

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 512-8665

SRP Section: 14 – Verification Programs

Application Section: 14.03.09

Date of RAI Issued: 08/04/2016

Question No. 14.03.09-2

The DCD, Section 14.3.2.9, states, "Design ITAAC will be closed in accordance with the guidance in RG 1.215 (Reference 31) and Section 8.3.1 of NEI 08-01 (Reference 32)". Reference 32 (DCD page 14.3-37) is identified as, "NEI 08-01, "Industry Guideline for the ITAAC Closure Process under 10 CFR Part 52," Rev. 4, Nuclear Energy Institute, 2010."

However, the NEI document, Reference 32, does not include a Section Number 8.3.1 that the applicant is using to close the design ITAAC. Therefore, the DCD applicant needs to clarify which section of Reference 32 is to be used to close the Design ITAAC. Additionally, the staff also notes that Rev. 4 of NEI 08-01 is not the current revision. The current revision of this document is Rev. 5 (Corrected) which was issued in June, 2014.

The staff also suggests that the DCD applicant should review and verify that its application does not use the non-existent Section 8.3.1 of Reference 32 for closure of any other ITAAC.

Response

Design ITAAC will be closed in accordance with the guidance in RG 1.215 and Section 10.1 of NEI 08-01 Rev. 5 (Corrected), June 2014. DCD Section 14.3.2.9 will be revised to include the appropriate reference to Section 10.1 of NEI 08-01 and Section 14.3.7 will be revised to update the reference to NEI 08-01 Rev. 5. KHNP has reviewed the DCD and determined that it is not necessary to reference design ITAAC for ASME Class 1 piping systems and components since the graded approach to piping analysis is being implemented on the APR1400 project. Therefore, reference to design ITAAC is being deleted from Section 14.3.2.3.

Impact on DCD

The DCD Tier 2, Sections 14.3.2.3, 14.3.2.9 and 14.3.7 will be revised as indicated in the

attached markup.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on the Technical/Topical/environmental Reports.

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- f. In-situ testing and functional design and qualification records that installed pumps, valves, and dynamic restraints have the capability to perform their intended functions under expected ranges of fluid flow, differential pressure, electrical conditions, and temperature conditions up to and including design basis conditions
- g. An LBB evaluation report that demonstrates that the as-built piping and piping materials comply with the LBB acceptance criteria

These as-built ITAAC are covered in each system ITAAC such as Sections 2.4, 2.6, 2.7, and 2.11 of Tier 1.

~~A “design ITAAC” is applied to ASME Class 1 piping systems and components design for APR1400. The COL applicant is to provide a design ITAAC closure schedule for completing the design ITACC (COL 14.3(4)). The piping design ITAAC will be closed in accordance with the guidance in NRC RG 1.215 (Reference 31) and Section 8.3.1 of NEI 08-01(Reference 32), “Closure through the COLA Review Process”, as described in Subsection 14.3.5.~~

14.3.2.4 ITAAC for Reactor Systems

Delete

Section 2.4 of Tier 1 includes reactor systems, fuel, control rods, loose parts monitoring system, and core cooling systems in accordance with the guidance in NRC RG 1.206 (Reference 1), SRP 14.3 (Reference 2), SRP 14.3.4 (Reference 6), and the ITAAC for reactor systems that have been developed to verify the following:

- a. Important input parameters used in the transient and accident analyses for the facility design
- b. Net positive suction head for key pumps
- c. Design pressures of the piping systems that interface with the reactor coolant boundary to validate intersystem LOCA analyses
- d. The following top-level design aspects of the reactor systems:

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- c. Radiation and airborne radioactivity levels in plant rooms and areas to provide reasonable assurance of adequacy of plant shielding and ventilation system designs
- d. Radiation levels that are commensurate with area access requirements and with as low as reasonably achievable (ALARA) principles during normal plant operations and maintenance
- e. Adequate shielding that is provided to provide reasonable assurance that radiation levels in plant areas are within the limits necessary for operator actions to aid in mitigating or recovering from an accident

14.3.2.9 ITAAC for Human Factors Engineering

Section 2.9 of Tier 1 involves human factors engineering (HFE) as it pertains to main control room (MCR), remote shutdown room (RSR), local control panels, the technical support center, and the emergency operations facility in accordance with the guidance in NRC RG 1.206 (Reference 1), SRP 14.3 (Reference 2), and SRP 14.3.9 (Reference 11). In addition, it addresses the minimum inventory of alarms, controls, and indications appropriate for the main control room (MCR) and the remote shutdown room (RSR).

