

KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Monday, August 31, 2015 12:34 PM
To: apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Steven Mannon
Cc: Ashley, Clinton; Betancourt, Luis; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 184-8209 (03.11 - Environmental Qualification of Mechanical and Electrical Equipment)
Attachments: APR1400 DC RAI 184 EEB 8209.pdf; image001.jpg

KHNP,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, KHNP requests, and we grant, 60 days, 30 days, 60 days, and 30 days, respectively, to respond to these RAI questions. We may adjust the schedule accordingly.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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REQUEST FOR ADDITIONAL INFORMATION 184-8209

Issue Date: 08/31/2015

Application Title: APR1400 Design Certification Review – 52-046

Operating Company: Korea Hydro & Nuclear Power Co. Ltd.

Docket No. 52-046

Review Section: 03.11 - Environmental Qualification of Mechanical and Electrical Equipment

Application Section:

QUESTIONS

03.11-12

In DCD Tier 2, Revision 0, Section 3.11.1.3, "Equipment Operability Times" provides a description of the operational time during which the equipment is required to operate in the accident environment. Operational times are defined as continuous, short-term, intermittent, and varies. Short-term operational time is defined as the "component is required to operate one time during the design basis accident (i.e., approximately a few seconds up to a few hours depending on the component and the event). This definition it is not clear as to how this operational times of short-term equipment will be determined component wise. Please clarify with example. It is essential that safety-related electric equipment be qualified to demonstrate that it can perform its safety function under the environmental service conditions in which it will be required to function and for the length of time its function is required. Also discuss how the applicant determines that the margin applied to the minimum operability time, when combined with the other test margins, will account for the uncertainties associated with the use of analytical techniques in the derivation of environmental parameters, as per RG 1.89 (C.4).

03.11-13

In DCD Tier 2, Revision 0, Section 3.11.2.3, "Environmental Qualification Method," talks about synergistic effects. Sub-section a. "Qualification by test," states that "Synergistic effects are considered in the aging program where synergistic effects have been identified on materials that are included in the equipment being qualified." It is also mentioned in the same Section 3.11.2.3, that "synergistic effects are evaluated to verify that these effects do not adversely affect the qualification of the mechanical, electrical, and I&C equipment, as required in accordance with 10 CFR 50.49(e)(7)." Describe briefly how the applicant will consider synergistic effects with respect to harsh environmental conditions in the qualification for electrical, mechanical, and I&C equipment which will be qualified under 10 CFR 50.49.

03.11-14

In DCD Tier 2, Revision 0, Table 3.11-3, "Equipment Qualification Equipment List" identifies the equipment within the plant that will be subject to the equipment qualification program. The same equipment list is in table 3 of the Equipment Qualification Program (APR1400-E-X-NR-14001-P, Rev. 0).

- 1) Provide the safety classification of the equipment, such as safety-related (Class 1E), non-safety-related supporting safety-related, and Post Accident Monitoring as described in 10 CFR 50.49 (b).
- 2) Provide the equipment designated function so that it is identified to mark specific functions such as Reactor trip (RT), Engineered Safeguards (ESF), or Post Accident Monitoring (PAM).
- 3) Provide EQ program designation, that identifies each equipment qualified for: such as electrical EQ, mechanical EQ, radiation, consumables, seismic, and for electromagnetic compatibility (EMC) depending on the environment it belongs to.

REQUEST FOR ADDITIONAL INFORMATION 184-8209

03.11-15

In DCD Tier 2, Revision 0, Section 3.11.2.3, "Environmental Qualification Method," subsection b, "Qualification by analysis" states, "If qualification documentation for other equipment is available, it is reviewed to determine if the qualified equipment is similar to that being procured." Subsection c, "Qualification by operating experience," also states this qualification method will be performed "similar equipment with a successful operating history in a service environment equal to or more severe than the environment for the equipment in question." However, it is not defined in this chapter or the equipment qualification program, APR1400-E-X-NR-14001-P, Rev. 0, what are the attributes that are to be compared to define and establish similarity under the EQ program. 10 CFR 50.49 (f) (2) and (3) states that each electrical equipment important to safety must be qualified by Testing a similar item of equipment or by experience with identical or similar equipment under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable. Provide a discussion on the determination of a qualified equipment and the process of qualifying it, when analyses are done by means of "Similarity". Provide the definition in the DCD.

