ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Wednesday, May 13, 2009 4:38 PM
To: Getachew Tesfaye
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); NOXON David B (AREVA NP INC); WELLS Russell D (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 181, FSAR Ch 19, Supplement 1
Attachments: RAI 181 Supplement 1 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided a schedule for response to the 3 questions of RAI No. 181 on February 24, 2009. The attached file, "RAI 181 Supplement 1 Response US EPR DC.pdf" provides technically correct and complete responses to the 3 questions, as committed.

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 181 Question 19-271.

The following table indicates the respective pages in the response document, "RAI 181 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 181 — 19-271	2	3
RAI 181 — 19-272	4	4
RAI 181 — 19-273	5	5

This concludes the formal AREVA NP response to RAI 181, 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.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: WELLS Russell D (AREVA NP INC)
Sent: Tuesday, February 24, 2009 9:47 AM
To: 'Getachew Tesfaye'
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); SLIVA Dana (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 181, FSAR Ch 19

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 181 Response US EPR DC.pdf" provides a schedule for the responses to the 3 questions.

The following table indicates the respective pages in the response document, "RAI 181 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 181 — 19-271	2	2
RAI 181 — 19-272	3	3
RAI 181 — 19-273	4	4

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

Question #	Response Date
RAI 181 — 19-271	May 15, 2009
RAI 181 — 19-272	May 15, 2009
RAI 181 — 19-273	May 15, 2009

Sincerely,

(Russ Wells on behalf of)
Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
New Plants Deployment
AREVA NP, Inc.
An AREVA and Siemens company
3315 Old Forest Road
Lynchburg, VA 24506-0935
Phone: 434-832-3694
Cell: 434-841-8788

From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, January 27, 2009 7:35 PM
To: ZZ-DL-A-USEPR-DL
Cc: Anne-Marie Grady; Edward Fuller; Theresa Clark; Hanh Phan; Christopher Jackson; Lynn Mrowca; John Rycyna; Joseph Colaccino; Meena Khanna; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 181 (1980), FSARCh. 19

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 19, 2009, and on January 27, 2009, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. 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: 472

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From: Pederson Ronda M (AREVA NP INC)

Created By: Ronda.Pederson@areva.com

Recipients:
"BENNETT Kathy A (OFR) (AREVA NP INC)" <Kathy.Bennett@areva.com>
Tracking Status: None
"DELANO Karen V (AREVA NP INC)" <Karen.Delano@areva.com>
Tracking Status: None
"NOXON David B (AREVA NP INC)" <David.Noxon@areva.com>
Tracking Status: None
"WELLS Russell D (AREVA NP INC)" <Russell.Wells@areva.com>
Tracking Status: None
"Getachew Tesfaye" <Getachew.Tesfaye@nrc.gov>
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Response to

Request for Additional Information No. 181, Supplement 1

01/27/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19.0

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects)
(SPCV)

Question 19-271:

The purpose of the regulation, 10 CFR 50.34(f)(3)(iv) – Dedicated Containment Penetration, is to protect the integrity of the containment should containment pressure continue to rise, for any reason, during the course of a severe accident.

FSAR section 19.2.3.3.8 states that the U. S. EPR has not been designed with a dedicated severe accident containment vent system, and that specific containment overpressure protection is provided in part through the availability of 47 passive autocatalytic recombiners (PARs) and the severe accident heat removal system (SAHRS). The former would remove hydrogen and the latter would remove steam, both principal contributors to high containment pressure during a severe accident.

Avoiding containment failure due to overpressure is dependent on the successful operation of the SAHRS. In one AREVA MAAP U. S. EPR Severe Accident calculation of the containment pressurization due to the failure of the containment spray function of the SAHRS, containment pressure would continue to increase for at least 80 hours and would exceed the ultimate containment pressure of 119 psig. The containment would be vulnerable to failure and an uncontrolled release of fission products to the environment. If the U. S. EPR design includes any other systems or components that could accomplish the function of the dedicated containment penetration, then the system and components should be identified and their capabilities should be described in the FSAR.

Response to Question 19-271:

The severe accident assessment (U.S. EPR FSAR Tier 2, Section 19.2), the PRA (U.S., EPR FSAR Tier 2, Section 19.1), and the containment analysis (U.S. EPR FSAR Tier 2, Section 6.2) demonstrate that a dedicated containment penetration is not required. Specific containment overpressure protection is provided through its large size and strength, and through the availability of 47 PARs and the SAHRS for the removal of hydrogen and steam, respectively, which are the principal contributors to high containment pressure during a severe accident. The functions of these systems are described in U.S. EPR FSAR Tier 2, Section 19.2.3.3.2.

