ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Friday, December 18, 2009 12:45 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); BEELMAN Ronald J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6, Supplement 6
Attachments: RAI 82 Supplement 6 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided responses to 3 of the 8 questions of RAI No. 82 on November 3, 2008. AREVA NP submitted Supplement 1 to the response on December 18, 2008 to address portions of 4 of the remaining questions. AREVA NP submitted Supplement 2 to the response on January 28, 2009 to address portions of 2 of the remaining questions. AREVA NP submitted Supplement 3 to the response on May 22, 2009 to address 2 of the remaining questions. Supplement 4 response was submitted on June 10, 2009 to address 1 of the remaining questions. Supplement 5 response was submitted on June 18, 2009 to address 1 of the remaining questions. The attached file, "RAI 82 Supplement 6 Response US EPR DC.pdf" provides technically correct and complete responses to the single remaining question, as committed.

The following table indicates the respective pages in the response document, "RAI 82 Supplement 6 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 82 — 06.02.01-12	2	9

This concludes the formal AREVA NP response to RAI No. 82 and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Ronda Pederson
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From: WELLS Russell D (AREVA NP INC)
Sent: Thursday, June 18, 2009 6:07 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. 82, FSAR Ch 6, Supplement 5

Getachew,

AREVA NP Inc. provided responses to 3 of the 8 questions of RAI No. 82 on November 3, 2008. AREVA NP submitted Supplement 1 to the response on December 18, 2008 to address portions of 4 of the remaining questions. AREVA NP submitted Supplement 2 to the response on January 28, 2009 to address portions of 2 of the remaining questions. AREVA NP submitted Supplement 3 to the response on May 22, 2009 to address 2 of the remaining questions. AREVA NP submitted Supplement 4 to the response on June 10, 2009 to address 1 of the remaining questions. The attached file, "RAI 82 Supplement 5 Response US EPR DC.pdf" provides a technically correct and complete response to 1 of the remaining 2 questions, as committed.

Appended to this file is an affected page of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which supports the response to RAI 82 Questions 06.02.01.04-1.h.

The following table indicates the respective pages in the response document, "RAI 82 Supplement 5 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 82 — 06.02.01.04-1.e	2	14
RAI 82 — 06.02.01.04-1.g	2	54
RAI 82 — 06.02.01.04-1.h	2	56

The schedule for a technically correct and complete response to the remaining question remains unchanged and is provided below.

Question #	Response Date
RAI 82 — 06.02.01-12	December 18, 2009

Sincerely,

(Russ Wells on behalf of)
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From: Pederson Ronda M (AREVA NP INC)
Sent: Wednesday, June 10, 2009 2:10 PM
To: Getachew Tesfaye
Cc: BEELMAN Ronald J (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. 82, FSAR Ch 6, Supplement 4

Getachew,

AREVA NP Inc. provided responses to 3 of the 8 questions of RAI No. 82 on November 3, 2008. AREVA NP submitted Supplement 1 to the response on December 18, 2008 to address portions of 4 of the remaining questions. AREVA NP submitted Supplement 2 to the response on January 28, 2009 to address portions of 2 of the remaining questions. AREVA NP submitted Supplement 3 to the response on May 22, 2009 to address 2 of the remaining questions. The attached file, "RAI 82 Supplement 4 Response US EPR DC.pdf" provides technically correct and complete responses to 1 of the remaining 3 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 82 Supplement 4 Response US EPR DC.pdf" that contain AREVA NP's response to the subject portions of RAI 82, Question 06.02.01.05-1.

