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Your ref: Docket No. 52-006
Our ref: DCP_NRC_002616

September 14, 2009

Subject: AP1000 Response to Request for Additional Information (TR 54)

Westinghouse is submitting responses to NRC requests for additional information (RAI) on Technical Report No. 54. This RAI response is submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in this response is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following RAI(s):

RAI-TR54-025 R1

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Request for Additional Information on Technical Report No. 54

D063
NRO

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ENCLOSURE 1

Response to Request for Additional Information on Technical Report No. 54

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-TR54-025
Revision: 1

Question:

Explain whether only full fuel racks are included in the two simulations, or if several scenarios are considered; i. e., different fill ratios, from partially full to full within a given rack; varying fuel locations within the partially filled rack; varying fill and locations in adjacent racks. Provide the technical justification if only full racks are considered. Also, would it ever be possible to have less than all fuel racks (eight) in the pool. If so, then additional simulations would be needed. If not, is there a requirement in the DCD that specifies all fuel racks must always be in place whenever fuel is stored in any of the racks?

Westinghouse Response: (Revision 0)

All spent fuel racks, in both simulations, are assumed to be fully loaded with maximum weight fuel assemblies. This scenario bounds any partially loaded configuration since it (1) maximizes the vertical compression and lateral friction loads on the support pedestals and (2) produces the maximum rack displacements and fuel-to-cell wall impacts. The displacements are larger for a fully loaded rack, as opposed to a partially filled rack, because the dynamic model conservatively assumes that all stored fuel assemblies rattle in unison. Hence, the momentum transferred between the rattling fuel mass and the spent fuel rack is at a maximum for a fully loaded rack. For a partially filled rack, the decrease in rattling fuel mass outstrips the destabilizing effect of an eccentric fuel loading pattern.

The Spent Fuel Pool rack analysis was performed with all eight fuel racks installed during operation of the spent fuel pool, which is consistent with the design intent of the AP1000 Spent Fuel Storage Racks. DCD Rev 16 Section 9.1 will include the statement that all spent fuel racks will be in place in the spent fuel pool whenever fuel is stored in the spent fuel racks.

Additional Response: (Revision 1)

After the Revision 0 response to this RAI and following other discussions with the NRC, Westinghouse withdrew the first paragraph of the Revision 0 response (the second paragraph is still applicable) and considered multiple loading conditions and subsequently incorporated the results into Revision 2 of TR-54. However, insufficient information was included in the TR revision to explain the additional cases that were considered. Also, during the August 6-7, 2009 meeting with the NRC it was identified that Table 2-10 was not updated to reflect the current results of the analysis. Revision 1 of this RAI addresses both of these concerns by making changes to TR-54 Rev. 2 to provide the requested clarification and to correctly update Table 2-10. See the Technical Report Revision section beginning on the following page for details.

AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Reference:

1. APP-GW-GLR-033, Revision 0, "Spent Fuel Storage Rack Structural/Seismic Analysis," (Technical Report Number 54)

Design Control Document (DCD) Revision: (Revision 0)

DCD Rev 16 Section 9.1 will include the statement that all spent fuel racks will be in place in the spent fuel pool whenever fuel is stored in the spent fuel racks.

PRA Revision:
None.

Technical Report (TR) Revision: (Revision 1)

~~None~~ ****Note: the following revisions which are part of the Revision 1 RAI response are against TR-54, Revision 2.****

The following new paragraph is added to the end of the "Stiffness Matrix" Section before 2.2.3:

Run numbers 1 through 3 in Table 2-4 are the base set of runs, which bound the possible coefficients of friction at the interface between the rack support pedestals and the bearing pads. All of the remaining runs, runs 4 through 9, are identical to run 1 with the following exceptions:

- Run number 4 considers increased rack to rack gaps (+0.5"). The gaps are modified in order to demonstrate the variation in results associated with the maximum acceptable rack to rack gaps.
- Run number 5 considers mixed fuel loading conditions as shown in Figure 2-15. The shaded boxes in Figure 2-15 represent the loading fraction and location where the assemblies were loaded in each rack; note, rack module B3 was modeled as empty for this run.
- Run number 6 considers decreasing the impact spring rates and rack beam stiffnesses by 20%.
- Run number 7 considers increasing the impact spring rates and rack beam stiffnesses by 20%. The purpose of run numbers 6 and 7 is to measure the sensitivity of the dynamic results to variations in the stiffness properties.

- Run number 8 considers a 50% reduction in the integration time step in order to verify that the solution is converged.
- Run number 9 considers the effects of the spent fuel racks being completely empty.

Figure 2-15 is added as follows:

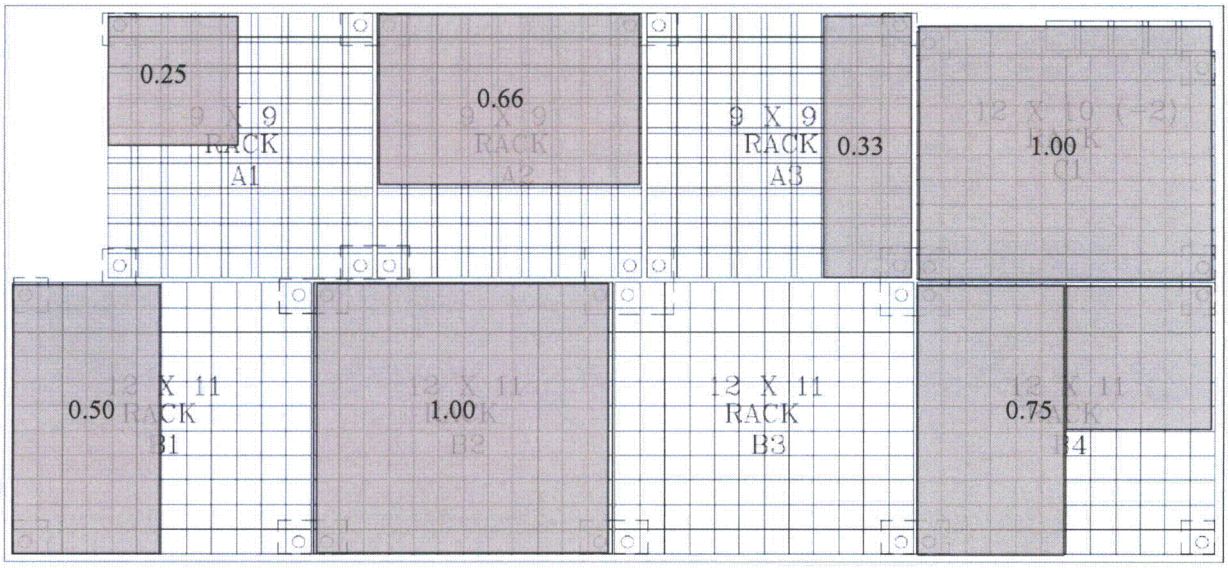

Figure 2-15: Loading Pattern for Run Number 5 - Mixed Loading Case

Table 2-10 is updated as follows:

Table 2-10 Time History Post-Processor Results

Location on Rack	Maximum Rack Displacement Relative to Floor (in)	Run Number
Base Plate	~~0.354~~ 2.73	~~1~~ 5
Top of Rack	~~1.486~~ 3.50	~~3~~ 7