

## REVISED 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.: 199-8223  
 SRP Section: 03.08.01 - Concrete Containment  
 Application Section: 03.08.01  
 Date of RAI Issue: 09/08/2015

### **Question No. 03.08.01-11**

Appendix A to 10 CFR Part 50, General Design Criteria 2, 4, 16 and 50, provide the regulatory requirements for the design of the concrete containment. Standard Review Plan (SRP) 3.8.1, Section II discusses the applicable codes, standards and specifications, regulatory requirements, and regulatory guides applicable to the design of the concrete containment.

The containment structure, including the basemat directly beneath the containment is integral with the auxiliary building (AB) basemat. The staff noted that Section 3.8.1 of the DCD Tier 2 does not describe the jurisdictional boundary for design of the containment in accordance with ASME Section III, Division 2, Subsection CC. In accordance with Appendix A to 10 CFR Part 50, General Design Criteria 1, 2, 4, 16 and 50, and SRP 3.8.1, the applicant is requested to identify the jurisdictional boundary of the containment for design in accordance with ASME Section III, Division 2 Code, and describe what aspects of the design incorporates additional design requirements beyond the portion of the containment foundation directly beneath containment shell. In addition, the applicant is requested to update Section 3.8.1 of the DCD Tier 2 accordingly.

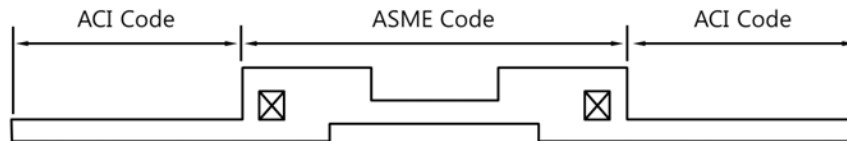
### **Response**

APR1400 has a mat foundation of reinforced concrete referred to as nuclear island (NI) common basemat for the reactor containment building (RCB) and the auxiliary building (AB) areas. The NI common basemat has variable thickness according to the arrangement of structures, systems, and components. The thickness of the AB foundation is 10 feet, and that of the RCB varies from 23 feet to 33 feet, except for the portions of the tendon gallery and the reactor cavity area.

The design basis of the RCB and AB foundations conform to the requirement of ASME Section III, Division 2, Subsection CC and ACI 349 codes, respectively. The boundary of jurisdiction between the ASME and the ACI codes is as shown in Figure 1. The common basemat is

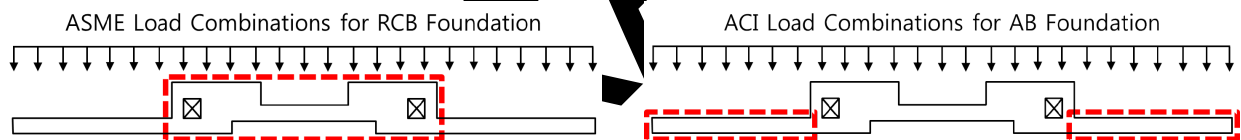
divided into two parts by code jurisdiction at the thickness transition interface, and it is a logical choice based on the physical configuration and functional requirements of the basemat.

In the APR1400 design, the anchoring of the containment shell reinforcement is limited within the ASME code boundary as shown in Figures 3.8A-16 and 3.8A-17 of the DCD, and this is in accordance with the ASME code interpretation III-2-83-01.



**Figure 1 Jurisdictional Boundary for Design of Common Basemat**

As the design criteria for the two portions of the basemat are different, the application of loads for the basemat is also divided into two parts. Figure 2 represents the application of loads based on the different code criteria. As shown in Figure 2, the load combinations provided by the ASME and the ACI codes are used in the analysis and design of the RCB and AB foundations, respectively. At the interface between the two codes, a greater amount of reinforcement required by either code is used, and the reinforcement of the RCB foundation is developed into the AB foundation as shown in Figures 3.8A-16 and 3.8A-17 of the DCD. The provisions of both codes are used to select a conservative development length. The portion beyond the RCB foundation, i.e., the entire AB foundation area, is conservatively designed using the larger member forces from the analysis results of the ASME and ACI codes.



**Figure 2 Application of Loads based on Code Criteria**

### Impact on DCD

DCD Tier 2, Subsection 3.8.1.1.2 will be revised as indicated in the attachment associated with this response.

### 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, or Environmental Report.

**APR1400 DCD TIER 2**

The general configuration and dimensions of the containment structure are shown in Figures 3.8-1 and 3.8-2. Local areas at the equipment hatch and two personnel airlock areas are thickened as shown in Figure 3.8-3.

The containment has the following dimensions:

- a. Inside diameter of containment: 45.72 m (150 ft)
- b. Inside height of containment: 76.66 m (251.5 ft) from the top of base slab to the ceiling of dome apex
- c. Thickness of containment wall: 1.37 m (4 ft 6 in)
- d. Dome thickness: 1.22 m (4 ft)

#### 3.8.1.1.2 Foundation Basemat

A description of the foundation basemat is given in Subsection 3.8.5.

