

ArevaEPRDCPEM Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Thursday, August 27, 2009 3:24 PM
To: Tesfaye, Getachew
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 227, FSAR Ch 19, Supplement 3
Attachments: RAI 227 Supplement 3 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided responses to 12 of the 20 questions of RAI No. 227 on July 6, 2009. AREVA NP submitted Supplement 1 to the response on July 16, 2009 to address one of the remaining 8 questions. AREVA NP submitted Supplement 2 to the response on July 24, 2009 to revise the Supplement 1 response. The attached file, "RAI 227 Supplement 3 Response U.S. EPR DC" provides a technically correct and complete response to one of the remaining 7 questions.

The following table indicates the respective pages in the response document, "RAI 227 Supplement 3 Response U.S. EPR DC," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 227 — 19-298	2	4

A complete answer is not provided for 6 of the 20 questions. The schedule for a technically correct and complete response to these questions was provided previously and remains as indicated below.

Question #	Response Date
RAI 227 — 19-284	September 18, 2009
RAI 227 — 19-287	September 18, 2009
RAI 227 — 19-292	September 18, 2009
RAI 227 — 19-293	September 18, 2009
RAI 227 — 19-294	September 18, 2009
RAI 227 — 19-295	September 18, 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: Pederson Ronda M (AREVA NP INC)

Sent: Friday, July 24, 2009 4:54 PM

To: Tesfaye, Getachew

Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); NOXON David B (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 227, FSAR Ch 19, Supplement 2

Getachew,

AREVA NP Inc. provided responses to 12 of the 20 questions of RAI No. 227 on July 6, 2009. On July 16, 2009, AREVA NP submitted Supplement 1 to the response to address 1 of the remaining questions. Several pages were unintentionally omitted in the appended U.S. EPR Final Safety Analysis Report (FSAR) markups provided in Supplement 1.

The attached file, "RAI 227 Supplement 2 Response U.S. EPR DC" provides the affected pages of the U.S. EPR FSAR in redline-strikeout format which support the response to RAI 227 Question 19-285, provided in Supplement 1. These FSAR markups replace, in their entirety, the FSAR markups provided in Supplement 1.

The schedule for a technically correct and complete response to the remaining questions was provided previously and remains as indicated below.

Question #	Response Date
RAI 227 — 19-284	September 18, 2009
RAI 227 — 19-287	September 18, 2009
RAI 227 — 19-292	September 18, 2009
RAI 227 — 19-293	September 18, 2009
RAI 227 — 19-294	September 18, 2009
RAI 227 — 19-295	September 18, 2009
RAI 227 — 19-298	August 28, 2009

Sincerely,

Ronda Pederson

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From: Pederson Ronda M (AREVA NP INC)

Sent: Thursday, July 16, 2009 1:57 PM

To: 'Tesfaye, Getachew'

Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); NOXON David B (AREVA NP INC)

Subject: Response to U.S. EPR Design Certification Application RAI No. 227, FSAR Ch 19, Supplement 1

Getachew,

AREVA NP Inc. provided responses to 12 of the 20 questions of RAI No. 227 on July 6, 2009. The attached file, "RAI 227 Supplement 1 Response U.S. EPR DC" provides a technically correct and complete response to one of the remaining 8 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 227 Question 19-285.

The following table indicates the respective pages in the response document, "RAI 227 Supplement 1 Response U.S. EPR DC," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 227 — 19-285	2 A-1 B-1	3 A-90 B-130

A complete answer is not provided for 7 of the 20 questions. The schedule for a technically correct and complete response to these questions was provided previously and remains as indicated below.

Question #	Response Date
RAI 227 — 19-284	September 18, 2009
RAI 227 — 19-287	September 18, 2009
RAI 227 — 19-292	September 18, 2009
RAI 227 — 19-293	September 18, 2009
RAI 227 — 19-294	September 18, 2009
RAI 227 — 19-295	September 18, 2009
RAI 227 — 19-298	August 28, 2009

Sincerely,

Ronda Pederson

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From: WELLS Russell D (AREVA NP INC)

Sent: Monday, July 06, 2009 6:08 PM

To: 'Getachew Tesfaye'

Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)

Subject: Response to U.S. EPR Design Certification Application RAI No. 227, FSAR Ch 19

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 227 Response US EPR DC.pdf" provides technically correct and complete responses to 12 of the 20 questions.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 227 Questions 19-299 and 19-300.

