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.:	**469-8578**
SRP Section:	**09.01.01 - Criticality Safety of Fresh and Spent Fuel Storage and Handling**
Application Section:	**DCD Tier 2, Section 9.1.1**
Date of RAI Issue:	**04/22/2016**

Question No. 09.01.01-36

In response to RAI 8421, Question 28811 (09.01.01-27) the applicant stated the following:

The lower parts of the fuel storage cells are installed within the cell pitch tolerance of [proprietary value] on the rack baseplate. And the upper parts of the cells are fixed by the gap spacers (Region I) and the connecting bars (Region II) so that the cell pitches are maintained within the tolerance of [proprietary value]. The form tolerance, which is applied to the outermost surfaces of the rack, does not affect the cell pitch.

The applicant has stated that the fuel storage cells will utilize the material specification SA-240. The plate, sheet, or strip material will be formed and welded into the square tube required by the design. The welding of SA-240 Type 304 often results in significant distortion of the material.

Experience has shown that welding of fuel storage cells must include careful planning to prevent distortion of the cells. Insufficient controls can result in fuel storage cells that are “banana shaped.” If the new fuel rack storage cells are fabricated with a curve, the cell pitch at the top and bottom of the fuel rack may be different than the cell pitch at the mid-plane of the fuel rack.

This will not impact the Region I and Region II spent fuel racks: the Region I spent fuel racks have spacer bars to ensure consistent spacing along the height of the spent fuel rack and the Region II design does not have flux traps. This would only impact the new fuel racks.

Additionally, it is not necessary for the applicant to describe how the distortion will be prevented during fabrication.

How does the criticality evaluation account for fuel storage cells that are not straight?

Response

The fuel storage cells that are not straight can impact the cell pitches and fuel assembly loading positions as shown in Figure 1. The effects of the cell pitches and fuel assembly loading positions in the criticality analysis were evaluated and included in the total uncertainty as follows.

1. Fuel storage cell pitch

The lower parts of the new fuel storage cells are installed within the cell pitch tolerance of [ ]^{TS} on the rack baseplate. The middle and upper parts of the cells are fixed by the middle and upper plates to maintain the cell pitch within the tolerance of [ ]^{TS} as shown in Figure 2. Therefore, even if the distortion due to the insufficient welding occurred during the fabrication, the cell pitches of the new fuel storage cells are maintained within the tolerance of [ ]^{TS}.

The uncertainty analysis for the cell pitch tolerance was provided in Section 2.4.2 of the criticality analysis TeR. In this analysis, cell pitches were assumed to be the minimum value (tolerance of [ ]^{TS}) for the purpose of conservatism. The analysis results are provided in Tables 2.4-3 and 2.4-4 in the TeR, which were revised in the response to RAI 179-8190, Question 09.01.01-23, Rev.2, and included in the total uncertainty.

2. Fuel assembly position in the fuel storage cell

The distortion of the fuel storage cells can impact the loading position of the fuel assemblies. The uncertainty analysis for the eccentric fuel assembly positions in the fuel storage cell is provided in Section 2.4.2 of the criticality analysis TeR. In this analysis, fuel assemblies are assumed to be loaded at the corner of the fuel storage cell as shown in Figure 3. The analysis results are provided in Tables 2.4-3 and 2.4-4 in the TeR, which was revised in the response to RAI 179-8190, Question 09.01.01-23, Rev.2, and included in the total uncertainty.

