ArevaEPRDCPEm Resource

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Sent: Thursday, November 19, 2009 5:14 PM
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Subject: U.S. EPR Design Certification Application RAI No. 323 (3903), FSAR Ch. 6
Attachments: RAI_323_SPCV_3903.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 30, 2009, and discussed with your staff on November 19, 2009. Drat RAI Questions 06.02.05-7, 06.02.05-8, 06.02.05-11, and 06.02.05-12 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,
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Hearing Identifier: AREVA_EPR_DC_RAIs
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U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.05 - Combustible Gas Control in Containment
Application Section: 6.2.5

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

06.02.05-7

This question is a follow-up to an October 7 and 8, 2009 audit on documentation relevant to passive autocatalytic recombiners (PARs). Confirm that the PARs described in FSAR Table 6.2.5-1 are 41 large PARs with a recombination rate of 11.8 lbm/hr, and 6 small PARs, with a recombination rate of 2.6 lbm/hr. Confirm that the large and small PARs identified on FSAR Figure 6.2.5-9 represent the recombiner rates above. In FSAR Tier 1, Table 2.3.1-1, CGCS Equipment Design, the PAR individual equipment numbers and locations are provided. Confirm that the 47 PARs are identified by the equipment numbers 30JMT10AT001-047. Indicate in Table 2.3.1-1 which are the 6 small PARs.

06.02.05-8

In response to RAI no. 69, Question 06.02.05-1, which asked the applicant to show that the assumed performance of PARs is verified by experimental evidence; consider the impact of possible poisons on PAR performance, and; discuss the time response on PAR efficiency, AREVA responded:

"EPRI Technical Report, TR-107517, “Generic Tests of Passive Autocatalytic Recombiners (PARs) for Combustible Gas Control in Nuclear Power Plants,” provides experimental evidence on the PAR performance, impact of possible containment conditions, and time response of the PARs. This experimental data is applicable to the U.S. EPR."

On 7 Oct 2009 the NRC staff audited EPRI TR-107517, volumes 1 and 3. Volume 1 is a general overview of the PAR tests at the KALI H2 facility and volume 3 presents the test results for FR90/1-150 PARs. The KALI program focused primarily on a range of hydrogen concentrations, initial ambient gas temperatures and pressures, steam and nitrogen as inert gases, and the effects of dome spray and direct spray on PAR start-up. The effect of fumes from an electric cable insulation burn was also evaluated. However, potential poisons on PAR performance during a severe accident, such as Iodine, Tellurium, Cesium, Antimony and other fission products were not evaluated in these PAR tests. Show how these potential poisons affect PAR performance. Identify experimental tests and provide test results.

06.02.05-9

This question is a follow-up to an October 7 and 8, 2009 audit on documentation relevant to passive autocatalytic recombiners (PARs). Coking occurs when elemental carbon in carbon-bearing gases is deposited on the surface of a catalyst, blocking the reaction of the recombinants. The sources in a reactor containment severe accident are: (1) molten core/concrete interaction (MCCI) and (2) a fire, in particular the smoke and soot from electrical cable fires

Identify all sources of elemental carbon produced as a result of the (MCCI) during and after a severe accident. Address the potential to "poison" the catalyst in the PARs. Identify experimental tests and provide test results.

06.02.05-10

This question is a follow-up to an October 7 and 8, 2009 audit on documentation relevant to passive autocatalytic recombiners (PARs).

DCA Tier 2, Table 6.2.5-1, CGCS Design and Performance Parameters, indicates that the catalyst on both the small and the large PARs is a Pt / Pd substrate. The chemistry definition of a substrate is the reactant which is consumed during a catalytic or enzymatic reaction. For these PARs, is either the platinum or the palladium the substrate? Discuss the consumption of this substrate on the performance of the PARs. If the substrate were completely consumed, what would be the effect on the catalysts and on the PAR performance?

06.02.05-11

This question is a follow-up to an October 7 and 8, 2009 audit on documentation relevant to passive autocatalytic recombiners (PARs).

EPRI TR-107517, vol. 3 documented the results of test showing that FR90/1-150 PARs when subjected to simulated containment spray did not begin recombination for ~4.5 hours and when subjected to direct spray did not begin recombination for ~ 14.5 hours. The same PAR under dry conditions started recombination almost instantaneously, and a wet PAR with a hydroscopic coating started recombination in ~ 10 minutes. Do the PARs in the US EPR design have a hydroscopic coating?

For a severe accident, the initiation of the containment spray function of the SAHRS would likely disable the PARs for ~ 4.5 hours. Has this been reflected in the chapter 19 analyses for H_2 concentration in containment? In the case of a direct spray impinging on the PAR, have the PARs likely to be affected by a high pressure line break been modeled as disabled for the ~ 14.5 hours the PARs would not be functioning?

Demineralized water was used for the spray tests. What effect on PAR performance would the borated water in the IRWST containing trisodium phosphate, HNO_3 from the radiolysis of water, and HCl from the radiolysis of the PVC and Hypalon jackets on the electrical cables following a severe accident have? Discuss these results. Identify any experimental tests and provide the test results.

06.02.05-12

This question is a follow-up to an October 7 and 8, 2009 audit on documentation relevant to passive autocatalytic recombiners (PARs). EPRI TR-107517, vol. 3 documented the results of test showing that FR90/1-150 PARs when subjected to concentrations of H_2 greater than 7% ignited and burned. Discuss the functionality of the PARs after H_2 ignition and deflagration. Identify experimental tests and provide test results.

06.02.05-13

This question is a follow-up to an October 7 and 8, 2009 audit on documentation relevant to passive autocatalytic recombiners (PARs). Discuss the effects of the operating environment in containment on the performance of the PARs. Address the effects of radiation, operational vibrations, welding fumes and solvent fumes.

06.02.05-14

This question is a follow-up to an October 7 and 8, 2009 audit on documentation relevant to passive autocatalytic recombiners (PARs). Discuss the effects of seismic vibrations and aerosol exposure during and following a design basis accident.