ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Friday, December 19, 2008 5:12 PM
To: Getachew Tesfaye
Cc: John Rycyna; Pederson Ronda M (AREVA US); BENNETT Kathy A (OFR) (AREVA US); DELANO Karen V (AREVA US); SLIVA Dana (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 1, FSAR Ch 6, Supplement 2
Attachments: RAI 1 Supplement 2 Response US EPR DC.pdf

Getachew,

During the October 31, 2008 meeting between NRC and AREVA NP at NRC Headquarters to discuss U.S. EPR containment analysis, AREVA NP committed to providing additional information concerning containment foils and dampers. AREVA NP's original response, dated May 9, 2008, to RAI-1 Questions 6.2.1-07a and 6.2.1.-07b are hereby superseded by this supplemental response.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the revised response to RAI 1 Questions 6.2.1-07a and 6.2.1-07b.

The following table indicates the respective pages in the attached response document, "RAI 1 Response Supplement 2 US EPR DC.pdf," that contain AREVA NP's revised response to the subject questions.

Question #	Start Page	End Page
RAI 1 — 6.2.1-07	2	4

The schedule for technically correct and complete responses to the remaining RAI No. 1 questions is provided below and remains unchanged.

Question #	Response Date
RAI 1—6.2.1-01	January 28, 2009
RAI 1—6.2.1-02	January 28, 2009
RAI 1—6.2.1-03	January 28, 2009
RAI 1—6.2.1-07c and -07d	January 28, 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.
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From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, September 05, 2008 1:42 PM
To: 'Getachew Tesfaye'
Cc: 'John Rycyna'; WELLS Russell D (AREVA NP INC); DUNCAN Leslie E (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: FW: Response to U.S. EPR Design Certification Application RAI No. 1, Question 06.02.01-10, Supplement 1

Getachew,

Attached is the AREVA NP Inc. supplemental response to the RAI No. 1, Question 06.02.01-10. AREVA NP Inc. provided responses to 6 of the 10 "RAI No. 1" questions on May 9, 2008. The attached file, "RAI 1, Question 06.02.01-10 Supplement 1 Response US EPR DC.pdf" provides a correct Figure 6.2.1-10-3, which replaces the previously submitted Figure 6.2.1-10-3. The submittal of an incorrect figure has been entered into AREVA NP Inc.'s corrective action program.

The following table provides the page in the response document, "RAI 1, Question 06.02.01-10 Supplement 1 Response US EPR DC.pdf" containing the supplemental information.

Question #	Start Page	End Page
RAI 1 — 06.02.01-10	2	2

Sincerely,

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From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, May 09, 2008 2:49 PM
To: 'Getachew Tesfaye'
Cc: 'John Rycyna'; SHAHROKHI F (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC)
Subject: FW: U.S. EPR Design Certification Application RAI No. 1

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 1 Response-US EPR DC.pdf" provides technically correct and complete responses to 6 of the 10 questions. Since the response file contains security-related sensitive information that should be withheld from public disclosure in accordance with 10 CFR 2.390, a public version is provided with the security-related sensitive information redacted. This email does not contain any security-related information. The unredacted SUNSI version is provided under separate email.

The attached file, "RAI 1 US EPR FSAR Changes.pdf" provides affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format.

The following table provides the page(s) in the response document, "RAI 1 Response-US EPR DC.pdf" containing the response to each question.

Question #	Start Page	End Page
RAI 1—6.2.1-01	2	4
RAI 1—6.2.1-02	5	5
RAI 1—6.2.1-03	6	6
RAI 1—6.2.1-04	7	7
RAI 1—6.2.1-05	8	10
RAI 1—6.2.1-06	11	11
RAI 1—6.2.1-07	12	33
RAI 1—6.2.1-08	34	37
RAI 1—6.2.1-09	38	50
RAI 1—6.2.1-10	51	55

Complete answers are not provided for 4 of the questions. The schedule for technically correct and complete response to for these questions is provided below.

Question #	Response Date
RAI 1—6.2.1-01	January 28, 2009
RAI 1—6.2.1-02	January 28, 2009
RAI 1—6.2.1-03	January 28, 2009
RAI 1—6.2.1-07c and -07d	January 28, 2009

The provided response and schedule meet NRC's stated expectation and support the established review schedule for the U.S. EPR Design Certification application.
Sincerely,

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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Wednesday, April 09, 2008 4:16 PM
To: ZZ-DL-A-USEPR-DL
Cc: Pederson Ronda M (AREVA NP INC); Jack Donohue; Walton Jensen; Christopher Jackson; Joseph Colaccino
Subject: U.S. EPR Design Certification Application RAI No. 1

Attached please find the subject requests for additional information (RAIs). This RAI was discussed with your staff on April 2, 2008. 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.

Getachew Tesfaye
Office of New Reactors
U.S. Nuclear Regulatory Commission
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 76

Mail Envelope Properties (1F1CC1BBDC66B842A46CAC03D6B1CD41E10D9F)

Subject: Response to U.S. EPR Design Certification Application RAI No. 1, FSAR Ch 6, Supplement 2
Sent Date: 12/19/2008 5:12:26 PM
Received Date: 12/19/2008 5:12:30 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	6462	12/19/2008 5:12:30 PM
RAI 1 Supplement 2 Response US EPR DC.pdf	54466	

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

Response to

Request for Additional Information No. 1, Supplement 2

4/9/2008

U. S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 6.2.1 – Containment Functional Design

Application Section: 6.2

SPCV Branch

Question 6.2.1-07:

(FSAR Section 6.2.1) In order to facilitate the review, the NRC staff needs certain design information as soon as possible. These include: (a) The design of rupture foils and convection foils; (b) details on the modeling of the containment in the multi-node GOTHIC calculations; and (c) detailed results for one of the multi-node GOTHIC calculations. (See detail below.)