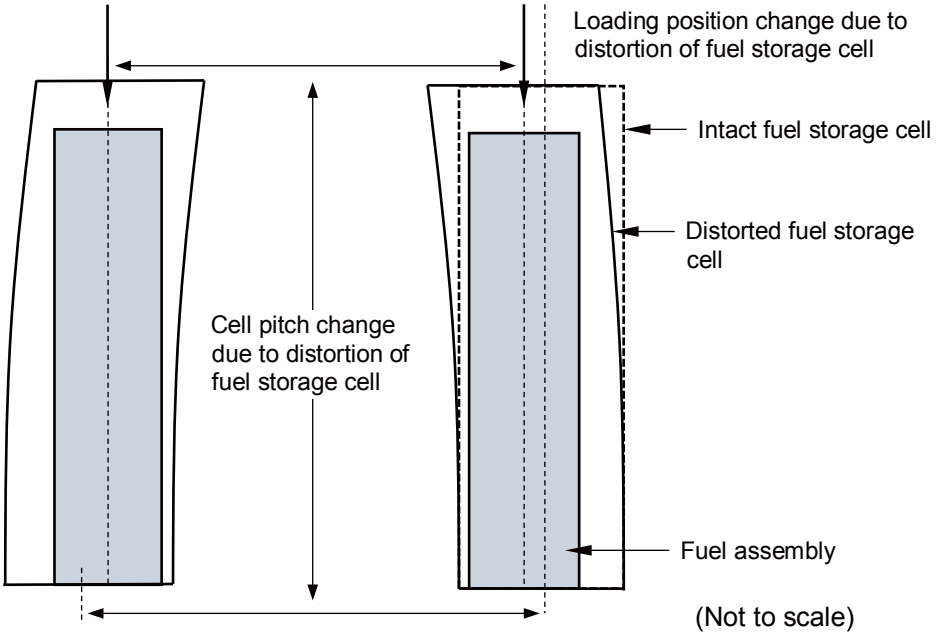

Figure 1 Schematic diagram for distortion of fuel storage cell

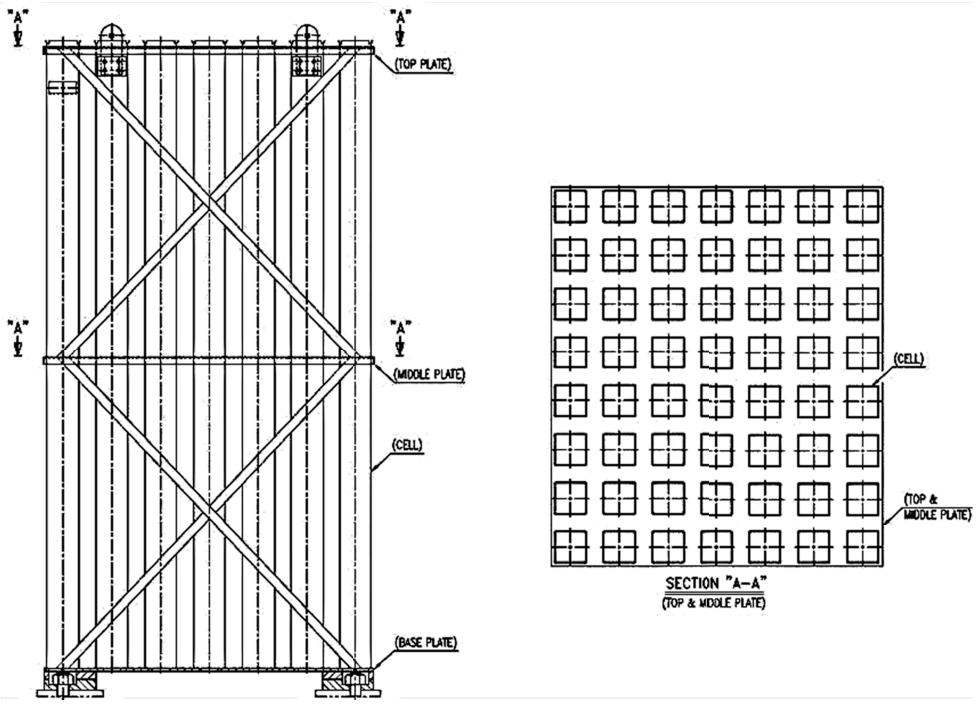

Figure 2 New fuel storage racks

