

KHNPDCRAIsPEm Resource

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Sent: Tuesday, September 08, 2015 6:53 AM
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Cc: Thomas, Vaughn; Xu, Jim; Betancourt, Luis; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 200-8225 (03.08.02 - Steel Containment)
Attachments: APR1400 DC RAI 200 SEB1 8225.pdf; image001.jpg

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.

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

Thank you,

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REQUEST FOR ADDITIONAL INFORMATION 200-8225

Issue Date: 09/08/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 03.08.02 - Steel Containment
Application Section: 3.8.2

QUESTIONS

03.08.02-1

Appendix A to 10 CFR Part 50, General Design Criteria (GDC) 1, 2, 4, 16 and 50, provide the regulatory requirements for the design of the containment penetrations. Standard Review Plan (SRP) 3.8.2, Section II specifies the procedures used for the analysis and design of the containment penetrations with emphasis on the extent of compliance with Article CC-3300 of Section III, Division 1, of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, with additional guidance provided in Regulatory Guide 1.57, “Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components.”

DCD Tier 2, Section 3.8.2.4.1, “Equipment Hatch, Personnel Airlocks, and Electrical Penetrations,” states, “The portions of the sleeves not backed by concrete are analyzed and designed according to the provisions of ASME Section III, Division 1, Subsection NE 3000.” This statement is not clear because the staff believes that not only this portion of the sleeves, but the entire penetration that is not backed by concrete should be designed according to the provisions of ASME Section III, Division 1, Subsection NE 3000. Also, DCD Tier 2, Section 3.8.2.4.2, “Process Piping Penetrations,” does not indicate that the design and analysis procedures are performed in accordance with ASME Section III, Division 1, Subsection NE 3000.

Additionally, the only information provided on the fuel transfer tube penetration is one sentence in Section 3.8.2.1.4 of DCD Tier 2, which indicates that the penetration is designed as a class MC component in accordance with ASME Section III, Division 1, Subsection NE. DCD Tier 2, Sections 3.8.2.1, 3.8.2.4, and 3.8.2.5 did not provide descriptive information, design and analysis procedures, and acceptance criteria for the fuel transfer tube penetration.

Per Appendix A to 10 CFR Part 50, GDC 1, 2, 4, 16 and 50; and SRP 3.8.2, the staff requests the applicant to address the following questions:

- a. Clearly state whether the design and analysis procedures for all ASME Class MC containment penetrations, including the portions of the sleeves that are not backed by concrete, are performed in accordance with ASME Section III, Division 1, Subsection NE 3000.
- b. Provide the following items: a description and figure of the fuel transfer tube penetration comparable to the information of the other penetrations, design and analysis procedures, and the structural acceptance criteria.

03.08.02-2

Appendix A to 10 CFR Part 50, General Design Criteria (GDC) 1, 2, 4, 16 and 50, provide the regulatory requirements for the design of the containment penetrations. Standard Review Plan (SRP) 3.8.2, Section II specifies the procedures

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used for the analysis and design of the containment penetrations with emphasis on the extent of compliance with Article CC-3300 of Section III, Division 1, of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, with additional guidance provided in Regulatory Guide 1.57, "Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components."

DCD Tier 2, Section 3.8.2.4, "Design and Analysis Procedures," describes the design and analysis procedures for the equipment hatch, personnel airlocks, electrical penetrations, and process piping penetrations. The staff noted that Section 3.8.2.4 did not adequately describe the design and analysis approach for the various penetrations. Per Appendix A to 10 CFR Part 50, GDC 1, 2, 4, 16 and 50; and SRP 3.8.2, the applicant is requested to describe to the extent possible, the design methodology for these penetrations in the application, including the models, boundary conditions, how loadings are applied, the analysis approach for the various loadings, and how stresses are determined including the approach to check for buckling. The description for the analysis of the various loads should include loads from internal and external pressures; applied end loads from attached process piping or attachment to adjacent structures for the fuel transfer tube; and containment interface displacements and seismic inertial loadings at the attachment points to the containment.