The following table indicates the respective pages in the response document, "RAI 227 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 227 — 19-284	2	3
RAI 227 — 19-285	4	4
RAI 227 — 19-286	5	5
RAI 227 — 19-287	6	6
RAI 227 — 19-288	7	10
RAI 227 — 19-289	11	11
RAI 227 — 19-290	12	12
RAI 227 — 19-291	13	13
RAI 227 — 19-292	14	14
RAI 227 — 19-293	15	15
RAI 227 — 19-294	16	16
RAI 227 — 19-295	17	17
RAI 227 — 19-296	18	19
RAI 227 — 19-297	20	22
RAI 227 — 19-298	23	23
RAI 227 — 19-299	24	26
RAI 227 — 19-300	27	32
RAI 227 — 19-301	33	33
RAI 227 — 19-302	34	35
RAI 227 — 19-303	36	37

A complete answer is not provided for 8 of the 20 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 227 — 19-284	September 18, 2009
RAI 227 — 19-285	July 20, 2009
RAI 227 — 19-287	September 18, 2009
RAI 227 — 19-292	September 18, 2009
RAI 227 — 19-293	September 18, 2009
RAI 227 — 19-294	September 18, 2009
RAI 227 — 19-295	September 18, 2009
RAI 227 — 19-298	August 28, 2009

(Russ Wells on behalf of)

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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]

Sent: Friday, June 05, 2009 3:29 PM

To: ZZ-DL-A-USEPR-DL

Cc: Theresa Clark; Hanh Phan; Edward Fuller; Lynn Mrowca; Prosanta Chowdhury; Joseph Colaccino; ArevaEPRDCPEm Resource

Subject: U.S. EPR Design Certification Application RAI No. 227 (2564, 2598),FSAR Ch. 19

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 15, 2009, and discussed with your staff on May 29, 2009. Draft RAI Questions 19-296, 19-300, and 19-302 were modified 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: 762

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD4101DFB919)

Subject: Response to U.S. EPR Design Certification Application RAI No. 227, FSAR Ch
19, Supplement 3
Sent Date: 8/27/2009 3:23:53 PM
Received Date: 8/27/2009 3:23:57 PM
From: WELLS Russell D (AREVA NP INC)

Created By: Russell.Wells@areva.com

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Tracking Status: None

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Files	Size	Date & Time
MESSAGE	8944	8/27/2009 3:23:57 PM
RAI 227 Supplement 3 Response US EPR DC.pdf		105434

Options

Priority: Standard

Return Notification: No

Reply Requested: No

Sensitivity: Normal

Expiration Date:

Recipients Received:

**Response to
Request for Additional Information No. 227 (2564, 2598), Supplement 3
6/05/2009**

**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**

**QUESTIONS for PRA Licensing, Operations Support and Maintenance
Branch 1 (AP1000/EPR Projects) (SPLA)**

Question 19-298:

(Follow-up to Question 19-277) In response to Question 19-277, AREVA evaluated hydrogen deflagration loads in containment assuming 75 and 50 percent passive autocatalytic recombiner (PAR) availability. The staff also noted that AREVA also added an insight to FSAR Table 19.1-109 recommending PAR availability during shutdown. However, PAR availability is not required by technical specifications. Thus, the staff requests information concerning how many PAR units have to be out of service to reach the containment hydrogen mass of 940 kg which was used for deflagration load calculations in the shutdown Level 2 analysis.

Response to Question 19-298:

The mass of hydrogen in containment of 940 kg, used as an upper bound in the shutdown Level 2 calculation of hydrogen deflagration loads could be reached if a significant number of the PAR units are not available. There are 41 large and six small PAR units within the U.S.EPR containment. To determine the limiting availability of the PAR units for which this limit is still not reached, two accident scenarios during shutdown are examined. The two cases considered, both of which are in plant operating state Ca, are: a transient and a loss of coolant accident (LOCA) scenarios.

The MAAP runs investigated in this response are; Ca_4_1c representative of a transient scenario and Ca_4_3 representative of a LOCA scenario. These cases were selected because they exhibited the highest hydrogen peaks in containment. In this response, both runs use an MAAP input file that includes an update to the mixing dampers model¹.

