ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Tuesday, September 01, 2009 10:44 AM
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. 233, FSAR Ch 6, Supplement 1
Attachments: RAI 233 Supplement 1 US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided responses to portions of 2 of the 4 questions of RAI No. 233 on July 10, 2009. The attached file, "RAI 233 Supplement 1 Response US EPR DC.pdf" provides technically correct responses to portions of 2 of the remaining 4 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 233 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 233 — 06.05.01-1	2	4
RAI 233 — 06.05.03-1	5	5

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

Question #	Response Date
RAI 233 — 06.02.02-29	December 18, 2009
RAI 233 — 06.02.02-30	December 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
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From: Pederson Ronda M (AREVA NP INC)
Sent: Friday, July 10, 2009 9:54 AM
To: 'Tesfaye, Getachew'
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); GUCWA Len T (EXT)
Subject: Response to U.S. EPR Design Certification Application RAI No. 233, FSAR Ch. 6

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 233 Response US EPR DC.pdf" provides responses to portions of 2 of the 4 questions.

The following table indicates the respective pages in the response document, "RAI 233 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 233 — 06.02.02-29	2	2
RAI 233 — 06.02.02-30	3	5
RAI 233 — 06.05.01-1	6	7
RAI 233 — 06.05.03-1	8	8

A complete answer is not provided for the 4 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 233 — 06.02.02-29	December 18, 2009
RAI 233 — 06.02.02-30	December 18, 2009
RAI 233 — 06.05.01-1 (Parts 2, 4, and 5)	September 3, 2009
RAI 233 — 06.05.03-1 (Part d)	September 3, 2009

Sincerely,

Ronda Pederson

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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, June 12, 2009 5:18 PM
To: ZZ-DL-A-USEPR-DL
Cc: Ashley, Clinton; ODriscoll, James; Jackson, Christopher; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 233 (2857, 2872,2873), FSAR Ch. 6

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 19, 2009, and on June 12, 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. Per your request, we support future interaction to give you an opportunity to clarify your design regarding Question 06.05.03-1 part d . 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: 776

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Subject: Response to U.S. EPR Design Certification Application RAI No. 233, FSAR Ch 6, Supplement 1
Sent Date: 9/1/2009 10:44:08 AM
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From: WELLS Russell D (AREVA NP INC)

Created By: Russell.Wells@areva.com

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RAI 233 Supplement 1 US EPR DC.pdf	82664	

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

Response to

Request for Additional Information No. 233, Supplement 1

6/12/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.02 - Containment Heat Removal Systems
SRP Section: 06.05.01 - ESF Atmosphere Cleanup Systems
SRP Section: 06.05.03 - Fission Product Control Systems and Structures
Application Section: FSAR Ch. 6

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

Question 06.05.01-1:

This question is in regard to clarification of carbon and HEPA filter design parameters. Areas of Review Paragraph 3 of SRP 6.5.1, Revision 3, states the following:

> `For each ESF atmosphere cleanup system, the specific areas of review are as follows: The component design criteria, qualification requirements, and qualification testing of heaters, demisters, prefilters, and high-efficiency particulate air (HEPA) filters, design requirements of the filter and adsorber mounting frames, system filter and adsorber housings, and water drains, the adsorbent used for removal of gaseous iodides (in the preliminary safety analysis report (PSAR)), the physical properties of the adsorbent, and the design of the adsorber section of the filter trains (in the final safety analysis report (FSAR)). Provisions to inhibit off design temperatures in the adsorber section and the design criteria of the system fans or blowers, ductwork, and housings are also reviewed.'

In view of the above, there is insufficient information to determine if the following Regulatory Guide 1.52 values are met with respect to carbon filters:

1. The design average atmosphere residence time should be 0.25 seconds per 2 inches in thickness of adsorbent bed.
2. The maximum charcoal loading for the adsorbent train should be below 2.5 mg/gm (≤ 2.5 mg of total iodine per gram of charcoal).
3. The design percent of the impregnant carbon should be no more than 5% of the total carbon.
4. The maximum component temperature in the adsorber section with normal flow conditions is not specified. The iodine loading post-accident radioactivity-induced heat in the adsorbent should not exceed that design temperature.
5. Under conditions of a failed fan post-LOCA, the charcoal temperature rise resulting from radioactivity-induced heat in the adsorbent should be below the 625 °F charcoal ignition temperature. Is water deluge from a fire protection sprinkler utilized to control this?

In addition, there is insufficient information to determine if the following Regulatory Guide 1.52 parameter is met with respect to HEPA filters:

> For the EPR, the applicant specifies that the design system efficiency for removal of particulates by the HEPA filter resulting from a DBA is 99.97/99.95% tested to ASME N510. There is insufficient information to determine if the HEPA filters have sufficient design margin to accommodate fission product loading without restricting flow rate.

Provide the additional information necessary to support and meet the requirements listed above.

Response to Question 06.05.01-1, Part 2:

In accordance with Regulatory Guide (RG) 1.52, the design of the charcoal filters includes the following specification:

> "The design of the carbon adsorber shall be below 2.5 mg/gm (≤ 2.5 mg of total iodine per gram of charcoal)."

