

KHNPDCDRAIsPEm Resource

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Subject: APR1400 Design Certification Application RAI 69-7994 (03.09.06 - Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints)
Attachments: image001.jpg; APR1400 DC RAI 69 MEB 7994.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, 45 days to respond to this RAI. 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 69-7994

Issue Date: 07/14/2015

Application Title: APR1400 Design Certification Review – 52-046

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

Docket No. 52-046

Review Section: 03.09.06 - Functional Design Qualification and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints

Application Section:

QUESTIONS

03.09.06-1

Section 3.9.6.1, "Functional Design and Qualification for Pumps, Valves, and Dynamic Restraints," of the APR1400 Design Control Document (DCD) Tier 2 specifies that functional design and qualification of safety-related pumps, valves, and dynamic restraints are performed in accordance with ASME Standard QME-1, "Qualification of Active Mechanical Equipment Used in Nuclear Power Plants," as endorsed by NRC Regulatory Guide (RG) 1.100, "Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants." NRC Standard Review Plan (SRP) Section 3.9.6 (Revision 3, March 2007), "Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints," specifies in its acceptance criteria that functional design and qualification of each safety-related pump and valve should be accomplished 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 all conditions ranging from normal operating to design-basis accident conditions. Based on operating experience with the performance of nuclear power plant components, the NRC staff requests that the APR1400 design certification applicant specify in the DCD that the functional design and qualification of pumps, valves, and dynamic restraints will be implemented in accordance with ASME QME-1-2007 as accepted in Revision 3 (or later revision) to RG 1.100 unless specific approval for a modification to that methodology is provided by the NRC. For example, this could be accomplished by specifying the functional design and qualification of pumps, valves, and dynamic restraints as a Tier 1 or Tier 2* requirement with long-term provisions during plant operation, or by specifying that the functional design and qualification methodology for pumps, valves, and dynamic restraints may not be modified under the change control provisions of the design certification rule unless NRC prior approval is obtained. This level of change control is consistent with other certified designs, for which this information has been categorized as Tier 2*.

03.09.06-2

NRC Commission Paper SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria [ITAAC]," and NRC Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," indicate that Combined License (COL) applicants should provide a full description of their operational programs (including preservice testing [PST], inservice testing [IST], and motor-operated valve [MOV] testing) to avoid the need for ITAAC for those programs. Some COL applicants incorporate in their final safety analysis report (FSAR) the description of these programs provided in the design control document (DCD) for their applicable certified design. Therefore, the NRC staff requests that the APR1400 design certification applicant clarify whether Section 3.9.6 in the APR1400 DCD Tier 2 is intended to provide a full description of the IST (including PST and MOV testing) program for pumps, valves, and dynamic restraints with plant-specific components to be addressed by the COL applicant. If the APR1400 DCD is not intended to fully describe the IST program, the NRC staff requests that the APR1400 design certification applicant specify those aspects of the IST program description that need to be provided by the COL applicant.

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03.09.06-3

In Reference 34 in Section 3.9.10, "References," of the APR1400 DCD Tier 2, the APR1400 design certification applicant specifies the ASME OM Code of record for the description of the inservice testing program for pumps, valves, and dynamic restraints to be used in the APR1400 reactor as the "2004 Edition with the 2006 Addenda" of the ASME OM Code. The NRC staff requests that the APR1400 design certification applicant clarify Reference 34 in Section 3.9.10 of the APR1400 DCD Tier 2 to specify a complete set of edition and addenda of the ASME OM Code (for example, 2004 Edition with the 2005 and 2006 Addenda) that are used as the basis for the description of the IST program for the APR1400 design certification application.

03.09.06-4

Section 3.9.6.3.2, "Inservice Testing Program for Power-Operated Valves Other than Motor-Operated Valves," of the APR1400 Design Control Document (DCD) Tier 2 summarizes the guidance in NRC Regulatory Issue Summary (RIS) 2000-03 (March 15, 2000), "Resolution of Generic Safety Issue 158: Performance of Safety-Related Power-Operated Valves Under Design Basis Conditions," in describing the inservice testing (IST) program for power-operated valves (POVs) other than motor-operated valves (MOVs) in the APR1400 reactor. The NRC staff finds that the applicant's summary in Section 3.9.6.3.2 of the APR1400 DCD Tier 2 of the provisions for an IST program for POVs in RIS 2000-03 is incorrect in two aspects. The NRC staff requests that the APR1400 design certification applicant correct those two aspects in its description of the IST program for POVs in Section 3.9.6.3.2 in the APR1400 DCD Tier 2 to be consistent with the specified use of the guidance in RIS 2000-03. First, the NRC staff requests that the applicant correct the provision specified in Section 3.9.6.3.2 for periodic dynamic testing of POVs by removing the comma after "if required" and prior to "based on valve qualification or operating experience." This provision in RIS 2000-03 is intended to specify that if required based on valve qualification or operating experience, periodic dynamic testing will be performed to re-verify the capability of the valve to perform its required functions. Second, the NRC staff requests that the APR1400 design certification applicant modify the provision in Section 3.9.6.3.2 that safety-related valves are categorized according to their safety significance and risk ranking to be consistent with the provision in RIS 2000-03 that safety-related air-operated valves (AOVs) are assigned the highest category according to the Joint Owners Group (JOG) AOV program (including NRC staff comments provided in a letter to the Nuclear Energy Institute, dated October 8, 1999).