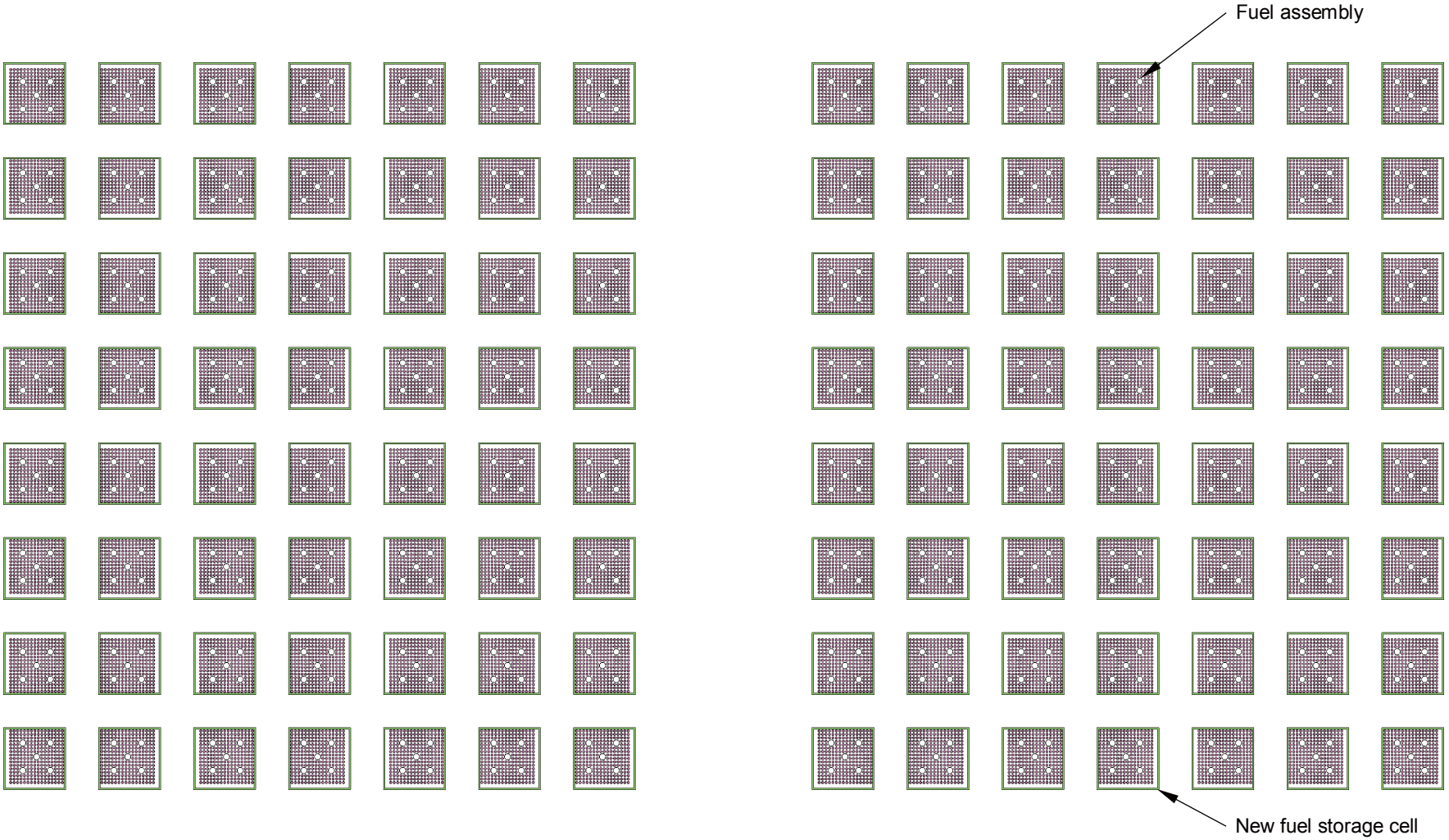

Figure 3 Fuel rack model of uncertainty analysis for eccentric fuel position

Impact on DCD

There is no impact on the DCD.

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.