The maximum charcoal loading for the carbon adsorbent trains is below 2.5 mg/gm (≤ 2.5 mg of total iodine per gram of charcoal):

- Annulus exhaust filtration system (KLB): 0.08 mg/gm
- Safeguard Building (SB) exhaust filtration system (KLC): 0.94 mg/gm
- Control room emergency filtration (CREF) subsystem of the main control room air conditioning system (CRACS): 2.0E-06 mg/gm.

These analytical results show that the calculated values are below the maximum charcoal loading for the carbon adsorbers per RG 1.52.

FSAR Impact for Question 06.05.01-1, Part 2:

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

Response to Question 06.05.01-1, Part 4:

The maximum component temperature in the adsorber section with normal air flow during normal operation is 115°F.

The maximum component temperature deep inside the adsorber section with the fan shutdown and the charcoal adsorption unit isolated post-loss of coolant accident (LOCA) is 148°F.

FSAR Impact for Question 06.05.01-1, Part 4:

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

Response to Question 06.05.01-1, Part 5:

Water deluge from a fire protection sprinkler is not used to control adsorber temperature post-LOCA.

The maximum post-accident radioactivity-induced heat is in the KLB. The heat gain (beta plus gamma radiation) is 560 watts over a mission time of 30 days. The maximum localized temperature deep inside the KLB adsorber unit (unit inlet and outlet dampers closed) under conditions of a failed fan post-LOCA with a temperature rise resulting from radioactivity-induced heat in the adsorbent is 148°F with a corresponding maximum bed surface temperature of 126°F (see the Response to Question 06.05.01-1, Part 4). This is well below the 625°F charcoal-ignition temperature referenced in this question.

For fire protection control of the engineered safety feature (ESF) carbon adsorbers in a fan shutdown condition post-LOCA alignment, the adsorber unit is isolated (stop the airflow and close all isolation dampers) to allow the carbon adsorber to cool.

FSAR Impact for Question 06.05.01-1, Part 5:

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

Response to Question 06.05.01-1 (Additional Information Question):

In accordance with RG 1.52, the design of the high efficiency particulate air (HEPA) filters includes the following specification:

> "The efficiency for removal of particulates by the HEPA filter resulting from a design basis accident shall be 99.97/99.95% tested to ASME N510."

The maximum mass loading of the HEPA filters is:

- Annulus exhaust filtration system (KLB): 822 mg
- SB exhaust filtration system (KLC): 631 mg
- Control room emergency filtration (CREF) subsystem of the main control room air conditioning system (CRACS): 0.0070 mg

Each of the ESF carbon filter units will have at least one HEPA filter installed. A single HEPA filter standard size (24" x 24" x 12") is rated for 1,500 cfm of air flow and has a dust loading capacity of 1,140 grams. A clean HEPA filter (rated for 1,500 cfm) has an initial pressure drop of 1.3 inch water gauge. A dirty HEPA filter (with a full dust loading of 1,140 grams) has a pressure drop across the HEPA filter of approximately 3 inch water gauge. The actual dust spot loading of the worst-case ESF adsorber unit (i.e., KLB) is 822 mg. Therefore, the increase in pressure drop between the clean and dirty conditions for the worst case ESF adsorber unit (KLB) is within the normal expected pressure increase for a typical filtered exhaust fan design.

FSAR Impact for Question 06.05.01-1 (Additional Information Question):

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

Question 06.05.03-1:

Per SRP 6.5.3, Acceptance Criteria 2, in order to be classified as a secondary containment for the purpose of fission product control, a structure or structures should completely surround the primary containment, and at least should be held at a pressure of 0.6 cm (0.25 in) (water) below adjacent regions under all wind conditions up to the wind speed at which diffusion becomes great enough to ensure site boundary exposures less than those calculated for the design basis accidents, even if exfiltration occurs.

a. During the DBA LOCA, the AVS ESF accident operation maintains a negative pressure in the annulus and the assumed in-leakage to the annulus is based only on the 0.25% allowable primary containment leakage. What is the allowed secondary containment in-leakage from the safeguards and fuel buildings that surround the shield building?

b. What programs are in place to test for secondary containment in-leakage?

c. What is the applicable mixing fraction to be applied to the annulus area?

d. What is the maximum wind speed at which annulus negative pressure can be maintained?

Response to Question 06.05.03-1, Part d:

The U.S. EPR Shield Building (secondary containment) is a tightly-fitted, axisymmetric, reinforced concrete structure completely surrounding the Reactor Building (primary containment) with no penetrations exposed to the environment. The Shield Building is further surrounded by the Nuclear Island (NI) buildings. Such a structure is not subject to the wind- and buoyancy-driven exchanges with the environment of the kind envisioned by RG 1.183, Regulatory Position 4.3. The NI configuration is shown in U.S. EPR FSAR Tier 2, Figure 1.2-1—3-Dimensional Conceptual Configuration of U.S. EPR Buildings and Figure 1.2-2—U.S. EPR Cutaway.

FSAR Impact for Question 06.05.03-1, Part d:

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