ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Thursday, March 07, 2013 3:59 PM
To: Snyder, Amy
Cc: Ford, Tanya; DELANO Karen (AREVA); LEIGHLITER John (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); TOLLEY Tracey (AREVA); VANCE Brian (AREVA); WELLS Russell (AREVA); WILLS Tiffany (AREVA); RITCHEY Calvin (AREVA); NOXON David (AREVA)
Subject: Advanced Response to U.S. EPR Design Certification Application FINAL RAI No. 561 (6504), FSAR Ch. 19, Questions 19.01-48, -49 and -50
Attachments: RAI 561 Advanced Response Questions 19.01-48, 19.01-49 and 19.01-50 US EPR DC.pdf

Amy,

Attached is an Advanced Response to RAI No.561, Questions 19.01-48, 19.01-49 and 19.01-50 in advance of the final response date of April 26, 2013.

To keep our commitment to send a final response to these questions by the commitment date, we need to receive all NRC staff feedback and comments no later than **April 12, 2013**.

Please let me know if NRC staff has any questions or if this response 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
Phone: 704-805-2223
Email: Dennis.Williford@areva.com

From: WILLIFORD Dennis (RS/NB)
Sent: Monday, February 11, 2013 4:39 PM
To: 'Snyder, Amy'
Cc: tanya.ford@nrc.gov; DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); WILLS Tiffany (CORP/QP); NOXON David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application FINAL RAI No. 561 (6504), FSAR Ch. 19

Amy,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 561 Response US EPR DC.pdf," provides a schedule since a technically correct and complete response to the three questions cannot be provided at this time.

The following table indicates the respective pages in the response document, "RAI 561 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 561 — 19.01-48	2	2
RAI 561 — 19.01-49	3	3
RAI 561 — 19.01-50	4	4

The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 561 — 19.01-48	**April 26, 2013**
RAI 561 — 19.01-49	**April 26, 2013**
RAI 561 — 19.01-50	**April 26, 2013**

Sincerely,

Dennis Williford, P.E.
U.S. EPR Design Certification Licensing Manager
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7207 IBM Drive, Mail Code CLT 2B
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From: Snyder, Amy [mailto:Amy.Snyder@nrc.gov]
Sent: Friday, January 11, 2013 1:52 PM
To: ZZ-DL-A-USEPR-DL
Cc: Pohida, Marie; Mrowca, Lynn; Ford, Tanya; Segala, John; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application FINAL RAI No. 561 (6504), FSAR Ch. 19

Attached please find the subject request for additional information (RAI). A draft of the RAI was provided to you on October 2 2012 and discussed with your staff on October 23, 2012. On October 23 2013, you informed us that the RAI, as discussed on the teleconference, is clear and no further clarification is needed and that the draft RAI does not contain proprietary information. As a result, Draft RAI Question 19-01.48 was modified as a result of those discussions.

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 RAI question 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.

Thank you.
Amy

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 4301

Mail Envelope Properties (554210743EFE354B8D5741BEB695E6560ED03C)

Subject: Advanced Response to U.S. EPR Design Certification Application FINAL RAI No. 561 (6504), FSAR Ch. 19, Questions 19.01-48, -49 and -50
Sent Date: 3/7/2013 3:59:24 PM
Received Date: 3/7/2013 3:59:30 PM
From: WILLIFORD Dennis (AREVA)

Created By: Dennis.Williford@areva.com

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Files	**Size**	**Date & Time**
MESSAGE	3475	3/7/2013 3:59:30 PM
RAI 561 Advanced Response Questions 19.01-48, 19.01-49 and 19.01-50 US EPR DC.pdf	204473	

Options
Priority: Standard
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Advanced Response to

Request for Additional Information No.561

Questions 19.01-48, 19.01-49 and 19.01-50
1/11/2013
U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 19.01 - Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed
Application Section: 19

Question 19.01-48:

Open Item

FOLLOW-UP TO RAI 97, QUESTION 19-225

In FSAR Revision 3, Section 19.1.5.4.1, the EPR high winds evaluation is discussed. The FSAR states, "The EPR Seismic Category I structures are specifically designed for a basic wind speed of 145 mph. This value bounds all locations within the U.S. except the extreme southern tips of Louisiana and Florida (SEI/ASCE 7-05)." These statements have no justification attached. Please provide the risk analyses of extreme winds (other than tornadoes) that justifies this statement or please remove the conclusion from the FSAR.

The staff understands the basic wind speeds from SEI/ASCE 7-05 to be the 100 year return period of a 3 second gust wind at 33 feet based on a specific location located on the wind speed map of the United States.

