KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Monday, November 09, 2015 8:40 AM
To: apr1400rai@khnp.co.kr; Harry (Hyun Seung) Chang; KHNPDCDRAIsPEm Resource; Andy Jiyong Oh; James Ross
Cc: Scarbrough, Thomas; Clark, Theresa; Steckel, James; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 297-8309 (19.03 Beyond Design Basis External Event (APR1400))
Attachments: APR1400 DC RAI 297 MEB 8309.pdf

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, the following response time for the RAI questions. We may adjust the schedule accordingly.

19.03 Beyond Design Basis External Event (APR1400)-1: 60 days
19.03 Beyond Design Basis External Event (APR1400)-2: 60 days
19.03 Beyond Design Basis External Event (APR1400)-3: 60 days
19.03 Beyond Design Basis External Event (APR1400)-4: 60 days
19.03 Beyond Design Basis External Event (APR1400)-5: 30 days
19.03 Beyond Design Basis External Event (APR1400)-6: 30 days
19.03 Beyond Design Basis External Event (APR1400)-7: 30 days
19.03 Beyond Design Basis External Event (APR1400)-8: 30 days

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

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REQUEST FOR ADDITIONAL INFORMATION 297-8309

Issue Date: 11/09/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 19.03 Beyond Design Basis External Event (APR1400)
Application Section: 19.3

QUESTIONS

19.03 Beyond Design Basis External Event (APR1400)-1

NRC Commission paper SECY-12-0025 (February 17, 2012), "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," stated that the NRC staff expected new reactor design certification or license applications (e.g., construction permit, operating license, and combined license) not yet then-submitted to address the Commission-approved Fukushima actions in their applications, prior to submittal, to the fullest extent practicable. In SECY-12-0025, the NRC staff outlined a three-phase approach regarding mitigation strategies to respond to beyond-design-basis external events (BDBEEs). The initial phase involved the use of installed equipment and resources to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling without alternating current power. The transition phase involved providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase involved obtaining sufficient offsite resources to sustain those functions indefinitely.

The NRC staff provided guidance for satisfying the Commission directives regarding BDBEE mitigation strategies in Japan Lesson-Learned Project Directorate (JLD)-ISG-2012-01, Revision 0, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," (ADAMS Accession No. ML12229A174). JLD-ISG-2012-01 endorsed with clarification the methodologies described in the industry guidance document Nuclear Energy Institute (NEI) 12–06, Revision 0, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (ADAMS Accession No. ML12242A378). The guidance in JLD-ISG-2012-01 describes one acceptable approach for satisfying the Commission directives regarding BDBEE mitigation strategies.

APR1400 DCD Tier 2, Section 19.3, "Beyond Design Basis External Event," describes the mitigation strategies to manage and mitigate external events that are beyond the design basis of the APR1400 nuclear power plant. This section in the DCD addresses the conformance of the APR1400 design with SECY-12-0025 and Commission Order EA-12-049, and other related documents.

The NRC staff requests that the APR1400 design certification applicant describe the performance requirements as part of the mitigation strategies (including initial full-power operation and mid-loop operation) to ensure core cooling, containment function, and spent fuel pool cooling capabilities during a BDBEE at an APR1400 nuclear power plant as follows:

a) All safety-related installed pumps, valves, and dynamic restraints that will be used at the APR1400 plant as part of the mitigation strategies for an extended loss of ac power event;
b) All nonsafety-related installed pumps, valves, and dynamic restraints that will be used at the APR1400 plant as part of the mitigation strategies for an extended loss of ac power event; and
c) All portable or FLEX flow systems (including pumps, valves, and dynamic restraints) that will be used at the APR1400 plant as part of the mitigation strategies for an extended loss of ac power event.

19.03 Beyond Design Basis External Event (APR1400)-2

The NRC staff requests that the APR1400 design certification applicant describe the provisions for design, manufacture, testing, installation, and surveillance to provide assurance of the seismic, environmental, and functional capability of all safety-related installed pumps, valves, and dynamic restraints to perform their intended functions as part of the mitigation strategies (including initial full-power operation and mid-loop operation) to ensure core cooling, containment function, and spent fuel pool cooling capabilities during an extended loss of ac power event at an APR1400 nuclear power plant. As part of this request, the applicant should indicate whether any safety-related pumps, valves, and dynamic restraints used as part of the mitigation strategies for an extended loss of ac power event will have performance requirements that exceed their original safety-related design and performance specification (such as pumps used with reduced net positive suction head available, and safety or

relief valves used to support feed and bleed conditions). In addition, the applicant should indicate where the APR1400 DCD Tier 2 specifies the provisions for the design, manufacture, testing, installation, and surveillance for the safety-related pumps, valves, and dynamic restraints that perform functions as part of the mitigation strategies, or provide proposed modifications to the APR1400 DCD Tier 2 to incorporate these provisions.

