ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Tuesday, February 15, 2011 2:04 PM
To: 'usepr@areva.com'
Cc: Makar, Gregory; Terao, David; Jackson, Christopher; Grady, Anne-Marie; McKirgan, John; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 471 (5387, 5426, 5389), FSAR Ch. 6
Attachments: RAI_471_SPCV_5387_5426_5389.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 26, 2011, and discussed with your staff on February 15, 2011. No change is made to the draft RAI 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: 2556

Mail Envelope Properties (0A64B42AAA8FD4418CE1EB5240A6FED125D22F034D)

Subject: U.S. EPR Design Certification Application RAI No. 471 (5387, 5426, 5389), FSAR Ch. 6
Sent Date: 2/15/2011 2:03:48 PM
Received Date: 2/15/2011 2:03:53 PM
From: Tesfaye, Getachew

Created By: Getachew.Tesfaye@nrc.gov

Recipients:
"Makar, Gregory" <Gregory.Makar@nrc.gov>
Tracking Status: None
"Terao, David" <David.Terao@nrc.gov>
Tracking Status: None
"Jackson, Christopher" <Christopher.Jackson@nrc.gov>
Tracking Status: None
"Grady, Anne-Marie" <Anne-Marie.Grady@nrc.gov>
Tracking Status: None
"McKirgan, John" <John.McKirgan@nrc.gov>
Tracking Status: None
"Carneal, Jason" <Jason.Carneal@nrc.gov>
Tracking Status: None
"Colaccino, Joseph" <Joseph.Colaccino@nrc.gov>
Tracking Status: None
"ArevaEPRDCPEm Resource" <ArevaEPRDCPEm.Resource@nrc.gov>
Tracking Status: None
"'usepr@areva.com'" <usepr@areva.com>
Tracking Status: None

Post Office: HQCLSTR02.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	763	2/15/2011 2:03:53 PM
RAI_471_SPCV_5387_5426_5389.doc	40442	

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

Request for Additional Information No. 471(5387, 5426, 5389), Revision 0

2/15/2011

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.02 - Containment Heat Removal Systems
SRP Section: 06.02.05 - Combustible Gas Control in Containment
Application Section: 6.2

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

06.02.02-84

In RAI 401, Question 06.02.02-58, the staff asked why the debris generation calculations from Microtherm insulation in ANP-10293, did not assume the highest potential alumina and silica contents (25% and 70%, respectively). AREVA explained in its response that the assumed alumina and silica contents were based on chemical analysis of the Microtherm used in the U.S. EPR autoclave testing. Although the Microtherm insulation used in the testing contained these lower percentages of alumina and silica, these lower values do not bound the maximum percentages permitted by the Microtherm specification for debris generation. Discuss plans to revise the debris generation calculations and ANP-10293 by assuming Microtherm contains the highest allowable alumina and silica contents.

06.02.02-85

Figure 2-1 of ANP-10293, Revision 2, accessible in ADAMS ML103200583, depicts the service space drains extending under the water of the IRWST and into a retaining basket (small compartment of the double compartment retaining basket). Additionally, it shows the elevation of the water level and the elevation of the service space being very close.

During blowdown is there sufficient pressure difference between the equipment space and the service space to force water from the IRWST into the service space? The staff notes that GOTHIC calculations by AREVA appear to indicate that the pressure difference is large enough to displace water. If this is the case, provide information on the amount of water that will flood the service space. Describe if the service space is designed to be flooded by borated water. If the service space is designed to be flooded by borated water, provide information regarding the design of the service space in this regard.

Because there is a short weir in the service space, this water may remain borated through the accident. Are the exposed concrete, metal and aluminum in this area assumed to be available to contribute to the chemical and corrosion products in the debris source term for the U.S. EPR?

Is all the water that can transfer between the service space and the IRWST routed into a retaining basket?

Provide an evaluation of the effect on available NPSH to the MHSI and LHSI pumps from the IRWST water loss by reverse flow through the service space drains.