Please note, as documented in Table 1.8-2 of the EPR FSAR, COL Item 19.1-7 states that the COL applicant that references the U.S. EPR design certification will perform the site-specific screening analysis and the site-specific risk analysis for external events applicable to their site

Response to Question 19.01-48:

U.S. EPR FSAR Tier 2, Section 19.1.5.4.1, will be revised to remove the following sentence:

> "This value bounds all locations within the U.S. except the extreme southern tips of Louisiana and Florida (SEI/ASCE 7-05)."

U.S. EPR FSAR Tier 2, Section 19.1.5.4.1, "High Winds and Tornado Evaluation Conclusion," will be revised to remove the following sentence:

> **"**Therefore, the risk from high wind and tornado events is judged not significant."

The risk analysis for tornado and high wind events will be performed by the COL applicant (U.S. EPR Tier 2, Table 1.8-2, COL Item 19.1-7).

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 19.1.5.4.1, will be revised as described in the response and indicated in the enclosed markup.

Question 19.01-49:

Open Item

FOLLOW-UP TO RAI 97, QUESTION 19-225

The external flooding evaluation is discussed in FSAR Revision 3, Section 19.1.5.4.2. The external flooding conclusion states, "The preceding external flooding design features, in combination with the U.S. EPR requirements for building location relative to the probable maximum flood (PMF) and maximum groundwater elevation, provide a robust design against potential external floods. Therefore, the risk from external flooding events is judged not significant."

The last sentence in the paragraph above, "the risk from external flooding events is judged not significant" has no justification attached. Please provide the risk analyses that justify this statement or please remove the conclusion from the FSAR. As documented in Table 1.8-2 of the EPR FSAR, COL Item 19.1-7 states that the COL applicant that references the U.S. EPR design certification will perform the site-specific screening analysis and the site-specific risk analysis for external events applicable to their site.

Response to Question 19.01-49:

U.S. EPR FSAR Tier 2, Section 19.1.5.4.2, “External Flooding Evaluation Conclusion,” will be revised to remove the following sentence:

“Therefore, the risk from external flooding events is judged not significant.”

The risk analysis for external flooding events will be performed by the COL applicant (U.S. EPR Tier 2, Table 1.8-2, COL Item 19.1-7).

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 19.1.5.4.2, will be revised as described in the response and indicated in the enclosed markup.

Question 19.01-50:

Open Item

FOLLOW-UP TO RAI 97, QUESTION 19-225

The external fire evaluation is discussed in FSAR Revision 3, Section 19.1.5.4.3. The external fire conclusion states, "The preceding external fire design features, in combination with the U.S. EPR requirements for structural design, structure location and design consideration of the CRE, provide a robust design against potential external fire and smoke events. Therefore, the risk from external fire and smoke events is judged not significant."

The last sentence in the paragraph above, “the risk from external fires and smoke events is judged not significant” has no justification attached. The staff accepts that external smoke has been evaluated the design of the CRE. However the risk of external fires has not been evaluated. Please provide the risk analyses that justify this statement or please remove this conclusion from the FSAR. As documented in Table 1.8-2 of the EPR FSAR, COL Item 19.1-7 states that the COL applicant that references the US EPR design certification will perform the site-specific screening analysis and the site-specific risk analysis for external events applicable to their site.

Response to Question 19.01-50:

U.S. EPR FSAR Tier 2, Section 19.1.5.4.3, “External Fire Evaluation Conclusion,” will be revised to remove the following sentence:

“Therefore, the risk from external fire events is judged not significant.”

The risk analysis for external fire events will be performed by the COL applicant (U.S. EPR Tier 2, Table 1.8-2, COL Item 19.1-7).

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 19.1.5.4.3, will be revised as described in the response and indicated in the enclosed markup.

U.S. EPR
Final Safety Analysis Report

MARKUPS

A COL applicant that references the U.S. EPR design certification will perform the site-specific screening analysis and the site-specific risk analysis for external events applicable to their site.

19.1.5.4.1 High Winds and Tornado Risk Evaluation

All U.S. EPR Seismic Category I structures are designed to meet the following standards for high winds and tornadoes.

High Winds

RAI 561, Q. 19.01-48

The U.S. EPR Seismic Category I structures are designed to withstand high wind load characteristics as specified in NUREG-0800, Section 3.1.1. The EPR Seismic Category I structures are specifically designed for a basic wind speed of 145 mph. ~~This value bounds all locations within the U.S. except the extreme southern tips of Louisiana and Florida (SEI/ASCE 7-05).~~

Tornado Wind Loads

The U.S. EPR Seismic Category I structures are designed to meet the design-basis tornado wind characteristics of Tornado Intensity Region 1 as specified in NUREG-0800, Section 3.3.2. Tornado Intensity Region 1 is characterized by a maximum tornado wind speed of 230 mph (184 mph maximum rotational speed, 46 mph maximum translational speed). These design-basis tornado wind characteristics are bounding for all U.S. regions within the contiguous 48 states.