03.09.06-5

Section 3.9.6.3.4, "Pressure Isolation Valve Leak Testing," in the APR1400 Design Control Document (DCD) Tier 2 describes the leak testing of pressure isolation valves (PIVs) in the APR1400 reactor, and specifies that PIVs associated with the reactor coolant system are defined in NRC Generic Letter (GL) 89-04 (dated April 3, 1989), "Guidance on Developing Acceptable Inservice Testing Programs," Attachment 1, Section 4a. In Supplement 1 to GL 89-04 (dated April 4, 1995), the NRC stated that NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," was being issued to incorporate the provisions of GL 89-04. Therefore, the NRC staff considers the reference to GL 89-04 in Section 3.9.6.3.4 of the APR1400 DCD Tier 2 to be out of date. The NRC staff requests that the APR1400 design certification applicant update Section 3.9.6.3.4 in the APR1400 DCD Tier 2 to reference the guidance in NUREG-1482 (Revision 2) for leak testing of PIVs in the APR1400 reactor.

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03.09.06-6

Section 3.9.6.3.8, "Inservice Testing for Explosively Activated Valves," in the APR1400 Design Control Document (DCD) Tier 2 states that the inservice testing (IST) program for explosively activated valves (commonly referred to as squib valves) is "not applicable" to the APR1400 design. The NRC staff finds that this reference to "not applicable" could be misinterpreted. Therefore, the NRC staff requests that the APR1400 design certification applicant revise Section 3.9.6.3.8 in the APR1400 DCD Tier 2 to clarify that explosively actuated valves (squib valves) are not included in the APR1400 design.

03.09.06-7

APR1400 DCD Tier 2, Section 3.9.6.5, "Relief Requests and Alternative Authorizations to ASME OM Code," indicates that relief requests will be made on a case-by-case basis. To address the current plans for relief requests and alternative authorizations to the ASME OM Code for the APR1400 reactor, the NRC staff requests that the APR1400 design certification applicant clarify Section 3.9.6.5 in the APR1400 DCD Tier 2 to describe any planned alternative requests under 10 CFR 50.55a(z), and relief requests under 10 CFR 50.55a(f)(6) or (g)(6) for the IST programs for pumps, valves, and dynamic restraints, as applicable. For example, Section 3.9.6.5 should specify whether any requests for relief from the ASME OM Code provisions are intended for IST activities of pumps, valves, or dynamic restraints in the APR1400 reactor. In addition, Section 3.9.6.5 should describe whether OM Code Cases will be implemented as part of the IST program for pumps, valves, and dynamic restraints as accepted in RG 1.192 as incorporated by reference in 10 CFR 50.55a, or as a separate alternative authorization pursuant to 10 CFR 50.55a(z).

03.09.06-8

APR1400 Design Control Document (DCD) Tier 2, Section 3.9.9, "Combined License Information," includes COL Information Item 3.9(4), which states that "[t]he COL applicant is to provide a full description of the IST program including PST for pumps, valves and dynamic restraints and will be administratively controlled that the applicable requirements of the ASME OM Code edition and addenda are incorporated in the IST program." The NRC staff finds that the proposed COL Information Item is not clear. The NRC staff requests that the APR1400 design certification applicant make editorial corrections to COL Information Item 3.9(4) to clarify the action item, such as the following changes: "The COL applicant is to provide a full description of the IST program (including PST and MOV testing) for pumps, valves and dynamic restraints that ~~and~~ will be administratively controlled such that the applicable requirements of the ASME OM Code edition and addenda are incorporated in the IST program."

03.09.06-9

APR1400 Design Control Document (DCD) Tier 2, Table 3.9-13, "Inservice Testing of Safety-Related Pumps and Valves," specifies inservice testing (IST) activities and frequencies for pumps and valves in the IST program for the APR1400 reactor. NRC Standard Review Plan Section 3.9.6 specifies in its acceptance criteria that the IST program description should satisfy the IST activities and frequencies for pumps and valves provided in the applicable subsection of the ASME OM Code. The NRC staff requests that the APR1400 design certification applicant modify Table 3.9-13 to be consistent with the NRC regulations in 10 CFR 50.55a and guidance for IST programs in NUREG-1482 (as referenced in Section 3.9.6 of the APR1400 DCD Tier 2). In particular, the NRC staff considers the following changes to Table 3.9-13 to be appropriate. The applicant should evaluate all pumps and valves in Table 3.9-13 for appropriate changes similar to the specific pump and valve examples listed below.

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1. Pump information should include the pump identification number, ASME OM Code Group, and specific test (Group A, Group B, and Comprehensive) and its frequency depending on OM Code Group.
2. Valve information should include the valve safety position (open, closed, or open/closed).
3. Relief valves should be specified as active Category A/C valves with position indication requirements (as applicable) in addition to other ASME OM Code, Subsection ISTC, requirements indicated in the IST table. See, for example, relief valve CS-1005 on page 3.9-173.
4. Manual valves should include position indication requirements (as applicable) in addition to other ASME OM Code, Subsection ISTC, requirements indicated in the IST table. See, for example, manual valve SI-293 on page 3.9-157.
5. Check valves should be categorized as active valves in the IST program because of their operating characteristics as indicated in NUREG-1482 (Revision 2), Section 4.1, "Check Valves." In addition, check valves should be tested in both the open and close directions. See, for example, check valve CS-1001 on page 3.9-173.
6. The Note at the end of paragraph (h) on page 3.9-227 should justify pump curve testing to assess pump degradation with clarification of its reference to the provisions in Subsection 3.9.6.1.
7. Paragraph (i) on page 3.9-227 references Figure 3.9-15, "Typical Inservice Testing Connections," and indicates that these typical test configurations constitute design requirements for the affected pump or valve. Paragraph (i) and Figure 3.9-15 should indicate the full set of IST program tests for pumps (such as Group A, Group B, and Comprehensive Tests) and valves (such as flow tests to periodically verify design-basis capability).