Question #	Start Page	End Page
RAI 82 — 06.02.01.05-1a	2	4
RAI 82 — 06.02.01.05-1f	2	22
RAI 82 — 06.02.01.05-1h	2	26

The schedule for technically correct and complete responses to the remaining 2 questions is unchanged and provided below:

Question #	Response Date
RAI 82 — 06.02.01-12	December 18, 2009
RAI 82 — 06.02.01.04-1	June 23, 2009

Sincerely,

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From: WELLS Russell D (AREVA NP INC)
Sent: Friday, May 22, 2009 5:07 PM
To: 'Getachew Tesfaye'
Cc: Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); DUNCAN Leslie E (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6, Supplement 3

Getachew,

The proprietary and non-proprietary versions of the response to RAI No. 82, Supplement 3 are submitted via AREVA NP Inc. letter, "Response Supplement 3 to U.S. EPR Design Certification Application RAI No. 82" NRC 09:060, dated May 22, 2009. The enclosure to that letter provides technically correct and complete responses to 2 of the 5 remaining questions in RAI No. 82. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

The following table indicates the respective pages in the response document, "RAI 82 Supplement 3 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 82 — 06.02.01-12a.1	2	9

RAI 82 — 06.02.01-12a.2	2	9
RAI 82 — 06.02.01-12a.3	2	9
RAI 82 — 06.02.01-12c.1	2	10
RAI 82 — 06.02.01-12c.3	2	10
RAI 82 — 06.02.01-12c.3-1	2	11
RAI 82 — 06.02.01-12c.3-2	2	11
RAI 82 — 06.02.01-12c.3-3	2	14
RAI 82 — 06.02.01-12d.1	2	20
RAI 82 — 06.02.01-12d.2	2	15
RAI 82 — 06.02.01-12d.3	2	21
RAI 82 — 06.02.01.02-1a.2	22	24
RAI 82 — 06.02.01.02-1a.10	22	25
RAI 82 — 06.02.01.03-1c	26	32
RAI 82 — 06.02.01.03-1g	26	38
RAI 82 — 06.02.01.03-1h	26	42
RAI 82 — 06.02.01.04-1i	44	46
RAI 82 — 06.02.01.04-1j	44	46
RAI 82 — 06.02.01.05-1b	47	49
RAI 82 — 06.02.01.05-1c	47	50
RAI 82 — 06.02.01.05-1d	47	61
RAI 82 — 06.02.01.05-1e	47	62
RAI 82 — 06.02.01.05-1g	47	64

The schedule for the technically correct and complete response to the remaining questions in RAI No. 82 has been changed and is provided below:

Question #	Response Date
RAI 82 — 06.02.01-12	December 18, 2009
RAI 82 — 06.02.01.04-1	June 23, 2009
RAI 82 — 06.02.01.05-1	June 12, 2009

Sincerely,

(Russ Wells on behalf of)

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From: Pederson Ronda M (AREVA NP INC)
Sent: Wednesday, January 28, 2009 7:34 PM
To: Getachew Tesfaye
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); BEELMAN Ronald J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 82, Supplement 2

Getachew,

AREVA NP Inc. provided responses to 3 of the 8 questions of RAI No. 82 on November 3, 2008. Supplement 1 response to RAI No. 82 was sent on December 18, 2008 to address portions of 4 of the remaining 5 questions.

The proprietary and non-proprietary versions of technical report, ANP-10299, are submitted via AREVA NP, Inc. letter, "Submittal of ANP-10299P, 'Applicability of AREVA NP Containment Response Evaluation Methodology to the U.S. EPR™ for Large Break LOCA Analysis Technical Report'," NRC:09:006, dated January 28, 2009.

The following table indicates the RAI No. 82 questions that are answered in the subject technical report.

Question #
RAI 82 — 06.02.01-12.c.2
RAI 82 — 06.02.01.03-1.d
RAI 82 — 06.02.01.03-1.f
RAI 82 — 06.02.01.03-1.i
RAI 82 — 06.02.01.03-1.j
RAI 82 — 06.02.01.03-1.k
RAI 82 — 06.02.01.03-1.l
RAI 82 — 06.02.01.03-1.m
RAI 82 — 06.02.01.03-1.n
RAI 82 — 06.02.01.03-1.o