a. Foils are installed in a steel framework. Does the framework separate the foil into many foils each of which has to rupture individually? What is the size of the individual foils? What is the total surface area of the foils? What is the available flow area once the foils rupture? Justify this flow area. What materials are the foils made of? What is the thickness of the foils? What is the weight of the foils per square foot? The above questions apply to both rupture foils and convection foils. In addition, how many fusible links are on the frame of a convection foil? Where are the links located?

b. Please provide a simplified sketch of the containment. Show internal walls, major components (steam generators, tanks, and so on) and the location and size of all mixing dampers, rupture foils and convection foils.

c. Provide the noding diagram that was used in the multi-node GOTHIC calculations (pages 47-50 of the U.S.-EPR Design Certification Acceptance Review presentation by AREVA of January 29, 2008). Provide the input data used in these calculations: volumes, elevations, cross sections, flow path dimensions, heat transfer surfaces. What was the break location and break size selected for the above referenced multi-node GOTHIC calculations?

d. Provide for one of the multi-node calculations (LB LOCA cold leg break if available) sufficient details of the results to permit visualization of flow patterns in the containment as well as heat transfer to the various heat sinks. Results should be given as a function of time for the duration of the accident. Please include flow in each flow path; content, temperature and pressure of each node; surface temperatures of significant heat sinks and heat transfer to each significant heat sink.

Response to Question 6.2.1-07a:

This response supersedes AREVA NP's original RAI-1 response to this question.

The rupture and convection foils are made of austenitic stainless steel. They are installed in a steel framework above each steam generator and are separated into individual foils according to the layout provided in Figure 6.2.1-07-1 (see AREVA NP's original response to this question). The types and numbers of the individual foils, including their flow areas and setpoints, are listed in Table 6.2.1-07-1. Data from this table will be used to update U.S. EPR FSAR, Tier 2, Table 6.2.5-1.

The rupture and convection foils burst at a pre-determined ΔP from either direction. In addition, the convection foils include a fusible link that melts within 30 seconds of reaching a pre-defined temperature. The general arrangement between the bursting element and fusible link is shown in the profile view of a convection foil in Figure 6.2.1-07-2 (see AREVA NP's original response to this question), in both the opened (vertical) and closed (horizontal) positions.

The thickness and dimensions of the foils will meet the following functional requirements:

- Rupture foils open on a differential pressure > 0.7 psid (either direction) ±30%
- Convection foils open on a differential pressure > 0.7 psid (either direction) ±30%, or temperature >180.5°F ±3%.

Once the thickness is defined, the weight per square foot will be determined.

Table 6.2.1-07-1—Foil and Damper Data

Data / Type	Type Number per SG	Flow Area per Unit Type	Opening Setpoint	Opening Time	Opening Direction	Opening Actuator
Rupture I	17	4.0 ft²	0.7 psid	instantaneous	Bi-directional	Diaphragm
Rupture II	6	3.08 ft²	0.7 psid	instantaneous	Bi-directional	Diaphragm
Rupture III	2	1.63 ft²	0.7 psid	instantaneous	Bi-directional	Diaphragm
Rupture IV	3	1.35 ft²	0.7 psid	instantaneous	Bi-directional	Diaphragm
Convection	30	4.0 ft²	0.7 psid	instantaneous	Bi-directional	Diaphragm
			180.5ºF	30 s	Downward	Fusible link
Damper	2	8.04 ft²	0.5 psid 17.4 psia	7 sec min 18 sec max	90º rotation	Spring

Response to Question 6.2.1-07b:

This response supersedes AREVA NP's original RAI-1 response to this question.

Figure 6.2.1-07-3 (see AREVA NP's original response to this question) is a simplified graphic of the containment showing the internal walls, major equipment, mixing damper locations, rupture foils, convection foils, and heat transfer parameters of interest. The damper number, flow area, and setpoints are listed in Table 6.2.1-07-1. Data from this table will be used to update U.S. EPR FSAR, Tier 2, Table 6.2.5-1.

The symbols in the graphic are defined as follows:

Q = heat transfer
Γ = condensation
ρ = density
T = temperature
M = mass flow.

The subscripts in the graphic identify regions of the containment and are defined as follows:

A = heavy floor
B = lower equipment room
C = in-containment refueling water storage tank (IRWST)
D = upper equipment room
E = upper accessible area
E' = lower accessible area.

Response to Question 6.2.1-07c:

AREVA NP's original response to RAI 1 remains unchanged.

Response to Question 6.2.1-07d:

AREVA NP's original response to RAI 1 remains unchanged.

FSAR Impact:

U.S. EPR FSAR, Tier 2, Table 6.2.5-1 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

Table 6.2.5-1—CGCS Design and Performance Parameters

Parameter	Value
Large PARs	
• Number of units	41
• Nominal hydrogen reduction rate (per PAR)	11.8 lbm/hr
• Catalyst	Pt / Pd substrate
Small PARs	
• Number of units	6
• Nominal hydrogen reduction rate (per PAR)	2.6 lbm/hr
• Catalyst	Pt / Pd substrate
Hydrogen mixing dampers	
• Number of units	8
• Approximate opening cross section (total)	~~60~~64 ft^2
• Nominal actuation pressure	0.5 psid or17 psia
Rupture foils	
• Approximate opening cross section (total)	~~390~~375 ft^2
• Nominal actuation pressure	0.7 psid
Convection foils	
• Approximate opening cross section (total)	~~430~~480 ft^2
• Nominal actuation pressure	0.7 psid
• Nominal actuation temperature	~~175 – 185~~180.5°F

6.2.1-07a
6.2.1-07b