ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Thursday, March 18, 2010 1:48 PM
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Cc: Li, Yong; Cook, Christopher; Hammer, Charles; Terao, David; Patel, Jay; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: Draft - U.S. EPR Design Certification Application RAI No. 381 (4421,4529), FSAR Ch. 3 OPEN ITEM
Attachments: Draft RAI_381_RGS2_4421_CIB1_4529.doc

Attached please find draft RAI No. 381 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,
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Request for Additional Information No. 381(4421, 4529), Revision 1

3/18/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.07.04 - Seismic Instrumentation
SRP Section: 03.09.06 - Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints

Application Section: FSAR Chapter 3

QUESTIONS for Geosciences and Geotechnical Engineering Branch 2 (RGS2)
QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)

03.07.04-6

OPEN ITEM

U.S. EPR FSAR Section 3.7.4.2.1 indicates that field mounted sensors of the triaxial type (i.e., three directional, x-y-z axes) are rigidly mounted at the following locations:

1. Free field, if a suitable location is available.

2. The primary containment structure (base foundation and two higher elevations).

3. An independent Seismic Category I structure (foundation and higher elevations) not influenced by or connected to the primary containment structure.

The FSAR further states that the in-structure instrumentation is placed at locations modeled as mass points in the building dynamic analysis so that the measured motion can be directly compared with the design spectra. In addition, the FSAR refers to the Cumulative Absolute Velocity (CAV) cited in RG 1.166 as an alternative criterion to shutdown an US EPR plant.

However, RG 1.12 specifies that a seismic instrument be located in the free-field and RG 1.166 states that the evaluation to determine whether the OBE has been exceeded should be performed using the ground motion recorded from a free-field instrument. As such, the staff asks the applicant to

1. clarify the criteria for a “suitable location” for installing a free field seismic sensor,
2. justify how the OBE exceedance will be determined by seismic instrument installed on structures and,

3. explain if CAV threshold of shutdown is still applicable if there is no free field sensor available (no suitable location).

03.09.06-15

OPEN ITEM

FSAR Tier 2, Sections 3.9.3.3 and 3.9.3.4 state that FSAR Tier 2, Section 3.9.6 provides a description of the functional design and qualification provisions for pumps, valves, and snubbers. While FSAR Tier 2, Section 3.9.6.1 states that the "functional design and qualification of each safety-related pump and valve is performed such that each pump and valve is capable of performing its intended function for a full range of system differential pressure and flow, ambient temperatures, and available voltage (as applicable) under conditions ranging from normal operating to design-basis accident conditions," this FSAR section focuses on IST rather than functional design and qualification. As discussed below, the staff has determined that the current provisions in FSAR Tier 2, Section 3.9.3.3, 3.9.3.4, and Section 3.9.6 are not sufficient to adequately describe a program that will provide reasonable assurance of the design-basis capability of pump, valves, and dynamic restraints for the U.S. EPR.

As documented in numerous NRC generic communication issuances, weaknesses in the design programs for plant components used at operating nuclear power plants have resulted in situations in which valves might not have been able to perform their safety-related functions under design-basis conditions. As a result of the lessons learned from nuclear power plant operating experience and NRC and industry research programs, the staff has provided guidance related to the functional design of safety-related pumps, valves, and dynamic restraints in SRP Section 3.9.6; RG 1.206, and RG 1.100. One lesson learned from nuclear power plant operating experience and research programs is that the IST provisions of the ASME OM Code alone do not adequately provide assurance of the design-basis capability of safety-related valves.

In RAI 49, Question 03.09.06-1, the staff requested that the Design Certification applicant describe its plans to provide assurance of the design-basis capability of pumps, valves, and dynamic restraints for the U.S. EPR design.

In a June 11, 2009, Supplement 2 response to RAI 49, Question 03.09.06-1, the applicant indicated that it intended to use ASME QME-1-2007, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants," as guidance for qualifying active mechanical equipment. However, the applicant did not provide an FSAR markup indicating that it would follow all of the provisions of ASME QME-1-2007, nor are the current provisions in the U.S. EPR FSAR Tier 2 for design testing in Sections 3.9.3 and 3.9.6 sufficient to allow the staff to evaluate the process for the functional design and qualification to ensure the systematic review and documentation of the design basis for safety-related pumps, valves, and snubbers. For example, the design process should include consideration of the maximum differential pressure and flow rate expected during operation of the component for both normal operations and abnormal events, to the extent that these operations and events are part of the design basis. One acceptable method for providing assurance that active mechanical equipment (such as pumps, valves, and dynamic restraints) will meet their design-basis functional capability is specified in ASME QME-1-2007, as accepted by the staff in Revision 3 to RG 1.100. Therefore, in follow-up RAI 49, Question 03.09.06-15, the staff requests that the applicant revise the U.S. EPR FSAR to adequately describe the functional design and qualification process for pumps, valves, and dynamic restraints (or specify implementation of QME-1-2007 as accepted in Revision 3 to RG 1.100), with examples of the implementation of the FSAR provisions in the design specifications made available for NRC audit.

03.09.06-16

OPEN ITEM

FSAR Tier 2, Section 3.9.6.1 indicates that the IST program provides for pump and valve testing over the full range of system differential pressures, flow-rates, temperatures, and available voltages (as applicable) from normal operating to design-basis conditions and considers degraded flow that may occur during post-accident conditions. The staff was unable to confirm that safety-related systems were provided with full-flow test capabilities on design drawings. This was the subject of RAI 49, Question 03.09.06-3. In a June 11, 2009, Supplement 2 response to RAI 49, Question 03.09.06-3, the applicant explained how each safety-related pump was capable of being tested at the accident assumed flow rates. In regard to safety-related valves, the applicant referred to the test procedures, acceptance criteria, and corrective actions specified in the ASME OM Code. As discussed above, the ASME OM Code inservice test alone cannot be used to demonstrate the design-basis capability of safety-related valves. Therefore, in follow-up RAI 49, Question 03.09.06-16, the staff requests that the applicant revise the U.S. EPR FSAR to describe the testing and/or analysis performed to demonstrate the design-basis capability of safety-related valves.

03.09.06-17

OPEN ITEM

Based on its review, the staff does not consider the applicant to have fully described the IST program for POVs, other than MOVs, for the U.S. EPR. In particular, the applicant has not described how the POV testing program for the U.S. EPR compares to the JOG AOV Program, how POV functional margin and test frequencies will be determined, and how static or dynamic tests (or both) will be performed to confirm operability and develop the basis for future testing for POVs. Therefore, in follow-up RAI XXX, Question 03.09.06-17, the staff requests that the applicant revise the U.S. EPR FSAR to (1) reference the NRC comments on the JOG AOV program contained in the NRC letter to the Nuclear Energy Institute (NEI), October 8, 1999, and (2) incorporate into the FSAR additional attributes of a successful POV design capability and long-term periodic verification program as listed in Regulatory Issue Summary (RIS) 2000-3. The following program attributes should be included in the description of the IST program for POVs:

1. Valves will be categorized according to their safety significance and risk ranking.

2. Post-maintenance procedures will include appropriate instructions and criteria to ensure baseline testing is re-performed as necessary when maintenance on a valve, valve repair, or replacement has the potential to affect valve functional performance.

3. Procedures and training specific to the AOV program will address lessons learned from other valve programs and documentation from AOV testing, and maintenance records and records from the corrective action program will be retained and periodically evaluated as part of the AOV program.

Finally, the U.S. EPR FSAR should indicate that the attributes of the AOV testing program described above, to the extent that they apply to and can be implemented with respect to other safety-related POVs will be applied to those other POVs.