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

Question #	Response Date
RAI 82 — 06.02.01-12	May 22, 2009
RAI 82 — 06.02.01-12.c.1	May 22, 2009
RAI 82 — 06.02.01-12.c.3	May 22, 2009
RAI 82 — 06.02.01-12.c.3-3	May 22, 2009
RAI 82 — 06.02.01.02-1	May 22, 2009
RAI 82 — 06.02.01.03-1	June 23, 2009
RAI 82 — 06.02.01.03-1.c	June 23, 2009
RAI 82 — 06.02.01.04-1	June 23, 2009
RAI 82 — 06.02.01.05-1	June 12, 2009

Sincerely,

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From: WELLS Russell D (AREVA NP INC)
Sent: Thursday, December 18, 2008 2:49 PM
To: 'Getachew Tesfaye'
Cc: Pederson Ronda M (AREVA US); BENNETT Kathy A (OFR) (AREVA US); DELANO Karen V (AREVA US); SLIVA Dana (EXT); 'John Rycyna'
Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6, Supplement 1

Getachew,

The proprietary and non-proprietary versions of the response to RAI No. 82, Supplement 1 are submitted via AREVA NP Inc. letter, "Response Supplement 1 to U.S. EPR Design Certification Application RAI No. 82," NRC 08:098, dated December 17, 2008. The enclosure to that letter provides technically correct and complete responses to portions of 4 of the 5 remaining questions in RAI No. 82. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

The schedule for technically correct and complete responses to the remaining RAI No. 82 questions, is provided below and remains unchanged.

Question #	Response Date
RAI 82 — 06.02.01-12	May 22, 2009
RAI 82 — 06.02.01.02-1	May 22, 2009
RAI 82 — 06.02.01.03-1	May 22, 2009
RAI 82 — 06.02.01.04-1	June 23, 2009
RAI 82 — 06.02.01.05-1	June 12, 2009

Sincerely,

(Russ Wells on behalf of)

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From: WELLS Russell D (AREVA NP INC)
Sent: Monday, November 03, 2008 8:48 PM
To: 'Getachew Tesfaye'
Cc: 'John Rycyna'; Pederson Ronda M (AREVA US); BENNETT Kathy A (OFR) (AREVA US); DELANO Karen V (AREVA US)
Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6

Getachew,

The proprietary and non-proprietary versions of the response to RAI No. 82 are submitted via AREVA NP Inc. letter, "Response to U.S. EPR Design Certification Application RAI No. 82" NRC 08:085, dated November 3, 2008. The enclosure to that letter provides technically correct and complete responses to 3 of the 8 questions in RAI No. 82. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

The schedule for technically correct and complete responses to the remaining 5 questions in RAI No. 82 is provided below:

Question #	Response Date
RAI 82—06.02.01-12	May 22, 2009
RAI 82—06.02.01.02-1	May 22, 2009
RAI 82—06.02.01.03-1	May 22, 2009
RAI 82—06.02.01.04-1	June 23, 2008
RAI 82—06.02.01.05-1	June 23, 2008

Sincerely,

(Russ Wells on behalf of)

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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, October 03, 2008 3:29 PM
To: ZZ-DL-A-USEPR-DL
Cc: Walton Jensen; Anne-Marie Grady; Michael Miernicki; Joseph Colaccino; John Rycyna
Subject: U.S. EPR Design Certification Application RAI No. 82(1082,1096,1107,1113,1125,1151,1098,1097), FSAR Ch 6

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on September 15, 2008, and discussed with your staff on October 2, 2008. Draft RAI Questions 06.02.01-12 (a)(3) and 06.02.01.03-1(a) 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: 1054

Mail Envelope Properties (5CEC4184E98FFE49A383961FAD402D31017E36DF)

Subject: Response to U.S. EPR Design Certification Application RAI No. 82, FSAR Ch 6, Supplement 6
Sent Date: 12/18/2009 12:44:48 PM
Received Date: 12/18/2009 12:44:50 PM
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
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Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 82, Supplement 6