Appendix 3.8A shows the reinforcement details of the intersection where the containment wall intersects with nuclear island (NI) common foundation basemat.

#### 3.8.1.1.3 Containment Shell

##### 3.8.1.1.3.1 General

The cylindrical containment shell has a constant thickness of 1.37 m (4 ft 6 in) from the top of the foundation basemat to the springline. The shell is thickened locally around the equipment hatch, two personnel airlocks, feedwater, and main steam line penetrations. The containment reinforcing consists primarily of hoop and meridional steel. Prestressing tendons are also arranged in hoop and meridional directions. The tendons in the meridional directions extend over the dome to form an inverted “U” shape.

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The design basis of the NI common basemat under the RCB and the AB conform to the requirement of ASME Section III, Division 2, Subsection CC and ACI 349, respectively. The boundary of jurisdiction between the ASME and the ACI codes is shown in Figure 3.8-26. The jurisdictional boundary is placed at the thickness transition interface due to the physical configuration and functional requirements of the basemat. The anchoring of the containment shell reinforcement is limited within the ASME code boundary as shown in Figures 3.8A-16 and 3.8A-17.

As the design criteria for the two portions of the basemat are different, the application of loads is also divided into two parts, as shown in Figure 3.8-26. The load combinations provided by the ASME and the ACI codes are used in the analysis and design of the RCB and AB foundations, respectively. At the interface between the ASME and ACI codes, a greater amount of reinforcement required by either code is used, and the reinforcement of the RCB foundation is developed into the AB foundation as shown in Figures 3.8A-16 and 3.8A-17. The provisions of both codes are used to select a conservative development length. The portion beyond the RCB foundation, i.e., the entire AB foundation area, is conservatively designed using the larger member forces from the analysis results of the ASME and ACI codes.

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APR1400 DCD TIER 2

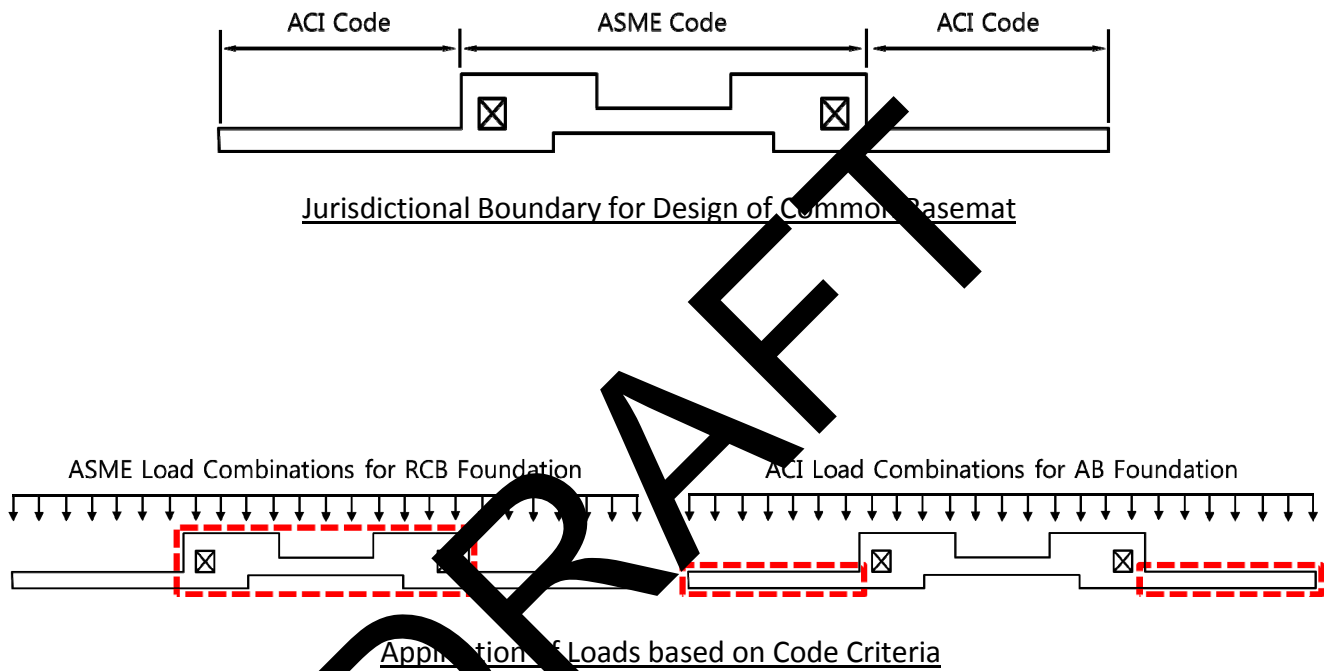


Figure 3.8-26 Code Jurisdiction Boundary of Common Basemat

Figure Added

Rev. 0

Enclosure 3

**APR1400 DCD TIER 2**

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