ArevaEPRDCPEm Resource

From: BRYAN Martin (EXT) [Martin.Bryan.ext@areva.com]
Sent: Thursday, March 11, 2010 4:11 PM
To: Tesfaye, Getachew
Cc: DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); ROMINE Judy (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 277, FSAR Ch. 9, Supplement 3
Attachments: RAI 277 Supplement 3 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided responses to 5 of the 12 questions of RAI No. 277 on October 16, 2009. Supplement 1 response to RAI No. 277 was sent on December 9, 2009 to provide a revised schedule for the remaining questions. Supplement 2 response to RAI No. 277 was sent on February 4, 2010 to address 1 of the remaining 7 questions.

The attached file, "RAI 277 Supplement 3 Response US EPR DC.pdf" provides a technically correct and complete response to 1 of the remaining 6 questions.

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 277 Question 09.02.05-21.

The following table indicates the respective pages in the response document, "RAI 277 Supplement 3 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 277 — 09.02.05-21	2	3

The schedule for a technically correct and complete response to the remaining 5 questions is unchanged and provided below:

Question #	Response Date
RAI 277 — 09.04.01-1	April 14, 2010
RAI 277 — 09.04.02-1	April 14, 2010
RAI 277 — 09.04.03-1	April 14, 2010
RAI 277 — 09.04.03-3	April 14, 2010
RAI 277 — 09.04.05-2	April 14, 2010

Sincerely,

Martin (Marty) C. Bryan
Licensing Advisory Engineer
AREVA NP Inc.
Tel: (434) 832-3016
Martin.Bryan.ext@areva.com

From: DUNCAN Leslie E (AREVA NP INC)
Sent: Thursday, February 04, 2010 3:14 PM

To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 277, FSAR Ch. 9, Supplement 2

Getachew,

AREVA NP Inc. provided responses to 5 of the 12 questions of RAI No. 277 on October 16, 2009. AREVA NP submitted Supplement 1 to the response on December 9, 2009 to provide a revised schedule. The attached file, "RAI 277 Supplement 2 Response US EPR DC.pdf" provides a technically correct and complete response to one of the remaining seven questions. The schedule for the remaining six questions has been revised.

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 277 Question 09.04.03-2.

The following table indicates the respective pages in the response document, "RAI 277 Supplement 2 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 277 — 09.04.03-2	2	2

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

Question #	Response Date
RAI 277 — 09.02.05-21	March 12, 2010
RAI 277 — 09.04.01-1	April 14, 2010
RAI 277 — 09.04.02-1	April 14, 2010
RAI 277 — 09.04.03-1	April 14, 2010
RAI 277 — 09.04.03-3	April 14, 2010
RAI 277 — 09.04.05-2	April 14, 2010

Sincerely,

Les Duncan
Licensing Engineer
AREVA NP Inc.
An AREVA and Siemens Company
Tel: (434) 832-2849
Leslie.Duncan@areva.com

From: Pederson Ronda M (AREVA NP INC)
Sent: Wednesday, December 09, 2009 4:03 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 277, FSAR Ch. 9, Supplement 1

Getachew,

AREVA NP Inc. provided responses to 5 of the 12 questions of RAI No. 277 on October 16, 2009. AREVA NP also provided a schedule for technically correct and complete responses to the remaining 7 questions.

Since responses to the remaining questions remain in process, a revised schedule is provided in this email.

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

Question #	Response Date
RAI 277 — 09.02.05-21	February 4, 2010
RAI 277 — 09.04.01-1	February 4, 2010
RAI 277 — 09.04.02-1	February 4, 2010
RAI 277 — 09.04.03-1	February 4, 2010
RAI 277 — 09.04.03-2	February 4, 2010
RAI 277 — 09.04.03-3	February 4, 2010
RAI 277 — 09.04.05-2	February 4, 2010

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
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From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, October 16, 2009 5:33 PM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); KOWALSKI David J (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 277, FSAR Ch. 9

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 277 Response US EPR DC.pdf" provides technically correct and complete responses to 5 of the 12 questions.

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 277 Questions 09.04.02-2, 09.04.04-1, and 09.05.01-71.