For penetrations that are considered to be a vendor designed component, a description should still be provided of the criteria to be used for the analysis and design of the penetrations. This description should summarize, to the extent possible, the key analysis and design aspects discussed above, consistent with ASME Code Section III, Division 1, Subsection NE, provisions applicable to containment penetrations and the existing criteria in the DCD. It should be noted that even if the design of the containment penetrations are not completed or finalized at this time, SRP 3.8.1 and 3.8.2 indicates that the ultimate pressure capacity of the containment, including its penetrations, need to be determined. Therefore, some analysis of the critical containment penetrations (e.g., equipment hatch and/or personnel airlocks) would be needed to address the ultimate pressure capacity evaluation of the containment and Section 19 PRA/accident evaluations.

03.08.02-3

Appendix A to 10 CFR Part 50, General Design Criteria (GDC) 1, 2, 4, 16 and 50, provide the regulatory requirements for the design of the containment penetrations. Standard Review Plan (SRP) 3.8.2, Section II specifies the procedures used for the analysis and design of the containment penetrations with emphasis on the extent of compliance with Article CC-3300 of Section III, Division 1, of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, with additional guidance provided in Regulatory Guide 1.57, "Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components."

DCD Tier 2, Section 3.8.2, "Steel Containment," states that, "This subsection pertains to ASME Class MC components that are part of the containment described in DCD Subsection 3.8.1. ASME Class MC components include the equipment hatch, personnel airlocks, and piping and electrical penetration sleeves." DCD Tier 2, Section 3.8.2.1.3.2, "Component Classification," states that "The penetration sleeve is designed as a class MC component in accordance with ASME Section III, Division 1, Subsection NE." The staff notes that a portion of the penetration sleeve is backed by concrete while the remaining portion is not. According to ASME Section III, Division 2, Subsection CC, Article CC-3740, the portion of the penetration sleeve backed by concrete shall be designed to meet the requirements of CC-3700 and CC-3800.

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Therefore, in accordance with Appendix A to 10 CFR Part 50, GDC 1, 2, 4, 16 and 50; and SRP 3.8.2, the applicant is requested to clarify the statements made in the DCD Sections 3.8.2 and 3.8.2.1.3.2, and elsewhere, as appropriate, to identify that the portion of the penetration sleeves that are not backed by concrete are classified as ASME Class MC components and are covered in DCD Section 3.8.2. This issue also appears in DCD Sections 3.8.2.4.2 on design and analysis procedures and 3.8.2.5 on structural acceptance criteria. Also, the fuel transfer tube should be included in the listed penetrations of Class MC components in Section 3.8.2 of the DCD.

03.08.02-4

10 CFR 50.55a and Appendix A to 10 CFR Part 50, General Design Criterion (GDC) 1, provide the regulatory requirements for the design, test, fabrication, inspection and erection of the steel portions of the concrete containment not backed by concrete. Standard Review Plan (SRP) 3.8.2, Section II specifies the loads and load combination used for the analysis and design of the steel portions of the concrete containment with emphasis on the extent of compliance with Article CC-3300 of Section III, Division 1, of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, with additional guidance provided in Regulatory Guide 1.57, "Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components."

DCD Tier 2, Section 3.8.2.3.2, "Load Combinations for Instrument and Process Piping Penetrations," refers to the load combinations in Table 3.8-4, "Load Combinations for Penetration Sleeves and Head Fittings." A review of the load combinations in this table for consistency with DCD Tables 3.12-1 and 3.12-2 for ASME Section III, Class 1, 2, and 3 piping could not be made based on the information contained in Table 3.8-4. Therefore, in accordance with 10 CFR 50.55a, Appendix A to 10 CFR Part 50, GDC 1 and SRP 3.8.2, the applicant is requested to present the load combinations in DCD Table 3.8-4 in a manner which would allow comparison to the load combinations in DCD Tables 3.12-1 and 3.12-2.

