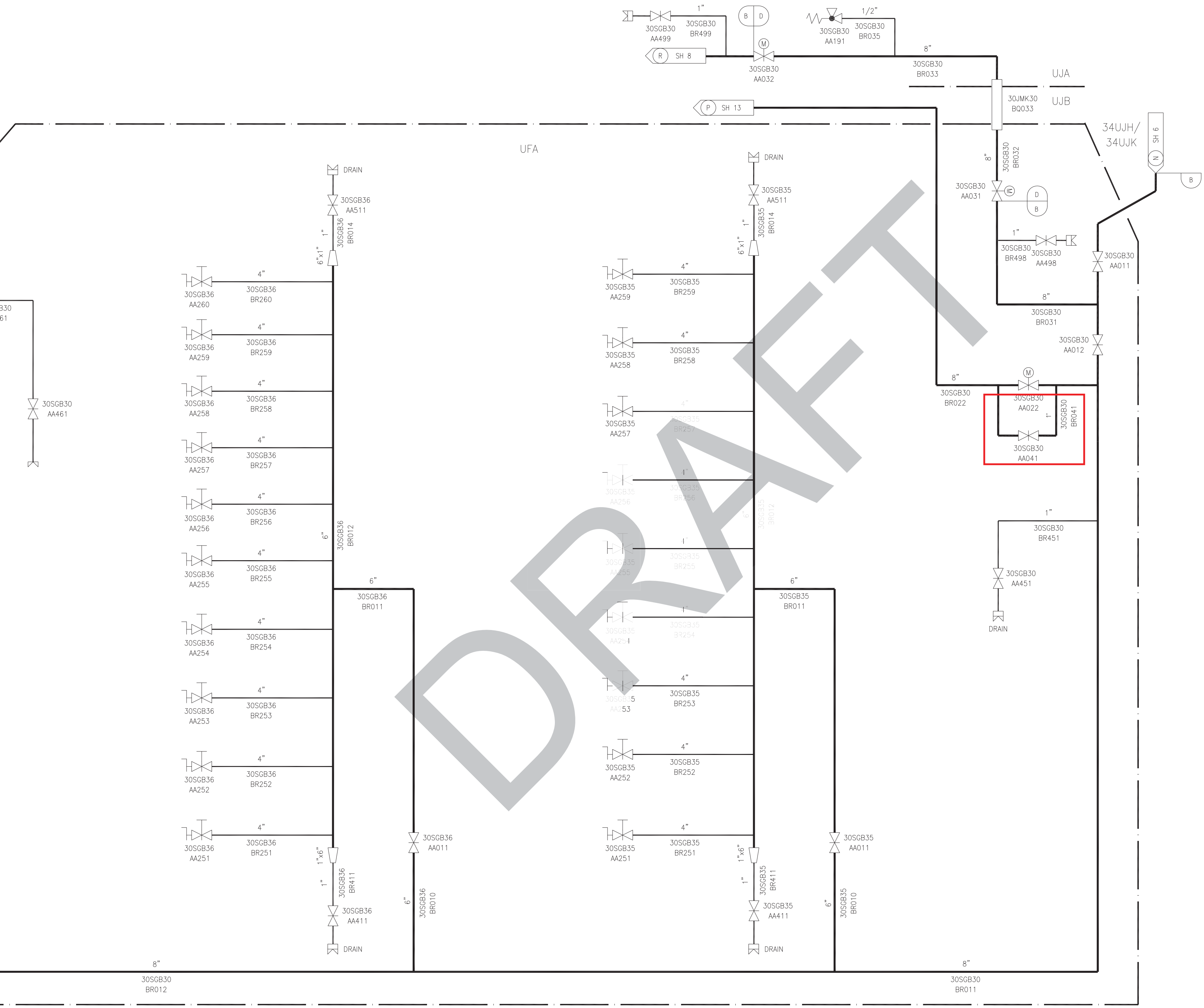




KAA – COMPONENT COOLING WATER SYSTEM SUPPLY TRAIN
SGA – FIRE WATER DISTRIBUTION SYSTEM, CONVENTIONAL AREA
SGB – FIRE WATER DISTRIBUTION SYSTEM INSIDE NUCLEAR ISLAND

UJB – REACTOR BUILDING ANNULUS
31UJH – SAFEGUARD BUILDING MECHANICAL, DIVISION 1
31UJK – SAFEGUARD BUILDING ELECTRICAL, DIVISION 1
32UJH – SAFEGUARD BUILDING MECHANICAL, DIVISION 2
32UJK – SAFEGUARD BUILDING ELECTRICAL, DIVISION 2
33UJH – SAFEGUARD BUILDING MECHANICAL, DIVISION 3
33UJK – SAFEGUARD BUILDING ELECTRICAL, DIVISION 3

| B | D | 300 | 150 |
|---|---|---|---|
| DESIGN AREA | SSC QUALITY GROUP | DESIGN PRESSURE PSIG | DESIGN TEMPERATURE °F |




JMK – PIPING PENETRATIONS
SGB – FIRE WATER DISTRIBUTION SYSTEM INSIDE NUCLEAR IS

UFA – FUEL BUILDING
UJA – REACTOR BUILDING
UJB – REACTOR BUILDING ANNULUS
31UJH – SAFEGUARD BUILDING MECHANICAL, DIVISION 1
31UJK – SAFEGUARD BUILDING ELECTRICAL, DIVISION 1
34UJH – SAFEGUARD BUILDING MECHANICAL, DIVISION 4
34UJK – SAFEGUARD BUILDING ELECTRICAL, DIVISION 4

| DESIGN AREA | SSC QUALITY GROUP | DESIGN PRESSURE PSIG | DESIGN TEMPERAT °F |
|---|---|---|---|
| D | B | 300 | 150 |
| B | D | 300 | 150 |