10/03/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.01 - Containment Functional Design
SRP Section: 06.02.01.02 - Subcompartment Analysis
SRP Section: 06.02.01.03 - Mass and Energy Release Analysis for Postulated Loss-of-Coolant Accidents (LOCAs)
SRP Section: 06.02.01.04 - Mass and Energy Release Analysis for Postulated Secondary System Pipe Ruptures
SRP Section: 06.02.01.05 - Minimum Containment Pressure Analysis for Emergency Core Cooling System Performance Capability Studies
SRP Section: 06.02.02 - Containment Heat Removal Systems
SRP Section: 06.02.04 - Containment Isolation System
SRP Section: 06.02.06 - Containment Leakage Testing
Application Section: FSAR Ch. 6
SPCV Branch

Question 06.02.01-12:

RAI 6.2.1.1-1

a. Steam Line Break Calculations (FSAR Section 6.2.1.1.3)

1. Only one power level (50%) was investigated in the large span between 20% initial power level and 80% initial power level. This analysis at 50% initial power level produced the limiting temperature and pressure for the design of the U.S. EPR containment. Perhaps the peak containment pressure and temperature lie at an intermediate power level. Provide additional analysis for double ended main steam line breaks at intermediate power levels so that the power level producing the most severe containment results may be identified.

2. Section 6.2.1.4.1.3 states that emergency feedwater flow to the affected steam generator is assumed to be terminated 30 minutes (1800 seconds) after the break by the plant operators. Figures 6.2.1-34 and 6.2.1-35 provide containment pressure and temperature analyses for only 500 seconds. Since there are no active safety systems to provide containment atmospheric cooling at EPR, extend the containment analysis until steam flow from the postulated main steam line break is terminated.

3. For the spectrum of main steam line breaks analyzed, the calculated containment vapor temperature for some cases exceeded the specified containment design temperature of 338°F. Explain why exceeding the design temperature is acceptable. Provide appropriate COL interface requirements (COL Information Item) for instrumentation within the containment so that adequately qualified equipment may be installed.

b. Negative Containment Pressure Analysis (FSAR Section 6.2.1.1.1)

1. Section 6.2.1.1.1 lists 5 potential events which cause negative pressure across the containment wall. So that the staff may perform a review, provide a complete description of the calculation which was performed in each case including the assumptions and justification that the assumptions and methodology are conservative for containment analysis. For example for the post accident cooldown scenario, the leakage of air from the containment before isolation should be evaluated and the details of the evaluation should be described in the response.

2. A sudden containment temperature reduction is said to produce the largest negative pressure of 2.92 psi which is said to be within the external design of the building. Provide the maximum negative differential pressure that would be within the structural design of the reactor building and provide reference to the FSAR section where the structural design is described.

c. Containment Atmospheric Mixing and Heat Transfer Modeling (FSAR Section 6.2.1.1.3)

1. Describe and justify the heat transfer correlations that are used with the GOTHIC containment building model to describe heat transfer to the containment heat structures following a LOCA. For both LOCA and MSLB calculations describe and

justify the differences in assumptions for heat transfer coefficients between vertical and horizontal surfaces within containment.

2. Provide an analysis of IRWST pool stratification following a large break LOCA and include the following information.

   i. Justify that the assumptions made for pool surface temperature in calculations of atmospheric heat transfer to the pool are conservative.

   ii. FSAR Figures 3.8.2 and 6.3-5 appear to show a vertical partition bisecting the IRWST. The IRWST drawings in ANP-10293 do not appear to show such a partition. Describe the function of the partition and its effect on IRWST mixing.

   iii. FSAR Figures 3.8-11, 3.8.12 and 3.8.13 seem to show that the section of ceiling over the IRWST which is under the pressurizer is about 3 feet lower than the rest of the IRWST ceiling. Discuss the effect of the lowered ceiling area on heat transfer to the IRWST surface in particular for raised post-accident IRWST water levels.