06.02.05-20

POTENTIAL OPEN ITEM

The staff performed confirmatory calculations and sensitivity studies and compared the results to calculations performed by AREVA. The confirmatory calculations generally showed higher hydrogen concentrations in the staff calculation and noted the dominant sensitivity was the efficiency of the PARS. In order for staff to understand the differences between the two analyses, provide the input assumptions for the FSAR figure 19.2-5, including:

a. % PARs effective, and at what efficiency
b. % foils open
c. % dampers open
d. Number of open safety related doors in pressurizer rooms
e. Identify doors credited with being open, other than in pressurizer rooms.
f. Time period in accident scenario when H_2 from MCCI is added to containment

Provide curves for H_2 concentration for all nodes vs. time with 100% of the PARs at 100% efficiency. Provide curves for H_2 concentration for all nodes vs. time with 100% of the PARs at 50% efficiency.

AREVA has provided H_2 concentration curves for sensitivity cases involving PARs in response to RAI 69, Question 6.2.5-1. However, in Figure 6.2.5-1-6, not all nodes were included, and in figure 6.2.5-1-5, for the PARs sensitivity cases, only the global i.e., well mixed concentrations were provided.

06.02.05-21

POTENTIAL OPEN ITEM

A noticeable difference between the MELCOR and MAAP4 models is how and, more importantly, when all the H_2 is released in the analyses. MELCOR models the H_2 release almost completely at the time of actual generation and release during the scenario (rupture disk opening, RV head failure). MAAP4 accounts for the amount of H_2 generated from 100% fuel clad coolant interaction at two different times during the accident- during the actual fuel clad coolant interaction, accounting for ~ 60%, and then “making up the difference” later at the time of MCCI.

Provide the results of modeling the release of H_2 to the containment at the time in the accident scenario when it is likely to be released. Perhaps using similar treatment as that discussed in FSAR section 6.2.5.3.1, where, for the design basis analysis, AREVA assumed the integrated production of H_2 from 1% core oxidation.

Provide curves for H_2 concentration for all nodes vs. time with 100% of the PARs at 100% efficiency. Provide curves for H_2 concentration for all nodes vs. time with 100% of the PARs at 50% efficiency.

06.02.05-22

POTENTIAL OPEN ITEM

Confirm that the MAAP4 analysis used the H_2 production curves provided in the response to RAI 6, Question 19-95h, for both the small and large PARs. If the MAAP4 analysis is based on different production curves, provide the curves used in the analysis.

Revise FSAR Tier 2, Section 6.2.5 to include the curves on which PAR performance is credited. Revise FSAR Tier 1, Section 2.3.1 to add the design H_2 recombination rates to the nominal rates provided in Table 2.3.1-1 –CGCS Equipment Design.

AREVA has committed to revising FSAR Tier 2, Section 6.2.5 to include the performance criteria of components required for severe accidents in response to RAI 410, Question 6.2.5-16. FSAR Tier 2, Section 6.2.5 is where the detailed design of the CGCS is described.

06.02.05-23

POTENTIAL OPEN ITEM

Follow-up to response to RAI 262, Question 19-321, part a, with reference to responses to RAI 1, Question 6.2.1-07c, Table 6.2.1-07-3, and RAI 209, Question 06.02.01-14, Supplement 1:

RAI 262, question 19-321, part a, asked about the failure junctions in the MAAP parameter file and the accident conditions under which each junction might be assumed to open, including loss of offsite power. AREVA responded that access between compartments in containment is provided by doorways, dampers and foils, and that the principal mechanism for opening these closed doors, dampers and foils is by differential pressure.

a. For the doors, which AREVA has identified in response to RAI 1, question 6.2.1-07c, Table 6.2.1-07-3, please indicate which doors, if any, fail open on loss of offsite power.

b. In the AREVA analysis which demonstrates the CGCS performance during bounding severe accident scenarios, identify all doors credited with being open.

c. In the AREVA analysis which demonstrates the CGCS performance during a design basis accident, identify all doors credited with being open.