The following table indicates the respective page(s) in the response document, "RAI 277 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 277 — 09.02.05-21	2	2
RAI 277 — 09.04.01-1	3	3
RAI 277 — 09.04.02-1	4	4
RAI 277 — 09.04.02-2	5	5
RAI 277 — 09.04.03-1	6	6
RAI 277 — 09.04.03-2	7	7

RAI 277 — 09.04.03-3	8	8
RAI 277 — 09.04.04-1	9	10
RAI 277 — 09.04.04-2	11	11
RAI 277 — 09.04.05-2	12	12
RAI 277 — 09.05.01-71	13	13
RAI 277 — 09.05.06-12	14	14

A complete answer is not provided for 7 of the 12 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 277 — 09.02.05-21	December 10, 2009
RAI 277 — 09.04.01-1	December 10, 2009
RAI 277 — 09.04.02-1	December 10, 2009
RAI 277 — 09.04.03-1	December 10, 2009
RAI 277 — 09.04.03-2	December 10, 2009
RAI 277 — 09.04.03-3	December 10, 2009
RAI 277 — 09.04.05-2	December 10, 2009

Sincerely,

Ronda Pederson
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Wednesday, September 16, 2009 12:52 PM
To: ZZ-DL-A-USEPR-DL
Cc: Wheeler, Larry; Segala, John; ODriscoll, James; Jackson, Christopher; Snodderly, Michael; McCann, Edward; Radlinski, Robert; Wolfgang, Robert; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 277(3538,3371,3372,3376,3374,3375,3399,2995)), FSAR Ch. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on August 17, 2009, and discussed with your staff on August 31, 2009. Draft RAI Questions 09.05.01-70 was deleted 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: 1227

Mail Envelope Properties (BC417D9255991046A37DD56CF597DB7105875D43)

Subject: Response to U.S. EPR Design Certification Application RAI No. 277, FSAR Ch. 9, Supplement 3
Sent Date: 3/11/2010 4:11:28 PM
Received Date: 3/11/2010 4:11:41 PM
From: BRYAN Martin (EXT)

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Files	Size	Date & Time
MESSAGE	8334	3/11/2010 4:11:41 PM
RAI 277 Supplement 3 Response US EPR DC.pdf	169282	

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

Response to

Request for Additional Information No. 277, Supplement 3

9/16/2009

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.02.05 - Ultimate Heat Sink
SRP Section: 09.04.01 - Control Room Area Ventilation System
SRP Section: 09.04.02 - Spent Fuel Pool Area Ventilation System
SRP Section: 09.04.03 - Auxiliary and Radwaste Area Ventilation System
SRP Section: 09.04.04 - Turbine Area Ventilation System
SRP Section: 09.04.05 - Engineered Safety Feature Ventilation System
SRP Section: 09.05.01 - Fire Protection Program
SRP Section: 09.05.06 - Emergency Diesel Engine Starting System

Application Section: 9.2.9

QUESTIONS for Balance of Plant Branch 2 (ESBWR/ABWR) (SBPB)
QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)
QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

Question 09.02.05-21:

Based on the staff's review of the RAI 169/09.02.05-02 response dated January 22, 2009, the applicant did not address the 10 CFR 52.47(a)(24) and (a)(25) regulations which state:

> "(24) A representative conceptual design for those portions of the plant for which the application does not seek certification, to aid the NRC in its review of the FSAR and to permit assessment of the adequacy of the interface requirements in paragraph (a)(25) of this section;
>
> (25) The interface requirements to be met by those portions of the plant for which the application does not seek certification. These requirements must be sufficiently detailed to allow completion of the FSAR;"

Since the design of the raw water supply system (RWSS) is not provided in the EPR design certification (DC) application, the RWSS is by definition a portion of the plant for which the application does not seek certification. Therefore, to comply with 10 CFR 52.47(a)(24), the FSAR needs to be revised to include a conceptual design for the RWSS. Also, to comply with 10 CFR 52.47(a)(25), the FSAR, including Chapter 4, "Interface Requirements," of Tier 1, needs to be revised to include sufficiently detailed interface requirements for the RWSS that must be satisfied by combined license applicants when they provide their plant specific RWSS design.

In regards to the safety-related ultimate heat sink (UHS) design, FSAR Section 9.2.5.5, "Safety Evaluation," states that:

> "The cooling towers must operate for a nominal 30 days following a LOCA without requiring any makeup water to the source or it must be demonstrated that replenishment or use of an alternate or additional water supply can provide continuous capability of the heat sink to perform its safety-related functions. The tower basin contains a minimum 72-hour supply of water. After the initial 72 hours, the site specific makeup water system will provide sufficient flow rates of makeup water to compensate for system volume losses for the remaining 27 days."

Since the plant specific RWSS will be needed to replenish the UHS basin post 72 hours, the plant specific RWSS will need to be safety-related and the staff will need to review the EPR DC interface requirements to ensure that the plant specific RWSS design will be capable of performing its safety-related makeup function.

Response to Question 09.02.05-21:

The raw water supply system (RWSS) contains water received from a site-specific natural source and directly supplies water to the points of usage. The RWSS and the downstream users, including the ultimate heat sink (UHS) normal makeup, do not provide safety-related functions. The UHS basin is supplied for 72 hours post design basis accident (DBA) loss-of-coolant accident (LOCA) by the site-specific, redundant safety-related emergency service water (ESW) emergency makeup water source consisting of four independent trains, one to each UHS basin.