3. The Containment Building is separated into a central portion containing the reactor system and a peripheral lower temperature portion containing equipment. Separation is accomplished by compartment walls, foils, doors, and dampers. The foils are located above the steam generator compartments and are designed to open at a fraction of a psi. The doors and dampers located at lower elevations and must also open to avoid stratification so that steam flowing to the containment dome can circulate down the containment walls to reach the heat structures an the containment lower elevations. The doors and dampers are designed to open at various pressures from a few psi to greater than 13 psi. The staff is concerned that the foils above the reactor system will open and cause pressure to be equalized throughout the containment building. With the pressure equalized the doors and dampers needed to promote circulation and prevent stratification may not open. Provide justification that sufficient compartment dampers and doors will open and to discuss impact on containment circulation if only a portion of the dampers and doors are open following a LOCA or a main steam line break accident.

   1. Describe the testing program by which the opening characteristics of the foils, doors and dampers assumed in the analyses will be verified.

   2. In the absence of containment atmospheric sprays and fan coolers, the containment internal heat structures (heat sinks) play a vital role in removing steam from the containment atmosphere following a high energy line break within containment. The expected heat sink inventory is given in FSAR Table 6.2.1.5. Describe the pre-operational inspections which will be performed to ensure that the heat sinks given in Table 6.2.1.5 are present in the as built plant.

   3. Section 6.2.2 of the FSAR contends that long-term hydrogen mixing experiments at the Battelle Model Containment (BMC) facility show that adequate containment mixing will occur under post-LOCA conditions at EPR. At BMC flashing of superheated liquid in the containment sump was reported to be the agent for containment mixing. FSAR Section 6.2.1.1.3 describes how following a LOCA subcooled water spills out of the postulated break on to the heavy floor

and into the IRWST promoting steam condensation. The staff does not understand how the same water source can provide both heating and cooling. Describe this process in greater detail and provide justification that the processes which occurred at the test facility will occur at EPR. Provide a scaling analysis of the BMC and EPR containments to demonstrate that it is appropriate to apply BMC test results to the EPR.

d. Containment Compartments and Flow Paths (FSAR Section 6.2.1.1.2)

1. Additional Flow Paths

   From examining FSAR Figures 3.8-1 through 3.8-13, the NRC staff is concerned that significant flow paths might have been omitted form Table 6.2.1-07-3. For example: The vertical grating openings from UJA rooms 15-003 to 18-003 (elevation +30.77 ft) and from 23-003 to 29-003 (elev +64.8 ft) are included in Table 6.2.1-07. There should also be openings from room 11-003 to 15-003 (elev +17 ft) and from 18-003 to 23-003 (elev +45 ft) because the steam generator rooms form a vertical stack. We believe that the flow paths described in the attached Tables 1 and 2 may exist. Provide data for elevation, opening type and area for these flow paths or provide justification that the flow paths do not exist or are insignificant. For initially closed doors, flaps and dampers provide the differential pressure required to open.

2. Room volumes:

   The Reactor Building rooms of US-EPR are identified in FSAR Figures 3.8-1 through 3.8-13. Table 6.2.1-07-02 of RAI 6.2.1 lists the elevation and free volumes of these rooms. The staff could not find UJA rooms 15-026, 15-027, 18-026, 18-027, 23-026, 23-027, 29-025 and 29-026 from the Chapter 3.8 figures on the table. Does Areva believe that these rooms will not affect the results from multi-noded containment analyses of design basis accidents? If not, provide information for these rooms similar to that of Table 6.2.1-07-02 including the associated containment heat structures. Otherwise the staff will leave them out of the multi-noded containment model which we are building.

3. Opening direction of doors:

   The pressure differentials required to open the doors between the UJA rooms in FSAR figures 3.8-1 through 3.8-13 are identified in Table 6.2.1-07-03 of RAI 6.2.1. Should the staff assume that the doors are able to open only to positive direction (one-way opening), or should we model the doors as opening to both directions? If the doors are capable of opening in the reverse opening direction provide the reverse opening pressures.

Table 1. Continuously open connections.

