ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Wednesday, October 21, 2009 6:48 PM
To: 'usepr@areva.com'
Cc: Kang, Peter; Jenkins, Ronaldo; Patel, Jay; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: Draft - U.S. EPR Design Certification Application RAI No. 317 (3741), FSAR Ch. 3
Attachments: Draft RAI_317_EEB_3741.doc

Attached please find draft RAI No. 317 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
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
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Created By: Getachew.Tesfaye@nrc.gov

Recipients:
"Kang, Peter" <Peter.Kang@nrc.gov>
Tracking Status: None
"Jenkins, Ronaldo" <Ronaldo.Jenkins@nrc.gov>
Tracking Status: None
"Patel, Jay" <Jay.Patel@nrc.gov>
Tracking Status: None
"Miernicki, Michael" <Michael.Miernicki@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

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Request for Additional Information No. 317 (3741), Revision 0

10/21/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.11 - Environmental Qualification of Mechanical and Electrical Equipment
Application Section: 3.11

QUESTIONS for Electrical Engineering Branch (EEB)

03.11-15

In RAI 135, Question 9.4.5-1 Supplement 1 response, the applicant has proposed to delete the main control room (MCR) air conditioning system humidity design parameter in Section 9.4.1.1. The humidity range in MCR is currently shown between 40 to 60 % on Table 3D-4 of Appendix 3D of Section 3.11, FSAR Tier 2. With such a deletion, the humidity level could go up to 100% which could expect to form condensations to the I&C equipment. The staff is concerned operability of I&C equipment in MCR with such a condensation and precipitation, if the humidity level reaches to 100%. As an equipment qualification (per 10 CFR 50.49), Section 4.3.6 of EPRI TR-107330 document indicated that the humidity level of the programmable logic controller (PLC) be between 40 to 95% (non-condensing) for normal and abnormal environmental basic requirements. Subsequent staff's evaluation (EMF-2110, Rev 1 dated May 2000) on Teleperm TXS also indicated the tested humidity level to be 93%. Explain why a potential humidity level of 100% in MCR would not damage any I&C equipment, or provide basis for the proposed deletion of humidity design parameter for the U.S. EPR."

03.11-16

Section 3D.6.2 (Analysis) states that "Analysis can be used to demonstrate that equipment suffers no appreciable change in its ability to perform because of the environmental conditions associated with high stress events at any time in its QL." It is not clear whether analysis alone can be used to demonstrate qualification. The bases for analysis typically include physical laws of nature, results of test data, operating experience and condition indicators. Revise Section 3D.6.2 to clarify that analysis with type test data for material properties, equipment rating, and environmental tolerances be used to demonstrate qualification.

03.11-17

Section 3D.6.2.1 (Similarity) of Appendix 3D of the U.S. EPR FSAR, Tier 2 states, "If the QL of one module can be established, then modules of similar types will have an equivalent QL if modules have similar failure mechanisms." The section then delineates the attributes that are to be compared to define and establish similarity under the EQ program. These attributes are "type of technology used to design and manufacture the module," "type of critical components," "packaging, mounting and type of connections,"

"service conditions," and "safety functions." However, these attributes are not sufficient to establish similarity in terms of durability and satisfactory application-specific performance in a harsh environment at end-of-life conditions. The reason is that they lack consideration of material properties that determine the critical materials' durability, aging characteristics, and application-specific harsh environment performance in end-of-life condition. Thus, considering only similar failure mechanisms is not sufficient when using similarity analysis for qualified life comparison. Revise Section 3D.6.2.1 to include consideration of key material properties and aging characteristics (e.g., application/failure mode-specific activation energy) that can affect accelerated aging equivalent degradation and end-of-life harsh environment durability and performance.

03.11-18

Section 3D.6.2.2 (Substitution) of Appendix 3D of the U.S. EPR FSAR, Tier 2 states "Substitution of parts or materials is acceptable if a comparison or analysis of their fit, form and function supports the conclusion that the equipment performance is equal to or better than the originally qualified equipment." This approach as stated contains some of the necessary elements, i.e., form, fit and function. However, those elements alone are not sufficient because they do not take materials or manufacturing process into account, both of which have the most significant effect on equipment performance in a harsh environment, especially prolonged exposure to elevated temperatures, moisture and radiation. Revise Section 3D.6.2.2 to reflect analysis of substitute parts or materials that takes the material properties required in a harsh environment and manufacturing processes that could affect equipment performance in a harsh environment into account, or using partial test data (or applicable operating experience data) to support the analyses as required by 10 CFR 50.49(f) when analysis is used in combination with other methods for qualification.