Tornado Missiles

The U.S. EPR Seismic Category I structures are designed to the design-basis tornado missile characteristics of Region 1 (most limiting U.S. region) as specified in NUREG-0800, Section 3.5.1.4. The design basis missiles include (1) a massive high-kinetic-energy missile that deforms on impact, (2) a rigid missile that tests penetration, and (3) a small rigid missile of a size sufficient to pass through any opening in protective barriers.

U.S. EPR Seismic Category I structures include:

- Reactor Building (RB) and Reactor Building annulus.
- Safeguard Buildings (SBs).
- Emergency Power Generating Buildings (EPGB).
- Essential service water (ESW) Pump Structures.
- ESW Cooling Water Structures.

- Fuel Building (FB).
- Vent Stack ~~(VSTK)~~.

Based on the U.S. EPR design, a tornado or high wind event will not have a significant impact on safety-related equipment. The most limiting impact from a tornado or high wind would likely be a LOOP.

The U.S. EPR has a robust design to cope with a LOOP event. Four independent EDGs (protected within the EPGB) are available to provide power to the safety buses. Although not specifically protected from high winds and tornado, two SBO diesels, which are located separately from the EPGB, are likely to be available to backup the EDGs.

High Winds and Tornado Evaluation Conclusion

RAI 561, Q. 19.01-48

The preceding high winds and tornado structural design features, in combination with the U.S. EPR onsite divisional and backup power supplies, provide a robust design against potential high wind and tornado hazards. ~~Therefore, the risk from high wind and tornado events is judged not significant.~~

19.1.5.4.2 External Flooding Evaluation

Safety-related systems and components housed in the Seismic Category 1 buildings are protected from external floods and groundwater by the flood protection measures summarized below. Refer to Section 2.4 and Section 3.4 for further information on external flood design protection features.

- Structures, including penetrations (e.g., piping and cable penetrations), are designed for the buoyancy loads and hydrostatic pressure loads resulting from groundwater pressure and external flooding.
- Portions of the buildings located below grade elevation are protected from external flooding by water stops and water proofing. All exterior wall or floor penetrations located below grade are provided with watertight seals. No access openings or tunnels penetrate the exterior walls of the Nuclear Island below grade.
- The roofs of the buildings are designed to prevent the undesirable buildup of standing water in conformance with RG 1.102. The roofs of the structures do not have parapets that could collect water. The maximum rainfall rate for roof design is 19.4 inches per hour. The design static roof load for rain, snow and ice is 100 pounds per square foot, which includes the weight of the 100-year return period snow pack and the weight of the 48-hour probable maximum winter precipitation.
- The structures hardened against airplane crash have exterior doors resistant to intrusion by aircraft fuel, and therefore these exterior doors would also provide additional protection against potential flood water.

External Flooding Evaluation Conclusion

RAI 561, Q. 19.01-49

The preceding external flooding design features, in combination with the U.S. EPR requirements for building location relative to the probable maximum flood (PMF) and maximum groundwater elevation, provide a robust design against potential external floods. ~~Therefore, the risk from external flooding events is judged not significant.~~

19.1.5.4.3 External Fire Evaluation

For the U.S. EPR, the structural design of safety-related structures, the physical arrangement of these structures and the cleared zones surrounding plant structures provide significant protection from external hazards including external fire.

The impact of external smoke on the habitability of the main control room is considered in the design of the control room envelope (CRE) and the control room air conditioning system (CRACS) (refer to Section 6.4 and Section 9.4). The CRE has isolation capability in the event of external fire/smoke and the CRACS is operated in full recirculation mode. The CRACS maintains the control room envelop at a positive pressure to prevent uncontrolled, unfiltered in-leakage during normal and accident conditions. The CRACS can support occupancy for eight people in the MCR and associated rooms for 70 hours without outside makeup air. Portable self-contained breathing apparatus (SCBA) are also available for use by the control room operators.

External Fire Evaluation Conclusion

RAI 561, Q. 19.01-50

The preceding external fire design features, in combination with the U.S. EPR requirements for structural design, structure location and design considerations of the CRE, provide a robust design against potential external fire and smoke events. ~~Therefore, the risk from external fire and smoke events impacting plant operations is judged not significant.~~

19.1.6 Safety Insights from the PRA for Other Modes of Operation

19.1.6.1 Description of the Low-Power and Shutdown Operations PRA

19.1.6.1.1 Methodology

The LPSD analysis is an extension of the at-power PRA to include the plant operating states (POS) associated with taking the reactor from hot standby to cold shutdown, mid-loop operation, refueling, and startup. Although the overall LPSD PRA methodology is the same as the at-power PRA, unique initiating events, success criteria, and accident response are developed for each POS. An overview of the methodology focusing on the differences to the at-power methods is provided below.