ITAAC are developed to verify the following essential HFE elements:

- a. An integrated system validation test that demonstrates the final HSI design conforms to the accepted HFE design principles
- b. The as-built HSI design that conforms to the verified and validated design resulting from the HFE design process

Design ITAAC is applied to the HFE verification and validation (V&V) for the APR1400. The COL applicant is to provide a design ITAAC closure schedule for implementing the V&V design ITAAC (COL 14.3(4)). Design ITAAC will be closed in accordance with the guidance in RG 1.215 (Reference 31) and ~~Section 8.3.1~~ of NEI 08-01 (Reference 32) as described in Section 14.3.5.

Section 10.1

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25. NUREG-0800, Standard Review Plan, Section 7, “Instrumentation and Controls – Overview of Review Process,” Rev. 6, U.S. Nuclear Regulatory Commission, May 2010.
26. Regulatory Guide 1.97, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants,” Rev. 4, U.S. Nuclear Regulatory Commission, June 2006.
27. 10 CFR 52.80, “Contents of Applications; Additional Technical Information,” U.S. Nuclear Regulatory Commission.
28. NUREG-0800, Standard Review Plan, Section 17.4, “Reliability Assurance Program (RAP),” U.S. Nuclear Regulatory Commission, March 2007.
29. Regulatory Guide 1.68, “Initial Test Programs for Water-Cooled Nuclear Power Plants,” Rev. 4, U.S. Nuclear Regulatory Commission, June 2013.
30. NUREG-0800, Standard Review Plan, Section 14.2, “Initial Plant Test Program – Design Certification and New License Applicants, U.S. Nuclear Regulatory Commission, March 2007.
31. Regulatory Guide 1.215, “Guidance for ITAAC Closure under 10 CFR PART 52,” Rev. 1, U.S. Nuclear Regulatory Commission, May 2012.
32. NEI 08-01, “Industry Guideline for the ITAAC Closure Process under 10 CFR Part 52,” ~~Rev. 4, Nuclear Energy Institute, 2010.~~
33. 10 CFR Part 20, “Standards for Protection against Radiation,” U.S. Nuclear Regulatory Commission.
34. Regulatory Guide 1.207, “Guidelines for Evaluating Fatigue Analyses incorporating the Life Reduction of Metal Components Due to the Effects of the Light Water Reactor Environment for New Reactors,” Rev. 0, U.S. Nuclear Regulatory Commission, March 2007.



Rev. 5(Corrected), Nuclear Energy Institute, June 2014.

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Question No. 14.03.09-3

The DCD Section 14.3.6 describes COL information item COL 14.3(4) as follows:

COL 14.3(4) The COL applicant is to provide a design ITAAC.

The above COL Information item description is not complete and also not consistent with the COL applicant action described in DCD Section 14.3.2.9. To make it complete and consistent with DCD Section 14.3.2.9, it needs to be modified to state, as a minimum, the following:

COL 14.3(4) The COL applicant is to provide a design ITAAC closure schedule for implementing the V&V design ITAAC as addressed in Subsection 14.3.2.9.

Response

The COL information item COL 14.3(4) will be revised as follows:

COL 14.3(4) The COL applicant is to provide a design ITAAC closure schedule for implementing the V&V design ITAAC as addressed in Subsection 14.3.2.9.

Impact on DCD

The DCD Tier 2, Section 14.3.6 and Table 1.8-2 will be revised as indicated in the attached markup.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on the Technical/Topical/environmental Reports.

APR1400 DCD TIER 2**14.3.5.3 Human Factors Engineering Design ITAAC**

Human factors engineering design ITAAC verifies final design at a level of detail adequate for procurement and construction. The final design can be validated by V&V since V&V covers all of the other elements. An integrated system validation test will be performed in accordance with the HF V&V implementation plan to validate final HSI design. The design ITAAC for V&V are listed in Tier1 Table 2.9-1.