AREVA NP has reevaluated its exemption from 10 CFR 50.34(f)(3)(iv) for a dedicated containment penetration. This reevaluation has lead to a decision to use an existing containment penetration to meet this requirement for a dedicated containment penetration. The withdrawal of the exemption request is provided in the following letter:

> Letter, Ronnie L. Gardner (AREVA NP Inc.) to Document Control Desk (NRC), “Withdrawal of 10 CFR 50.34(f)(3)(iv) Exemption Request for the U.S. EPR Standard Design Certification,” NRC:09:056, May 13, 2009.

An existing containment penetration will be used to meet the requirement of 10 CFR 50.34(f)(3)(iv). The penetration will have a diameter of 36 inches, which is the required diameter opening. Both ends of the penetration will have welded caps. Since the requirements of 10 CFR 50.34(f)(3)(iv) are met with such a penetration, no further analysis or identification of alternative systems or components will be performed.

U.S. EPR FSAR Tier 2, Section 1.9, Tables 1.9-3 and 1.9-4, and Section 19.2.3.3.8 will be revised to reflect that a dedicated containment penetration will be provided in accordance with 10 CFR 50.34(f)(3)(iv).

FSAR Impact:

U.S. EPR FSAR Tier 2, Section 19.2.3.3.8 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Tables 1.9-3 and 1.9-4 will be revised as described in the response and indicated on the enclosed markup.

Question 19-272:

The purpose of the regulation, 10 CFR 50.34(f)(3)(iv) – Dedicated Containment Penetration, is to protect the integrity of the containment should containment pressure continue to rise, for any reason, during the course of a severe accident.

FSAR section 19.2.3.3.8 states that the U. S. EPR has not been designed with a dedicated severe accident containment vent system, and that specific containment overpressure protection is provided, in part, through its large size and strength. Provide the following additional information regarding the U. S. EPR containment size and strength:

1. Compare/contrast the size of the U.S. EPR's containment with consideration of free volume and stored energy to existing PWR's and other new reactor designs. Provide additional discussion as to how this feature constitutes a design margin not shared by other reactors subject to the rule.
2. Discuss how the U.S. EPR's strength is different from existing containment designs or other proposed new designs such that its strength is considered a special circumstance. Comparison to existing designs is recommended.

Response to Question 19-272:

See the Response to Question 19-271.

Since the requirements of 10 CFR 50.34(f)(3)(iv) are met with an existing penetration, as described in the Response to Question 19-271, no further comparisons of U.S. EPR containment design to other existing designs will take place.

FSAR Impact:

There is no additional impact to this question. See the FSAR Impact in the Response to Question 19-271.

Question 19-273:

By AREVA letter NRC-07-075, dated 11 December 2007, Request for Two Exemptions for the U.S. EPR Standard Design Certification, AREVA NP requested an exemption from the requirements of 10 CFR 50.34(f)(3)(iv) with respect to providing a dedicated containment penetration. AREVA states that the U.S. EPR design does not utilize a dedicated containment penetration because a dedicated containment penetration is not required for containment overpressure protection.

Provide additional discussion in support of the statement "application of the rule is not necessary to achieve the underlying purpose of the rule" and AREVA's understanding of the purpose of the rule.

Response to Question 19-273:

See the Response to Question 19-271.

Since the requirements of 10 CFR 50.34(f)(3)(iv) are met with an existing penetration, as described in the Response to Question 19-271, no further discussion on the application of the rule is required.

FSAR Impact:

There is no additional impact to this question. See the FSAR Impact in the Response to Question 19-271.

U.S. EPR Final Safety Analysis Report Markups

temperature exceeds 1200°F) until SAHRS actuation. Prior to this period, in-vessel conditions are accurately represented in the main control room. Most of these instruments and controls support design basis functions, and therefore are designed to meet the applicable code or standard defining equipment qualification. The measurement of the core outlet temperature is a highly reliable part of the operational incore instrumentation and includes 12 wide-range thermocouples evenly distributed across all four I&C divisions that take data from all four sectors of the core.

Following the actuation of RCS depressurization, the PAR performance is paramount. The AREVA PAR design has received extensive testing for a broad range of pressure, temperature, humidity, aerosol and radiation conditions.

The SAHRS system relies on conventional pump and spray technology with a long history of reliable performance. In addition, the SAHRS backflush capability assures its performance in the event of debris-blockage in the IRWST sump region.

19.2.3.3.8 Containment Venting

19-271

The U.S. EPR has not been designed with a dedicated severe accident containment vent system; however, a dedicated containment penetration will be provided in accordance with 10 CFR 50.34(f)(3)(iv). Specific containment overpressure protection is provided through its large size and strength and through the availability of 47 PARs and the SAHRS for the removal of hydrogen and steam, respectively, the principal contributors to high containment pressure during a severe accident. The functions of these systems are described in Section 19.2.3.3.2.