U.S. EPR FSAR Tier 1, Section 2.7.11 provides interface requirements for the essential service water system (ESWS) and UHS. U.S. EPR FSAR Tier 1, Section 2.7.11, Item 8.1 will be revised to reflect the following information:

"8.1 The site-specific emergency makeup water system provides 300 gpm makeup water to each ESW cooling tower basin to maintain the minimum basin water level."

U.S. EPR FSAR Tier 2, Section 1.8 will be revised to include the following information:

- "Site-specific raw water supply system (RWSS). Conceptual design information for this system is presented, delineated by double brackets ([[ ]]), in Section 9.2.9."

U.S. EPR FSAR Tier 2, Table 9.2.5-2—Ultimate Heat Sink Design Parameters will be revised to include the required cooling tower emergency makeup flow of 300 gpm.

U.S. EPR FSAR Tier 2, Section 9.2.9 will be revised to describe a conceptual design for the non-safety-related RWSS and will reflect a new figure showing the conceptual site-specific RWSS.

FSAR Impact:

U.S. EPR FSAR Tier 1, Section 2.7.11 and U.S. EPR FSAR Tier 2, Section 1.8, Table 9.2.5-2 and Section 9.2.9 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.7.11-2 are powered from the Class 1E division as listed in Table 2.7.11-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.7.11-2 fail as-is on loss of power.

5.3 Deleted.

6.0 Environmental Qualifications

6.1 Deleted.

7.0 Equipment and System Performance

7.1 The ESWS UHS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the CCWS.

7.2 The pumps listed in Table 2.7.11-1 have sufficient net positive suction head absolute.

7.3 Class 1E valves listed in Table 2.7.11-2 can perform the function listed in Table 2.7.11-1 under system operating conditions.

7.4 The ESWS provides for flow testing of the ESWS pumps during plant operation.

7.5 Deleted. ~~The non-safety related dedicated ESWS as listed in Table 2.7.11-1 has the capacity to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.~~

7.6 The ESWS delivers water to the CCWS and EDG heat exchangers and the ESWPBVS room coolers.

8.0 Interface Requirements ~~Information~~

09.02.05-21

8.1 The site specific emergency makeup water system provides 300 gpm makeup water to each ESW cooling tower basin ~~in order~~ to maintain the minimum basin water level ~~in the ESW cooling tower basins~~.

9.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.11-3 lists the ESWS ITAAC.

1.8 Interfaces with Standard Designs and Early Site Permits

This section addresses the requirements of 10 CFR 52.47(a)(25) and describes the standard plant scope interfaces for the U.S. EPR as they relate to design certification between the standard U.S. EPR plant and the COL applicant. The site-specific items that must be included by a COL applicant that references the U.S. EPR design certification are also provided in this section.

Interface requirements for systems, structures, and components (SSC) that relate to specific mechanical, electrical, nuclear, or structural systems are covered in the appropriate chapter and identified by a specific COL information item to be addressed by the applicant. A COL applicant that references the U.S. EPR design certification will describe where the interface requirements are satisfied in the COL Final Safety Analysis Report (FSAR) to demonstrate compatibility with the U.S. EPR design. Interface requirements in Tier 1 of the U.S. EPR FSAR will demonstrate that conformance with the interface requirements can be verified with inspections, tests, or analyses and that the method for verification is included in the proposed inspections, tests, analyses, and acceptance criteria (ITAAC), per 10 CFR 52.47(a)(26).

The U.S. EPR design plant consists of the following structures and the SSC therein:

- Reactor Building.
- Safeguard Buildings.
- Fuel Building.
- Nuclear Auxiliary Building.
- Radioactive Waste Processing Building.
- Emergency Power Generating Buildings.
- Essential Service Water Buildings.

Site-specific assumptions on which the U.S. EPR standard design is based are presented in Section 1.2.1 and Chapter 2. The physical boundary of the U.S. EPR is provided in the site plan in Section 1.2. A more detailed listing of the systems included in the U.S. EPR standard design is included in Section 3.2.

The representative conceptual designs for the portions of the plant that are not submitted for certification are described in the FSAR to satisfy the requirement of 10 CFR 52.47(a)(24). These conceptual designs are outside the scope of the U.S. EPR standard design, but conceptual design information is provided as discussed below.

- The Access Building, Turbine Building, and the Fire Protection Storage Tanks and Pump Building. Conceptual design information for these structures is included, delineated by double brackets ([[ ]]), in Section 1.2 and Section 3.7.2.

- The Switchgear Building. Conceptual design information for this structure is included, delineated by double brackets ([[ ]]), in Section 1.2, Section 8.3, and Section 8.4.