From room	To room
07017	04002
04003	07016
04004	07019
04005	07022

04006 07023
04012 07012
07012 11012
07013 11020
07017 11022
07018 07014
07020 07023
07020 07028
07021 07027
07022 07021
07023 11024
07024 07020
07024 07022
07024 07027
07026 07023
07026 11024
07028 07027
07028 07027
07028 11023
07029 07026
07029 07028
07029 11024
11002 11003
11002 15002
11003 15003
11004 11005
11004 15004
11005 15005
11006 11007
11006 15006
11007 15007
11008 11009
11008 15008
11009 15009
11010 15010
11012 15012
11013 15013
11014 11013
11014 15014
11015 11016
11015 15015
11016 15016
11019 15019
11019 15018
11021 15025
11021 11002
11021 11023
11021 07021
11022 11023
11023 07028

11024 11009
11024 11023
11031 11025
11031 11026
11032 11027
11032 11028
15001 15017
15010 18010
15011 18011
15012 18012
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15013 18013
15014 18014
15015 15016
15015 18015
15016 18016
15018 15019
15018 18018
15019 18019
15020 15021
15023 29013
15026 18026
15027 18027
18002 18003
18002 23002
18003 23003
18004 18005
18004 23004
18005 23005
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23012 29012
23013 23014
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29019 34019
34003 34004
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34004 34005
34007 34006
34008 34007
18025 18013
15014 15026
15015 15027
34020 29020
34021 29021
34018 23018

Table 2. Doors.

From room To room
07019 07018
07026 07023
07027 07022
07028 07024
11019 11018
11021 11013
11031 11014

11032 11015
15014 15026
15015 15027
15020 15013
15024 15001
15025 15013
15026 15014
15027 15015
18002 18025
18014 18026
18015 18027
18025 18013
23002 23020
23009 23031
23014 23026
23015 23027
23017 23026
23042 23014
29022 29015
34014 34018
34020 34014

34021 34015

Response to Question 06.02.01-12:

a. Steam Line Break Calculations (FSAR Section 6.2.1.1.3)

1) This response supersedes the response provided in RAI 82, Supplement 3 on May 22, 2009.

   A full spectrum of break sizes at seven initial power levels was analyzed to determine the limiting containment pressure and temperature response. Analyses were performed at initial percent full power levels of: 0, 20, 40, 50, 60, 80, and 100. The results of the analyses are provided in U.S. EPR FSAR Table 6.2.1-9 (as revised in response to RAI 157, Supplement 2, Question 06.02.02-22).

2) A response to this question was provided in RAI 82, Supplement 3.

3) A response to this question was provided in RAI 82, Supplement 3.

c. Containment Atmospheric Mixing and Heat Transfer Modeling (FSAR Section 6.2.1.1.3)

1) A response to this question was provided in RAI 82, Supplement 3.

2) A response to this question was provided in RAI 82, Supplement 1.

3) U.S. EPR FSAR Section 6.2.2 was revised in RAI Response 209, Supplement 1, Question 06.02.01-14. The revision to the U.S EPR FSAR includes the use of a multi-node GOTHIC model for analyzing long-term loss of coolant accidents (LOCAs) and main steam line breaks (MSLBs) and also accounts for changes to the containment analysis methodology presented in AREVA Technical Report ANP-10299P, Revision 2, “Applicability of AREVA NP Containment Response Evaluation Methodology to the U.S.

EPR for Large Break LOCA Analysis." As part of the revision, the discussion of this BMC test was removed from the U.S. EPR FSAR. This consideration is no longer pertinent to the long-term LOCA response as a result of the changes to the containment methodology for treatment of the liquid to vapor interface of the IRWST as discussed in Section 8.3.1.6 of ANP-10299P, Revision 2.

d. A response to this question was provided in RAI 82, Supplement 3.

FSAR Impact:

U.S. EPR FSAR Tier 2, Sections 6.2.1 and Section 6.2.2 will be revised as described in the response and in the FSAR markups submitted via AREVA NP Inc. letter, NRC:09:128, dated December 17, 2009.