19.03 Beyond Design Basis External Event (APR1400)-3

The NRC staff requests that the APR1400 design certification applicant describe the provisions for design, manufacture, testing, installation, and surveillance to provide assurance of the seismic, environmental, and functional capability of all nonsafety-related installed pumps, valves, and dynamic restraints to perform their intended functions as part of the mitigation strategies (including initial full-power operation and mid-loop operation) to ensure core cooling, containment function, and spent fuel pool cooling capabilities during an extended loss of ac power event at an APR1400 nuclear power plant. In addition, the applicant should indicate where the APR1400 DCD Tier 2 specifies the provisions for the design, manufacture, testing, installation, and surveillance for the nonsafety-related installed pumps, valves, and dynamic restraints that perform functions as part of the mitigation strategies, or provide proposed modifications to the APR1400 DCD Tier 2 to incorporate these provisions.

19.03 Beyond Design Basis External Event (APR1400)-4

The NRC staff requests that the APR1400 design certification applicant describe the provisions for design, manufacture, testing, installation, and surveillance to provide assurance of the seismic, environmental, and functional capability of all portable or FLEX flow systems (including pumps, valves, and dynamic restraints) that are part of the mitigation strategies (including initial full-power operation and mid-loop operation) to ensure core cooling, containment function, and spent fuel pool cooling capabilities during an extended loss of ac power event at an APR1400 nuclear power plant. For example, APR1400-E-P-NR-14005-P, “Evaluations and Design Enhancements to Incorporate Lessons Learned from the Fukushima Dai-Ichi Nuclear Accident,” Revision 0, December 2014, referenced in APR1400 DCD Tier 2, Section 19.3, indicates in several subsections that FLEX pumps have a “robust design,” without explanation of their design, manufacture, testing, installation, and surveillance provisions. The applicant should indicate where the APR1400 DCD Tier 2 specifies the provisions for the design, manufacture, testing, installation, and surveillance for portable or FLEX pumps, valves, and dynamic restraints that perform functions as part of the mitigation strategies, or provide proposed modifications to the APR1400 DCD Tier 2 to incorporate these provisions.

19.03 Beyond Design Basis External Event (APR1400)-5

The NRC staff requests that the APR1400 design certification applicant provide a description of the operational programs that will provide assurance of the functional capability of the pumps, valves, and dynamic restraints used in the mitigation strategies for ensuring core cooling, containment function, and spent fuel pool cooling capabilities during an extended loss of ac power event at an APR1400 nuclear power plant.

19.03 Beyond Design Basis External Event (APR1400)-6

The NRC staff requests that the APR1400 design certification applicant establish a Combined License (COL) item for a COL applicant to propose a License Condition to verify the development and implementation of the guidance, strategies, and programs for the mitigation strategies for ensuring core cooling, containment function, and spent fuel pool cooling capabilities during an extended loss of ac power event at an APR1400 nuclear power plant. The staff requests that the APR1400 design certification applicant provide a model license condition in the APR1400 DCD with key elements for the implementation of mitigation strategies for extended loss of ac power events, such as found in other design certification and COL applications with the applicable NRC safety evaluations.

19.03 Beyond Design Basis External Event (APR1400)-7

Section 19.3.5, “References,” in APR1400 DCD Tier 2 includes APR1400-E-P-NR-14005-P, “Evaluations and Design Enhancements to Incorporate Lessons Learned from the Fukushima Dai-Ichi Nuclear Accident,” Revision 0, December 2014. Section 19.3.1, “Introduction,” in APR1400 DCD Tier 2 states that APR1400-E-P-NR-14005-P provides specific details for addressing the NRC’s Tier 1, 2, and 3 Near-Term Task Force (NTTF) items in response to the Fukushima accident. Other subsections in Section 19.3 reference APR1400-E-P-NR-14005-P in supporting the mitigation strategies. The NRC staff requests that the APR1400 design certification applicant specify whether the APR1400 DCD “incorporates by reference” APR1400-E-P-NR-14005-P for implementation of its provisions as requirements under the APR1400 design certification, or references APR1400-E-P-NR-14005-P as general guidance for use by COL applicants on a voluntary basis. The staff requests that APR1400 design certification applicant revise the DCD as necessary to clarify the intent regarding the reference to APR1400-E-P-NR-14005-P.

19.03 Beyond Design Basis External Event (APR1400)-8

Section 19.3.2.3.1.1, “Full-Power Operation,” in APR1400 DCD Tier 2 on page 19.3-5 refers to “boric acid storage tanks” when describing the basic operational strategy for core cooling during a loss of ac power following full-power operation. Table 5A-3, “Low-Pressure Equipment of the CVCS,” in Chapter 5, “Reactor Coolant System and Connecting Systems,” in APR1400 DCD Tier 2 lists only one boric acid storage tank. The NRC staff requests that the APR1400 design certification applicant clarify the DCD regarding the number of boric acid storage tanks in the APR1400 design.


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