14.3.6 Combined License Information

COL 14.3(1) The COL applicant is to provide the ITAAC for the site-specific portion of the plant systems specified in Subsection 14.3.3.

COL 14.3(2) The COL applicant is to provide the proposed ITAAC for the facility's emergency planning addressed in Subsection 14.3.2.10.

COL 14.3(3) The COL applicant is to provide the proposed ITAAC for the facility's physical security hardware addressed in Subsection 14.3.2.12.

COL 14.3(4) ~~The COL applicant is to provide a design ITAAC.~~

14.3.7 References

1. Regulatory Guide (LWR Edition),” U.S. Nuclear Regulatory Commission, June 2007.
2. NUREG-0800, Standard Review Plan, Section 14.3, “Inspections, Tests, Analyses, and Acceptance Criteria,” “Initial Test Program and ITAAC – Design Certification,” U.S. Nuclear Regulatory Commission, March 2007.
3. NUREG-0800, Standard Review Plan, Section 2.0, “Site Characteristics and Site Parameters,” Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants,” U.S. Nuclear Regulatory Commission, March 2007.

The COL applicant is to provide a design ITAAC closure schedule for implementing the V&V design ITAAC as addressed in Subsection 14.3.2.9.

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Table 1.8-2 (25 of 29)

Item No.	Description
COL 14.2(8)	The COL applicant that references the APR1400 design certification is to identify the specific operator training to be conducted as part of the low-power testing program related to the resolution of TMI Action Plan Item I.G.1, as described in (1) NUREG-0660, "NRC Action Plans Developed as a Result of the TMI-2 Accident," Revision 1, August 1980 and (2) NUREG-0737, "Clarification of TMI Action Plan Requirements."
COL 14.2(9)	The COL applicant is to prepare the pre-operational test of cooling tower and associated auxiliaries, and raw water and service water cooling systems.
COL 14.2(10)	The COL applicant is to develop the test program of personnel monitors and radiation survey instruments.
COL 14.2(11)	The COL applicant is to develop the test procedure of the communication system.
COL 14.3(1)	The COL applicant is to provide the ITAAC for the site-specific portion of the plant systems specified in Subsection 14.3.3.
COL 14.3(2)	The COL applicant is to provide the proposed ITAAC for the facility's emergency planning addressed in Subsection 14.3.2.10.
COL 14.3(3)	The COL applicant is to provide the proposed ITAAC for the facility's physical security hardware addressed in Subsection 14.3.2.12.
COL 14.3(4)	The COL applicant is to provide a DAC closure schedule for implementing the piping DAC.
COL 15.0(1)	The COL applicant is to perform the radiological consequence analysis using site-specific χ/Q values, unless the χ/Q values used in the DCD envelop the site-specific short-term or long-term χ/Q values of the DCD, and to show that the resultant doses are within the guideline values of 10 CFR 50.34 for EAB and LPZ and that of 10 CFR Part 50, Appendix A, GDC 19 for the MCR and TSC.
COL 17.4(1)	The COL applicant is to develop and implement Phases 2 and 3 of the design RAP, including QA requirements. In Phase 2, the plant's site-specific information is to be subjected to the design RAP process, and the site-specific risk-significant SSCs are combined with the APR1400 design risk-significant SSCs into one list for the plant. Phase 2 is to be performed during the COL application phase and updated/maintained during the COL license holder phase. In Phase 3, procurement, fabrication, construction, and test specifications for the SSCs within the scope of the RAP provide reasonable assurance that key assumptions, such as equipment reliability, are realistic and achievable. The QA requirements are implemented during the procurement, fabrication, construction, and pre-operational testing of the SSCs within the scope of the RAP. Phase 3 is to be performed during the COL license holder phase and prior to initial fuel loading. The COL applicant is to propose a method for incorporating the objectives of the reliability assurance program into other programs for design or operational errors that degrade non-safety-related, risk-significant SSCs.

The COL applicant is to provide a design ITAAC closure schedule for implementing the V&V design ITAAC as addressed in Subsection 14.3.2.9.