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.:	**18-7900**
SRP Section:	**14.03.11 – Containment Systems and Severe Accidents – Inspection, Tests, Analyses, and Acceptance Criteria**
Application Section:	**14.3.11**
Date of RAI Issued:	**06/01/2015**

Question No. 14.03.11-1

Update the DCD to add ITAAC that serve to reconcile the assumptions described in Tier 2 so that staff has reasonable assurance the as-built facility has an adequate long-term water supply for core cooling and that containment subcompartments will behave as described in Tier 2 following a postulated line break.

Response

To ensure that the holdup volumes in the as-built design are sized in accordance with the assumptions made in the analyses in Tier 2, Section 6.8, an analysis will be added in Tier 1 Table 2.4.2-4, 9.a.i and 9.a.ii.

To meet the requirements addressed in the Acceptance Criteria of SRP 6.2.1.2, the design pressure is determined by applying more than a factor of 1.4 to the calculated peak differential pressure. The as-built parameter values including volumes, vent areas and friction losses used for the subcompartment analysis are to be verified with the assumptions used in Section 6.2.1.2 of the DCD. It is then verified that the calculated peak differential pressure using as-built data does not exceed the design pressure. An ITAAC item will be added to Tier 1 Table 2.11.1-2.

Impact on DCD

DCD Tier 1 Tables 2.4.2-4 and 2.11.1-2 will be revised as indicated in the Attachment.

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 any Technical, Topical and Environmental Reports.

Table 2.4.2-4 (5 of 7)

Design Commitment		Inspections, Tests, Analyses		Acceptance Criteria	
8.a	All controls required by the design exist in the MCR to open and close MOVs and SOVs identified in Table 2.4.2-2.	8.a	Tests will be performed using the controls in the MCR.	8.a	All controls in the as-built MCR open and close MOVs and SOVs identified in Table 2.4.2-2.
8.b	All controls required by the design exist in the RSR to open and close MOVs and SOVs identified in Table 2.4.2-2.	8.b	Test will be performed using the controls in the RSR.	8.b	All control in the as-built RSR open and close MOVs and SOVs identified in Table 2.4.2-2.
8.c	All displays and alarms required by the design exist in the MCR as defined in Tables 2.4.2-2 and 2.4.2-3.	8.c	Inspections will be performed on the displays and alarms in the MCR.	8.c	All displays and alarms exist and are retrieved in the as-built MCR as defined in Tables 2.4.2-2 and 2.4.2-3.
8.d	All displays and alarms required by the design exist in the RSR as defined in Tables 2.4.2-2 and 2.4.2-3.	8.d	Inspections will be performed on the displays and alarms in the RSR. and analyses	8.d	All Displays and alarms exist and are retrieved in the as-built RSR as defined in Tables 2.4.2-2 and 2.4.2-3.
9.a	The IRWST has a sufficient water volume.	9.a.i	Inspection of the IRWST will be performed to provide a minimum water volume for ECCS and CSS operation during DBE.	9.a.i	The IRWST has a minimum water volume of 2,373.5m^3(83,818ft^3) and analyses
		9.a.ii	Inspection of the IRWST will be performed to provide a water volume for flooding the refueling pool.	9.a.ii	The IRWST has a water volume of at least 2,456.7m^3 (86,759 ft^3).
9.b	The IWSS provides post-LOCA pH control with tri-sodium phosphate (TSP).	9.b	Inspection will be performed for the capacity of the TSP baskets.	9.b	The TSP basket located in HVT has the following combined capacity of TSP: ≥ 26,976 kg (59,472 lbs).

Table 2.11.1-2

Containment Structure ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The reactor cavity floor area allows for spreading of core debris, enhancing its coolability.	1. Inspections of the as-built the reactor cavity will be performed.	1. A report exists and concludes that the large reactor cavity area exists in the as-built reactor cavity.
2. The reactor cavity has the core debris chamber to retain core debris.	2. Inspections of the as-built reactor cavity will be performed.	2. A report exists and concludes that the core reactor cavity includes a core debris trap.
3. Fill concrete slab of reactor cavity floor concrete is provided to protect against challenge to containment liner plate melt through.	3. Inspections of the as-built reactor cavity will be performed.	3. A report exists and concludes that the core debris chamber exists in the as-built reactor cavity.
4. The containment design pressure provides over a 10% margin above the maximum calculated peak pressure.	4. An analysis of the containment pressure response to a high energy line break will be performed to determine the limiting peak pressure.	4. A report exists and concludes that the containment peak pressure following a high energy line break remains below its design pressure with more than 10% margin.
5. The design basis LOCA containment pressure at 24 hours after postulated accident is less than 50 % of its calculated maximum pressure.	5. An analysis of the containment pressure response to a LOCA will be performed to show that the pressure at 24 hours after the postulated accident is less than 50% of its calculated peak pressure.	5. A report exists and concludes that the containment pressure is reduced less than 50% of its peak calculated pressure within 24 hours after the postulated accident.