MAAP runs with multiple fractions of the large PAR units disabled, showed that with 25 percent availability of the large PAR units (equivalent to 75 percent unavailability), the maximum hydrogen mass in containment is determined to be smaller than 940 kg. This is shown in Figures 19-298-1 and 19-298-2 for transient and LOCA scenarios, respectively. The hydrogen peak masses obtained with 25 percent of the large PAR units available are:

- A hydrogen peak of 891 kg for the transient scenario Ca_4_1c_25_ mixdmp.
- A hydrogen peak of 932 kg for the LOCA scenario Ca_4_3_25_ mixdmp.

It can be concluded from these results that the analysis of hydrogen phenomena in containment, developed in the shutdown Level 2 PRA, is applicable for a range of availability between 25 percent and 100 percent of the large PAR units. As stated in the response to RAI 197, Question 19-277, provided that multiple PAR units are installed at

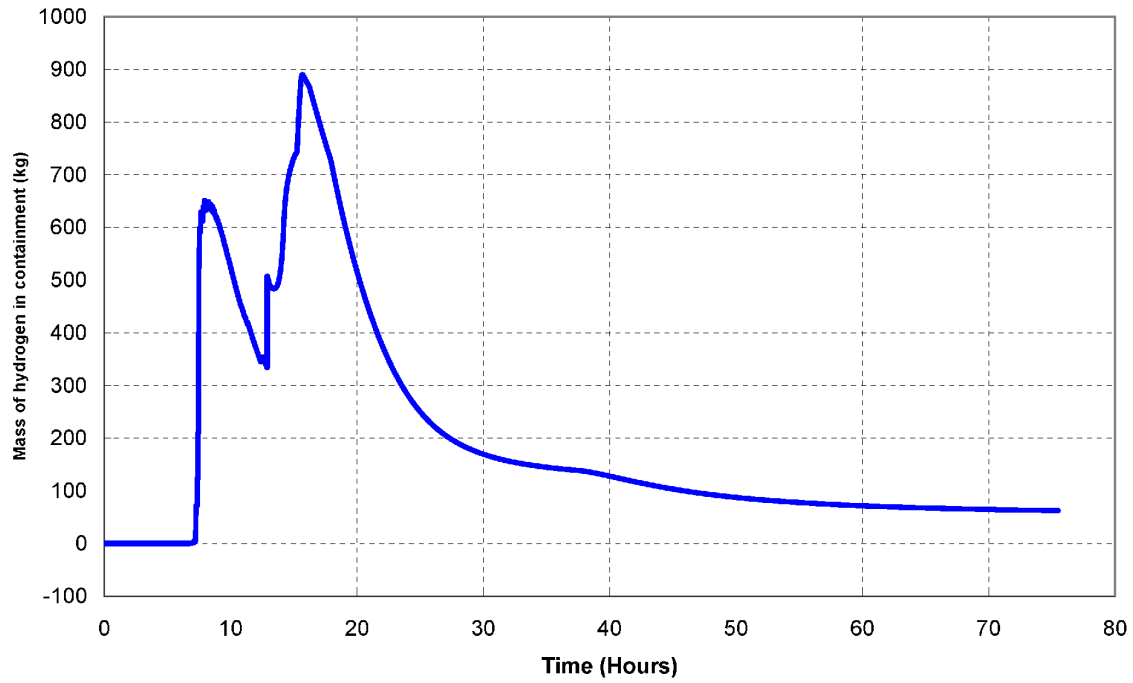
¹ The results presented in this response are based on a revised version of the MAAP input file that incorporates changes to the Combustible Gas Control System (CGCS) mixing dampers. This change was implemented after the response to RAI 197, Question 19-277. The opening pressure of the mixing dampers, has been revised to trigger an earlier opening and the MAAP input file has been updated accordingly. The impact of this revision on previous MAAP results has been investigated and it was concluded that most MAAP output parameters exhibited little or no change. The function of the mixing dampers is described in U.S. EPR FSAR Tier 2 Section 19.2.3.3.2.

different locations within the U.S.EPR containment, it is judged to be unlikely that a significant number of PAR units would be unavailable simultaneously. In conclusion, a 25 percent availability of the large PAR units is judged to be conservative. Nevertheless, this availability represents the boundary for the validity of the shutdown Level 2 analysis of hydrogen deflagration loads leading to containment failure.

FSAR Impact:

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

**Figure 19-298-1 Hydrogen Mass in Containment for Transient MAAP
Case Ca_4_1c_25_mixdmp with 25% of PAR Units Available**



**Figure 19-298-2 Hydrogen Mass in Containment for LOCA MAAP
Case Ca_4_3_25_mixdmp with 25% of PAR Units Available**