- The auxiliary power and generator transformer areas. Conceptual design information for these components is included, delineated by double brackets ([[ ]]), in Section 8.2.

- Buried conduit duct banks, pipe ducts, and piping. Conceptual design information for these components is included, delineated by double brackets ([[ ]]), in Section 3.8.

- Conceptual design of the ultimate heat sink (UHS) systems. Conceptual design information for these systems is presented, delineated by double brackets ([[ ]]), in Section 9.2.5.

- The portions of the circulating water supply system outside the Turbine Building. Conceptual design information for this system is presented, delineated by double brackets ([[ ]]), in Section 10.4.5, based upon a cooling tower approach.

- Security structures, systems, and components outside the U.S. EPR buildings listed above. Conceptual design information for these structures, systems, and components is included, delineated by double brackets ([[ ]]), in Section 13.6.

- The offsite power transmission system including the main switchyard area. Conceptual design information for this system is included, delineated by double brackets ([[ ]]), in Section 8.2.

- The lightning protection and grounding system grid. Conceptual design information for this system is included, delineated by double brackets ([[ ]]), in Section 8.3.

09.02.05-21

- Conceptual design of the raw water supply system (RWSS). Conceptual design information for this system is presented, delineated by double brackets ([[ ]]), in Section 9.2.9.

Table 1.8-1—Summary of U.S. EPR Plant Interfaces with Remainder of Plant, identifies the interfaces between the U.S. EPR standard design and the remainder of the plant. The safety-related interface requirements in Table 1.8-1 have been selected based on a review of interfaces between the U.S. EPR standard design and other COL applicant or site-specific items. The interface types are classified as follows:

- U.S. EPR interface: Assumptions made for the U.S. EPR design that must be verified during the coordination effort between the designer of the U.S. EPR and the COL applicant.

Table 9.2.5-2—Ultimate Heat Sink Design Parameters

Cooling Tower Cells 31/32/33/34 URB	
Description	**Technical Data**
Cooling Tower Type	Mechanical Induced Draft
Design Water Flow (total both cells)	19,200 gpm
Design Cold (Outlet) Water Temperature	≤95°F (max, DBA)
~~Ambient Wet Bulb/Summer/~~Design Inlet ~~WBT~~Wet Bulb Temperature	81°F (~~includes 1°F correction for interference~~non-coincident, 0% exceedance value)(1)
Maximum Drift Loss (Percent of Water Flow)	< 0.005%
Maximum Evaporation Loss at Design Conditions (total both cells)	571 gpm
Number of Cells	2 Cell/Tower
Basin Water Volume (Min)	~~337,987~~ ≥295,120 ft^3
Basin Water Level (Min)	~~27.2~~23.75 ft
Required Cooling Tower Emergency Makeup Flow, 72 hours, post-DBA	300 gpm ← 09.02.05-21

(1) COL applicant to determine wet bulb temperature correction factor to account for potential interference and recirculation effects. (Refer to COL Item 2.0-1 in Table 1.8-2).

9.2.9 Raw Water Supply System

The raw water supply system (RWSS) provides the initial source of water supplied to the plant demineralized water, potable and sanitary water, ultimate heat sink makeup, and fire protection systems. The RWSS and the design requirements of the RWSS are site-specific and will be addressed by the COL applicant.

09.02.05-21

[[The RWSS contains water received from a site-specific natural source and supplies it directly to the points of use where it may be further processed by the receiving plant systems. The raw water for demineralized water, potable water, fire protection, and ultimate heat sink (UHS) normal makeup is preprocessed as required by filtration, reverse osmosis, chemical treatment, and desalinization of brackish raw water sources prior to use.]] The conceptual design of the RWSS is shown in Figure 9.2.9-1—[[Conceptual Site-Specific Raw Water Supply System]].

[[The RWSS does not provide any safety-related function. There is no connection between raw water and the components of other systems that have the potential to contain radiological contamination.]]

[[Normal non-safety-related makeup water is provided to the UHS cooling tower basins as clean (desalinated) water. Connections to the UHS cooling tower basins are made at safety-related motor operated valves (MOV), identified in Section 9.2.5. These valves close during a DBA on receipt of an accident signal, thereby maintaining UHS cooling tower basin integrity under accident conditions.]]

Testing is conducted during post-construction, pre-commissioning, and startup as necessary to confirm system integrity and proper operation of individual components and the total system. Portions of the system are leak tested to demonstrate proper operation.

Instrumentation is provided for local and remote system monitoring, including alarms for flows, temperatures and pressures, tank level and temperature, UHS makeup flow, demineralized water system feed flow, potable water system feed flow, valve position indication for selected valves, and pump power on/off indication.

Next File

09.02.05-21

Figure 9.2.9-1—[[Conceptual Site-Specific Raw Water Supply System]]