6. The calculated subcompartment peak pressure does not exceed the design pressure.

6. An analysis of the subcompartment pressure response to a postulated line break will be performed to determine the calculated peak differential pressure.

6. A report exists and concludes that the calculated peak differential pressure does not exceed the design pressure.

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Question No. 14.03.11-2

As it stands, these ITAAC provides no value in determining that the as-built design matches the design described in Tier 2 of the DCD due to the lack of specificity. Although the reports listed may provide the information required to provide reasonable assurance that the assumptions made in Section 6.2.1 of the DCD are valid, it is not clear how the reports would be acceptable to close out the ITAAC. ITAAC, and specifically acceptance criteria, need to be specific and have a quantifiable or verifiable target. Revise the ITAAC listed such that as-built parameters are verified to match the assumptions used in Section 6.2 (e.g. containment volume, heat sink area).

Response

As a supporting document for the containment analysis described in Section 6.2.1.1 of the DCD, Technical Report (APR1400-Z-A-NR-14007-P) was provided to NRC. In the report, it is demonstrated that the APR1400 containment design pressure of [ ]^{TS} psig provides adequate margin above the calculated peak pressure of [ ]^{TS} psig for the design basis LOCA (Double-ended discharge leg slot break with maximum SI). Also stated in the report, the containment pressure at 24 hours after the design basis LOCA reaches [ ]^{TS} psig, which does not exceed 50% of the calculated peak pressure. The acceptance criteria for Item 4 and 5 described in Tier 1 Table 2.11.1-2 will be substituted with the following wording:

> “A report exists and concludes that the containment design pressure in Table 2.11.1-1 has more than 10% margin above the maximum calculated pressure for the design basis LOCA.”

"A report exists and concludes that the containment pressure at 24 hours after the accident initiation for the design basis LOCA does not exceed 50% of its calculated peak pressure."

Impact on DCD

DCD Table 2.11.1-2 will be revised as indicated in the Attachment.

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 any Technical, Topical and Environmental Reports.

Table 2.11.1-2

Containment Structure ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The reactor cavity floor area allows for spreading of core debris, enhancing its coolability.	1. Inspections of the as-built the reactor cavity will be performed.	1. A report exists and concludes that the large reactor cavity area exists in the as-built reactor cavity.
2. The reactor cavity has the core debris chamber to retain core debris.	2. Inspections of the as-built reactor cavity will be performed.	2. A report exists and concludes that the core reactor cavity includes a core debris trap.
3. Fill concrete slab of reactor cavity floor concrete is provided to protect against challenge to containment liner plate melt through.	3. Inspections of the as-built reactor cavity will be performed.	3. A report exists and concludes that the core debris chamber exists in the as-built reactor cavity.
4. The containment design pressure provides over a 10% margin above the maximum calculated peak pressure.	4. An analysis of the containment pressure response to a high energy line break will be performed to determine the limiting peak pressure.	4. A report exists and concludes that the containment peak pressure following a high energy line break remains below its design pressure with more than 10% margin.
5. The design basis LOCA containment pressure at 24 hours after postulated accident is less than 50 % of its calculated maximum pressure.	5. An analysis of the containment pressure response to a LOCA will be performed to show that the pressure at 24 hours after the postulated accident is less than 50% of its calculated peak pressure.	5. A report exists and concludes that the containment pressure is reduced less than 50% of its peak calculated pressure within 24 hours after the postulated accident.

4. A report exists and concludes that the containment design pressure in Table 2.11.1-1 has more than 10% margin above the maximum calculated pressure for the design basis LOCA.

5. A report exists and concludes that the containment pressure at 24 hours after the accident initiation for the design basis LOCA does not exceed 50% of its calculated peak pressure.