ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Wednesday, May 05, 2010 3:23 PM
To: 'usepr@areva.com'
Cc: Makar, Gregory; Terao, David; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: Draft - U.S. EPR Design Certification Application RAI No. 401(4685), FSAR Ch. 6
Attachments: Draft RAI_401_CIB1_4685.doc

Attached please find draft RAI No. 401 regarding your application for standard design certification of the U.S. EPR. If you have any question or need clarifications regarding this RAI, please let me know as soon as possible, I will have our technical Staff available to discuss them with you.

Please also review the RAI to ensure that we have not inadvertently included proprietary information. If there are any proprietary information, please let me know within the next ten days. If I do not hear from you within the next ten days, I will assume there are none and will make the draft RAI publicly available.

Thanks,
Getachew Tesfaye
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Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 1385

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Subject: Draft - U.S. EPR Design Certification Application RAI No. 401(4685), FSAR Ch. 6
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Request for Additional Information No. 401(4685), Revision 1

5/5/2010

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

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)

06.02.02-52

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: Please provide the report on the U.S. EPR docket (Rev. 0 and subsequent revisions). The staff has determined this is necessary because it is relying on a detailed review of this report to reach a safety conclusion.

06.02.02-53

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: Please revise the report to include an explanation of why it is conservative to add extra baked and shredded NUKON rather than a combination of untreated and baked/shredded NUKON. Although the quantity of NUKON was greater than planned, the test did not include the organic binder that would have been added with untreated NUKON.

06.02.02-54

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: With respect to the concrete release rates, please discuss how the use of data from pH 8 and 10 is conservative considering the pH with TSP is about 7.4, where the aluminum solubility is at a minimum. Include a revision to the report to explain the approach.

06.02.02-55

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: Describe how the Nukon release rate equation was derived using the data in Appendix B of Reference 6.

06.02.02-56

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: Please verify the correct units for the y-axis in Figure 3-3, the mass release rates vs. time for Nukon at pH 7. Clarify the discussion on the release rate going essentially to zero after about 100 hours. The data indicated that the release rate is constant at some low value rather than zero.

06.02.02-57

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: In the discussion of aluminum corrosion in Section 3.4, clarify the discussion about the role of augelite in the decrease in aluminum corrosion rate. It is not clear to the staff if the augelite was identified based on chemical analysis or theory.

06.02.02-58

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: For microtherm, what were the assumptions regarding the elements other than silica, and the bases for these assumptions? For example, the microtherm contains up to 25% Al_2O_3 according to the material safety data sheet (MSDS), and therefore the most conservative approach would be to assume 25% Al_2O_3. Similarly, it would be most conservative to assume the maximum (70%) amorphous silica. However, the report indicates that only granular and fibrous material is released to the sump.

06.02.02-59

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: Since there is no carbon in microtherm, according to the MSDS, discuss the basis for including carbon as a microtherm constituent in Table 3-4. If the carbon comes from the sample mount and is not actually in microtherm, recalculate the percent by weight of each constituent and show that this increase in percent composition will not affect the amount of precipitate predicted to form.

06.02.02-60

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: Describe how the composition of the precipitate in the autoclave tests was determined ($CaHPO_4$, $NaAlSiO_8$, Ti).

06.02.02-61

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: If the OLI model under-predicted the weight loss for a material, was the model prediction adjusted accordingly? If the model was not adjusted, what is the technical justification for using it despite the non-conservative prediction?

06.02.02-62

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: Please discuss the basis for turning off the aluminum precipitation to compare measured vs. predicted aluminum. This practice suggests a potential error in the model, since there would be a small but finite quantity of dissolved aluminum in the solution.

06.02.02-63

Regarding Report 32-7002848-000, “Sump Chemistry Modeling for US-EPR,” Rev. 0, February 4, 2010: Please provide a more detailed explanation of what happened to the

calcium-containing precipitates. There was a large disparity between what was predicted and what was detected through chemical analysis of solids. Therefore, it appears that the conclusion that the model is conservative was based mainly on calcium phosphate believed to be present but not positively identified.

06.02.02-64

Regarding Report 32-7002848-000, "Sump Chemistry Modeling for US-EPR," Rev. 0, February 4, 2010: Please clarify how the predicted and measured corrosion rate of aluminum was evaluated using the published literature and test data. The release rate is not zero; rather, the release is in equilibrium with precipitation. Although assumed to be negligible, there is no supporting justification. Please provide a calculation to justify this assumption.

06.02.02-65

Regarding Report 32-7002848-000, "Sump Chemistry Modeling for US-EPR," Rev. 0, February 4, 2010: Two of the four cases for the concrete surface are based on piping 5 feet above the floor. How far above the floor is the piping in the other two cases? What is the justification for using the piping 5 feet above the floor as the basis for exposed concrete area?

06.02.02-66

Regarding Report 32-7002848-000, "Sump Chemistry Modeling for US-EPR," Rev. 0, February 4, 2010: Please provide the following information about Table 6-3, the amounts of elements and solids released fro 2018 ft2 of exposed concrete:

1. In Table 6-3 (Elements and Solids Released), the temperature is less than 200°F until about 1.5 hours. Please discuss whether these temperatures were used for calculating solubility leaching and aluminum corrosion rates and how this affects the conservatism of the analysis.
2. During the blowdown phase of the RCS the pH is about 4.5, which means aluminum may corrode at a relatively fast rate for the short period of time when TSP has not yet dissolved and sprayed into the containment. The aluminum corrosion rate at pH 4.5 has not been modeled into the determination of final aluminum concentration in solution. Therefore, provide additional calculations that show the concentration of aluminum when this lower pH value is factored into the final concentration.

06.02.02-67

Regarding report 51-7003241-001, "Chemical Validation Testing Final Report," Rev. 1, March 12, 2010: Provide the report on the U.S. EPR docket (Rev. 1 and subsequent revisions). The staff has determined this is necessary because it is relying on a detailed review of this report to reach a safety conclusion.

06.02.02-68

Regarding report 51-7003241-001, “Chemical Validation Testing Final Report,” Rev. 1, March 12, 2010: Address the error message in Section 4.3 on page 21 where Reference 5 was deleted. The text reads, “……are documented in Reference Error! Bookmark not defined.”

06.02.02-69

Regarding report 51-7003241-001, “Chemical Validation Testing Final Report,” Rev. 1, March 12, 2010: Please discuss the reason for deleting the reference to the XRD results and full SEM/EDS investigation in Section 4.3.