19.2.4 Containment Performance Capability

19.2.4.1 Introduction

AREVA NP has developed a methodology (Reference 1) designed to confirm the adequacy of the U.S. EPR to address severe accident-related safety concerns. The principal issues relating to containment performance are hydrogen control, core debris coolability, high pressure melt ejection, fuel-coolant interactions and equipment survivability. This section describes the containment performance analysis for the U.S. EPR that meets the regulatory goals. Specifically addressed is the deterministic containment goal from Reference 4 which states:

"The containment should maintain its role as a reliable, leak-tight barrier (for example: by ensuring that containment stresses do not exceed ASME Service Level C limits for metal containments, or Factored Load Category for concrete containments) approximately 24 hours following the onset of core damage under the more likely severe accident challenges and, following this period, the containment should continue to provide a barrier against the uncontrolled release of fission products."

Table 1.9-3—U.S. EPR Conformance with TMI Requirements (10 CFR 50.34(f)) and Generic Issues (NUREG-0933)
Sheet 4 of 5

Issue	Description	U.S. EPR Assessment	FSAR Section(s)
(3)(iv)	Provide dedicated containment ventilation penetration 19-271	~~EXEMPTION (10CFR50.34(f)(3)(iv))~~Y	19.2.3.3.8
(3)(vii)	Provide a management plan for design and construction	N/A-COL	13.5
Generic Issues (NUREG-0933)			
Issue 24	Automatic ECCS Switchover to Recirculation (Medium-Priority GSI)	N/A-OTHER (Alternative design solution)	6.3 15.6.5
Issue 43	Reliability of Air Systems (High-Priority GSI)	Y	9.3.1
Issue 51	Proposed Requirements for Improving the Reliability of Open-Cycle Service Water Systems (Medium-Priority GSI)	Y	9.2.1
Issue 70	Power-Operated Relief Valves (PORV) and Block Valve Reliability (Medium-Priority GSI)	Y	3.9.6 5.2.2 5.4.12 5.4.13
Issue 89	Stiff Pipe Clamps (Medium-Priority GSI)	Y	3.9.3
Issue 93	Steam Binding of Auxiliary Feedwater Pumps (High-Priority GSI)	Y	10.4.9
Issue 94	Additional Low-Temperature Overpressure Protection for Light-Water Reactors (High-Priority GSI)	Y	5.2.2 5.3.2
Issue 99	RCS/RHR Suction Line Valve Interlock on PWRs (High-Priority GSI)	Y	5.4.7
Issue 105	Interfacing Systems LOCA at Light-Water Reactors (LWRs) (High-Priority GSI)	Y	3.12 5.4.7 6.8 9.3.4 19.2

Table 1.9-4—U.S. EPR Conformance with Advanced and Evolutionary Light-Water Reactor Design Issues (SECY-93-087)
Sheet 2 of 5

Issue	Description	U.S. EPR Assessment	FSAR Section(s)
I.J	Containment Performance: Position on acceptable conditional containment failure probabilities or other analyses to ensure a high degree of protection from the containment.	Y	19.2
I.K	Dedicated Containment Vent Penetration: Position for a dedicated vent penetration to preclude containment failure resulting from a containment overpressurization event. 19-271	~~EXEMPTION (10CFR50.34(f)(3)(iv))~~Y	19.2.3.3.8
I.L	Equipment Survivability: Position on the applicability of environmental qualification and quality assurance requirements related to plant features provided only for severe-accident protection.	Y	19.2
I.M	Elimination of Operating-Basis Earthquake: Position on the applicability of the OBE in design and the possibility of decoupling the OBE and SSE in the design of safety systems.	Y	3.7 3.7.2 3.7.3 19.1
I.N	In-Service Testing of Pumps and Valves: Position on periodic testing to confirm operability of safety-related pumps and valves.	Y	3.9.6 8.3 14.2
II.A	Industry Codes and Standards: Position on use of recently developed or modified design codes and industry standards in ALWR designs that have not been reviewed for acceptability by the NRC.	Y	3.1
II.B	Electrical Distribution: Position on acceptable practices relating to the electrical distribution of safety- and non-safety loads.	Y	8.2
II.C	Seismic Hazard Curves and Design Parameters: Position on use of proposed generic bounding seismic hazard curves and performance of seismic PRA.	Y	19.1
II.D	Leak-Before-Break: Position on use of leak-before-break concept.	Y	3.6.2 3.6.3
II. E	Classification of Main Steam Lines in BWRs: Position on the staff's defined approach for seismic classification of the main steam line in both evolutionary and passive BWRs.	N/A-BWR	N/A